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Editorial

Water as General Health Issue – Water for Present and Future

Report from the International Symposium held on March 22, 2012.

Dijana Avdić

Faculty of Health Studies, University of Sarajevo, Str. Bolnička 25, 71000 Sarajevo, Bosnia and Herzegovina.

Symposium organized by the Health and Environmental Studies Department titled "Water as General Health Issue – Water for Present and Future" provided knowledge and information about all aspects of water (drinkable and recreational) and types of water contamination, water resources conservation strategy on local and global level and relevant legal regulations. This effectively achieved the goal of the Symposium.

After Prof. Dijana Avdić, PhD, Dean of the School opened the Symposium and briefly discussed the World Water Day, keynote speakers and topics they covered included Prof. Fatima Jusupović, PhD - Importance of Water for Health and Features of Chemical Contamination; Prof. Suad Habeš, PhD – Microorganisms as Sanitation Indicators of Water Quality; Prof. Zarema Obradović, PhD – New Developments in Water Epidemiology; Arzija Pašalić, MSc – Use and Importance of HACCP System in Water Supply; Dario Brdarić, sanitary engineer – Features of Recreation Waters; Doc. Mehmed Cero, PhD - Water Management in the Region and Relevant Legislation.

Participants included representatives of public health agencies, hygiene and epidemiology services with community health care centers, inspections, educational institutions, utility companies, students, and representatives of the Federation of BiH Chamber of Sanitary Engineers. Sophomore, junior, and senior students of the Health and Environmental Studies Department also actively participated in the Symposium as they presented their very successful poster presentations and health education recommendations in the water sector.

After the formal part of the Symposium ended, participants were asked to fill out evaluation forms which were used to evaluate individual keynote speakers and organization of and the Symposiums in general. Average marks ranged 4.6 to 4.95 which is highly commendable.

In the evaluation form's Recommendations, Remarks, and Commendations field participants in general "highly commended organization and the Symposium itself," and indicated that it was "extremely informative and helpful in rising of awareness of water as one of the most important elements to ensure life on our planet."

The Sarajevo Faculty of health studies together with its Lifelong Learning Team will continue to pursue its lifelong learning goals and we wish to use this opportunity to invite you to work with us to that end.

Antioxidant potential of selected supplements *in vitro* and the problem of its extrapolation for *in vivo*

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Abstract

Introduction: antioxidants, free radicals and oxidative stress have been studied extensively for quite some time but their role in diseases and their prevention has not been clearly determined. Because commercial antioxidants do not need to pass clinical tests in order to be sold over the counter we have decided to test the antioxidant potential of different commercial preparations with the antioxidative properties.

Methods: pH, rH and oxidant-reduction potential of different preparations in aqueous solution was measured. Afterwards antioxidant potential using FormPlus® after adding the preparation to human blood as a more complex environment with different homeostasis mechanisms was determined.

Results: all the results showed expected change compared to the control but the results in aqueous solution did not match the results obtained from the human blood, as was expected.

Conclusion: from the experiments it can be concluded that while the preparations did show antioxidant activity, it is very difficult and even wrong to predict the antioxidant potential of an antioxidant preparation added to human blood, let alone in a living organism, based just on the results obtained in aqueous solution. Further possibilities for research include more extensive studies of antioxidant preparations in more complex environment and last but not least in test organisms or in human trials.

Keywords: antioxidants, oxidative stress, reactive oxygen species, food supplements

Introduction

Oxidative stress in a physiological setting can be defined as an excessive bioavailability of reactive oxygen species (ROS), which is the net result of an imbalance between production and destruction of ROS (with the latter being influenced by antioxidant defenses) (1). Oxidative stress is the direct consequence of an increased generation of free radicals and/or reduced physiological activity of antioxidant defenses against free radicals. The direct consequence of oxidative stress is damage to various intracellular constituents. In recent years oxidative stress has been implicated in a wide variety of degenerative processes, diseases and syndromes, including the following: mutagenesis, cell transformation and cancer; atherosclerosis, arteriosclerosis, heart attacks, strokes and ischaemia/reperfusion injury; chronic inflammatory diseases, such as rheumatoid arthritis, lupus erythematosus and psoriatic arthritis; acute inflammatory problems, such as wound healing; photo-oxidative stresses to the eye, such as cataract; central-nervous-system disorders, such as certain forms of familial amyotrophic lateral sclerosis, certain glutathione peroxidase-linked adolescent seizures, Parkinson's disease and Alzheimer's dementia; and a wide variety of age-related disorders, perhaps even including factors underlying the aging process itself (2). In order to understand oxidative stress, a brief introduction to the free radical formation and antioxidative defense will be presented. By definition, free radical is any chemical species which contains one or more unpaired electrons and can exist on its own (1). Eventhough that the reactions which free radicals are formed in seem simple *in-vitro*, the situation *in vivo* is much more complicated. In

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a living organism many chemical reactions happen at the same time, they intertwine and influence eachother, so grasping and researching the importance of free radicals in-vivo is quite difficult (3). It is not only obvious that free radicals are formed *in vivo* and that we cannot completely stop their formation but also that their chemichal features make them very reactive and unselective for the reactions they get involved in. Because radicals form in the presence of oxygen in aerobes we could generalize that when it comes to free radical chemistry oxygen is a harmful substance (4). Because of this fact humans and other aerobes have antioxidant mechanisms which help us minimise those effects. To protect against damage by ROS, all biological systems have evolved complex antioxidant systems composed of low molecular-weight compounds (such as glutathione and vitamin E) and enzymes, such as catalase, superoxide dismutase and glutathione peroxidase. Antioxidant is any substance which in concentrations smaller than that of a substrate slows down or prevents the oxidation of this substrate (1). Antioxidants can be endogenous or exogenous but in principle there is complex and cumulative effect when it comes to antioxidant protection and balance. Since endogenous antioxidant mechanisms cannot be deliberately increased researchers are focusing on the methods to increase the intake of exogenous antioxidants. Exogenous antioxidants, which are included in dietary supplements, also known as a food or nutritional supplements, are preparations intended to provide nutrients such as vitamins, minerals, fiber, fatty acids or amino acids that are either missing or not consumed in sufficient quantity in a person's diet. The idea that antioxidant supplements, such as Vitamin C, Vitamin E, lipoic acid and N-acetylcysteine, might extend human life stems from the free radical theory of aging (5, 6). Antioxidants are necessary for organisms living with a high $^3O_2$ concentration becaue they lessen the intensity and frequency of oxidative stress. Diet-derived antioxidants might be important agents in disease risk reduction, and might be beneficial for human health. When the balance between available antioxidants and the free radicals is ruined the organism comes in to a state of oxidative stress (1, 7). This might happen because of many reasons and might not even be noticed in the short term. Noticable problems in the organism arise when this state lasts for a while. Although the solution for oxidative stress seems obvious-just fix the ratio between the radicals formed and the antioxidants available-different studies have gained different results. Observational epidemiological studies provide the basis for relating the intake of vitamin E rich food to decreased incidence of risk of mortality due to cardiovascular diseases (8). However, the results from large-scale intervention studies on antioxidant supplements are inconclusive, reporting adverse, as well as beneficial, or no effects at all (9-20); e.g. daily supplementation with α-tocopherol (21, 22). Human intervention studies in which smoking male volunteers were exposed during 5-8 years to daily supplementation with vitamin E did not reveal any effect on the overall mortality of male smokers, but did show increased mortality resulting from hemorrhagic stroke (1, 23). On the other hand, impoverishment of the soil (resulting from the abnormal exploitation of the soil itself, acidic rains, increasing desertification, pollution, etc.), the often uncontrolled use of pesticides, the processes of refinement of vegetables, and the processes of transformation, storage and even the cooking of foods, can affect the antioxidant content of fruits and vegetables (24, 25). Besides, in most countries of the world the consumption of fruit and vegetables is below the minimal level of 400 g per day advised by WHO and FAO (26). The addition of different food supplements to the diet seems to be, besides consumption of fruit and vegetables for different reasons and especially in different clinical conditions, a need as well. Therefore, as a precaution, many nutritionists today suggest the indiscriminate use of antioxidants. However, the use of antioxidant supplements should be limited only to documented cases of oxidative stress and supplements should be safe and with proven health effects (27-29). The problem is that vitamin supplements do not have to pass all the tests that medicines do. While medicines need *in vitro* and *in vivo* studies, pre-clinical and many phases of clinical tests before they are approved for the use on people, vitamin supplements' activity and safety is not as vigorously tested so their effects and side-effects are easily questioned. Today consumers can find many products freely

accessible on the market claimed to posess antioxidative properties. The growing market of supplements and a less restrictive regulatory environment creates the potential for selling supplements with no in *vivo tests* done about their effectiveness and health effect. In the USA surveys show that more than half of the U.S. adult population uses food supplements. In 1996 alone, consumers spent more than $6.5 billion on dietary supplements. FDA or other similar institutions do not authorize or test dietary supplements since they are not intended to diagnose, cure, mitigate, treat, or prevent diseases. The manufacturer must just prove that new ingredient can reasonably be expected to be safe. In Slovenia "Pravilnik o prehranskih dopolnilih" defines food supplements as foods which are used to complement normal and diverse diet. The doses of substances in them must be expressed in percent of recommended daily allowance (%RDA). "Pravilnik o razvrstitvi vitaminskih in mineralnih izdelkov za peroralno uporabo, ki so v farmacevtskih oblikah, med zdravila - (Ur.l. RS, št. 83/2003; Ur.l. RS, št. 86/2008)." classifies certain food supplements as medicines. Those are substances which exceed the RDA or substances that are publicised as medicines (either for treatment or the prevention of the diseases). Besides these rules other conditions in terms of valid research are not included. Although the measurements and analyses of the food supplements in Slovenia have not been made there was a study conducted about the use of vitamin and mineral supplements in the Slovene population. The study of Poljšak et al., (30) showed that most of the people asked eat at least one meal of fruit or vegetables a day and that 72% of people think that adding the supplements is not necessary if one eats vegetables and fruit regularly. In contrast to this two thirds of people in the survey stated that they do use food supplements, half of them only in extreme cases (e.g. disease). Most commonly used supplements were A+C+E and multivitamins (30). More than half of them buy the products in the pharmacy. The most common reason for using the supplements is boosting the immune system. Number one source of information about the products is the media. A similar study, with similar outcome was performed also among Sarajevo inhabitants (31). Considering the formation of free radicals, the importance of antioxidant mechanisms, oxidative stress and the lack of testing of antioxidant supplements we have decided to research the effectiveness of the 4 synthetic and 2 natural products with antioxidant properties. First oxidation-reduction potential of all substances was measured to estimate the antioxidant »properties« of selected products *in vitro* in water solution by measuring pH and oxidation-reduction potential (ORP) of a substance. Then substances were injected in human blood, which is a far more complex environment. We expected that the added supplements will lower the concentration of free radicals in the blood and that the antioxidant potential will be higher compared to antioxidative potential measured as ORP in water solution and we proposed that all tested products will have a higher antioxidative potential in the samples compared to the control.

Methods

Preparation of solutions

The supplements we used were supplements containing vitamins A+C+E and selenium, only vitamin C, multivitamin supplement, Active H, coffee, green tea, water soluble Q10. All are available over the counter in pharmacies. The dillutions were prepared as follows:

Preparation of Active H, vitamin C, selen+ ACE, multivitamine supplement and Q10

We dissolved one tablette of either one of the supplements in 250 ml of distilled water. In this solution we measured pH and ORP. Afterwards we took away 5 ml and put it in a separate erlenmaier flask and added distilled water to 100 ml then we pipetted 10 µl from this mixture and added it to 0.2 ml of human blood.

Espresso coffee, green tea

250 ml of coffee or tea was made. We took away 5 ml and put it in a separate erlenmaier flask and added distilled water to 100 ml. Then we pipetted 10 µl from this mixture and added it to 0.2 ml of human blood. It is important to prepare each sample with blood right prior to measuring the potential, since different time of the interaction of supplement with blood might change the result due to the oxidation and coagulation of the blood.

We took 5 ml venous blood from a volunteer, and we put it in a test tube without any anticoagulants.

Measurement of ORP, pH and determination of rH

We measured the oxidation-reduction potential (ORP) and pH with the method precisely described in the article (32). These measurements were obtained in water solutions, not blood samples. Briefly, for the measurement of oxidation-reduction potential (ORP) and pH levels the simultaneous use of three instruments was performed: namely Inolab WTW pH meter, HACH Sension pH meter, HACH Sension ORP meter and Greisinger electronic ORP meter. All measurements were performed in 250 ml cup, previously mixed, at room temperature 25^{0}C. The final measured levels of pH and ORP were read in mV. The criterion for the reaction capability of a compound are oxidization/reduction potentials in mV. Reduction potential (also known as redox potential, oxidation/reduction potential or ORP) is the tendency of a chemical species to acquire electrons and thereby be reduced. Each species has its own intrinsic reduction potential; the more positive the potential, the greater the species' affinity for electrons and tendency to be reduced. pH of the solution is the criterion of concentration of free positive hydrogen ions in the solution. The use of rH gives a hydrogen proton-unbiased look at the absolute reducing potential of a compound, eliminating the effect of pH in the ORP measurement. It is a true indication of a compounds reduction potential capacity. The shifts in rH can be used to quantify the reducing ability and energy reserves of the compound. The rH level is the criterion for the state of reduction or oxidation in which is the compound, it is also the indicator of the probability that the compound will react with the free radical. The direct use of pH and reduction potential measurements (ORP) gives an indication of the probability of a compound to act as an antioxidant (33, 34). pH is the logarithm (base ten) of the molar concentration of hydrogen ions in a solution and it tells us whether the solution is acidic or basic. Redox potential depends also on the pH of the solution. ORP and pH can be used to calculate rH which uses both variables together to predict the likelyhood of the substance reacting with the free radical therefore acting as an antioxidant. Lower rH means that the substance is rich in hydrogen, while high values mean it contains more oxygen. rH of biological liquids should contain more hydrogen than oxygen quantitatively put rH should be below 28 (33, 34).

Nernst equation and rH

Because of the interaction of protons at the changes of pH oxidation-reduction potential may be biased by the pH and vice versa. For this reason the variation of Nernst equation (Equation [1]) was used, which is an effective way for measuring the reductive potential of a compound, which is given by the level of rH. This is the logarithmic value and is the criterion for absolute reductive potential.

$$E_h = 1.23 - \frac{RT}{F} pH - \frac{RT}{4F} \ln \frac{1}{P_0} \qquad [1]$$

E_h in the equation is the measured reductive potential (mV), F is the Faraday constant (the charge per a mole of electrons), equal to $9.6485309 \bullet 10^4$ C mol^{-1}, R is the universal gas constant, equal to 8.314510 $J \bullet K^{-1} \bullet mol^{-1}$ and T is the temperature in Kelvin. (Kelvin = 273.15 °C). The value 1.23 in the equation is the potential of oxygen at one atmosphere (101.235 kPa) 1.23 V higher than in the compound at the same pH. The level of rH is explicitly defined as the negative logarithm of oxygen pressure, P_o (equation [2]).

$$\mathrm{rH} = \log P_0 \qquad [2]$$

rH is the "absolute indicator of the reductive potential" of a substance (33-35). It shows then concentration of active hydrogen ions, rH can be determined indirectly with the determination of ORP and pH. The formula for its reckon was already discovered in 1923 by Clark (35) (remodelled Nernsto's equation), but only in later years it is gaining full value at studying processes in living beings. Basically it is a complicated logarithmic formula, but in practice (for measurements at 25 degrees Celsius) a simplified formula is used (equation [3]):

$$\mathrm{rH} = \frac{(ORP + 204)}{30} + 2 \cdot \mathrm{pH} \qquad [3]$$

Determination of total antioxidant capacity and the amount of free radiclas in human blood

The apparatus used for measuring the total antioxidant capacity and the amount of free radicals is called FORMplus® version 1.0. manufactured by Callegari. The two tests used for determination of oxidative stress in human blood were FORD (free oxygen radicals defence) and FORT (free oxygen radicals testing). The principle of FORD test is the use of free radicals which are formed from the reagents before adding of the blood sample and the change of the absorbance of light passing through the sample. This absorbance is proportional to the concentration of antioxidants in the added blood sample. In the presence of an acid buffer (pH=5.2) and an oxidant (FeCl3) the chromogen (amine derivative) forms a stable coloured compound (cation), which the machine detects at 505 nm wavelength. Antioxidant compounds (AOH) reduce the cation which causes discoloration of the solution. FORD test results of antioxidant concentration in the sample are given in the equivalent concentration of trolox, which is a water soluble vitamin E. FORT test principle is based on the fact that transition metals such as iron can catalyse the formation of free radicals in the presence of hydroperoxides. These free radicals are then trapped by an amine derivative which changes colour and is detectable at 505 nm. The intensity of the colour correlates directly to the amount of radicals in the solution. The results are given in the concentration of hydrogen peroxide. Because the apparatus measures the variables only in certain ranges, the supplements must be appropriately diluted in order to satisfy the ranges. Since the measuring FORD and FORT of the blood together with the antioxidant is not the standard procedure for using this apparatus, we had to design an experiment which would give results in the range of the machine. This means diluting the antioxidant preparations to certain concentrations. It should be noted that this depends on the amount of free radicals and antioxidant potential of the blood alone and that the dilution has to be adapted for each sample of blood.

Results

pH and ORP were measured in an aqueous solution, rH was calculated from pH and ORP using the formula described in methods. Table 1 shows the pH of the solutions of antioxidant supplements, coffee and green tea. pH is the logarithm (base ten) of the molar concentration of hydrogen ions in a solution and it tells us whether the solution is acidic or basic. It is evident that pure vitamin C has the lowest pH. Except for the active H solution which also has the highest pH from the samples, all other solutions are acidic. Reduction potential (also known as redox potential, oxidation/reduction potential or ORP) is the tendency of a chemical species to acquire electrons and thereby be reduced. Each species has its own intrinsic reduction potential; the more positive the potential, the greater the species' affinity for electrons and tendency to be reduced. The lowest ORP (oxidation-reduction potential) was measured in active H being very negative, the highest in pure vitamin C. Except fot Active H all other values are positive. The use of rH gives a hydrogen proton-unbiased look at the absolute reducing potential of a compound, eliminating the effect of pH in the ORP measurement. It is a true indication of a compounds reduction potential capacity. The shifts in rH can be used to quantify the reducing ability and energy reserves of the compound. The rH level is the criterion for the state of reduction or oxidation in which is the compound, it is also the indicator of the probability that the compound will react with the free radical. All values of rH are between 14 and 20. Again the lowest rH value was obtained in active H solution and selenium+ ACE, the highest in the multivitamin and vitamin C samples. Lower rH values mean that the supplement should have the highest antioxidant potential in vitro. From this result it

TABLE 1. Determination of pH, rH, ORP of selected solutions with antioxidant properties

	pH	ORP	rH
coffee	5.11	-15.5	16.98
Q10	3.70	39	16.50
Green tea	5.77	31.9	15.50
Vit c	4.22	-8.5	19.40
Ace + selenium	3.89	98.9	14.95
Multivitamin	3.72	6.2	17.89
Active H	7.66	-763. 5	14.45
Pure vitamin C (60mg)	2. 80	141	17.10

TABLE 2. FORD and FORT tests

	FORD** (mmol/Ltrolox)	FORT** (mmol/L H_2O_2)
Control sample	1.26	4.04
Vit c	1.53*	2.26
Multivitamin	1.44*	2.19
Q10	1.24*	2.87*
Selen + ACE	1.54*	2.53*
Green tea	1.62	3.52
Coffee	1.62	3.08
Active H	1.56	3.15

*result after diluting the original sample 10 times
** standard deviation of parallel samples was less than 5%

could be concluded that Active, A+C+E+selenium and green tea have ten times or even higher "antioxidant" potential than other compounds tested and this could offer greatest protection against free radical damage if used as supplements. All the samples in FORD test (measurement of total antioxidant potential) had higher result than the control sample, which means that the antioxidant potential of all tested substances was higher when adding it to the blood sample. The lowest potential was measured in active H. Vitamin C, multivitamin, Q10 and selenium+ACE preparations had to be additionally diluted so that the result could be obtained. This means that they had the highest antioxidant potential when added to the sample of blood, selenium+ ACE having the highest result among all samples. It should be noted that multivitamin and Q10 also contained 60 mg of vitamin C. This means that the highest results could be attributed to the presence of vitamin C, since all other antioxidants (e.g. vitamin E, beta carotene) are lipid soluble and therefore work when contained in a biologically active membrane. All the samples had lower result than control sample in FORT test, which means that adding the supplements to the blood sample, causes less H2O2 to remain or to be formed in the blood. This means that compounds tested did not form extra H2O2 which would indicate their prooxidative properties. Q10 and selenium + ACE had to be additionally diluted because original concentrations lowered the presence of H2O2 to the amounts undetectable by the spectrometer. After dilution the lowest concentrations of peroxide remained in the sample containing Q10. When comparing the results of pH, ORP and rH measured in aqueous solution of the supplements and the results obtained with FORD and FORT tests measured in blood, different values were observed. Blood is a more complex mixture and thus more important when extrapolating data for in vivo. We can see that predicting the most efficient antioxidant just by using values obtained in the aqueous solution is not only oversimplified but can also give different or even misleading results. While selenium + ACE had very promising results in rH values and also FORD and FORT tests, the Active H preparation promises the most with the rH value, but has poor functioning and results when added to the blood and measured with FORD and FORT tests.

Discussion

Antioxidant potential was higher compared to the control in all the preparations of blood containing added antioxidant, some of them had to be diluted to lower concentrations of antioxidant in order to get measurable results. These could be noted as the most effective antioxidants among the compounds tested. The most promising was selenium + ACE. The presence of free radicals in the blood was lowered by all antioxidants used and some solutions had to be additionally diluted. The preparation that scavenged the most free radicals was Q10, which also contains vitamin C. Comparing the results of pH, ORP and rH measured in aqueous solution of the supplements which predicted antioxidant potential in a water solution and the results obtained with FORD and FORT tests measured in blood we can see that predicting the most efficient antioxidant just by using values obtained in the aqueous solution is not only simplified but can also give different or even misleading results. The results predicted that Active H was the most powerful antioxidant with the lowest rH value. The Active H preparation promises the most with the rH value, but has poor functioning and results when added to the blood and measured with FORD and FORT tests on the other hand selenium + ACE supplement predicted good antioxidative properties when estimating rH value which were confirmed also with FORD and FORT tests. However Q10 supplement has a higher rH value but was quite efficient in FORD and FORT tests.

The main limitation of the study is that the absorption, metabolism, volume of distribution and excretion of the supplements were not considered since the antioxidants were added directly to the blood.. For this reason there is discrepancy between *in vitro* and *in vivo tests*. Besides it should be stressed that the results of epidemiological studies in which people were treated with synthetic antioxidants are inconclusive and contradictory, providing findings that prove either a beneficial effect, no effect, or a harmful effect of the synthetic antioxidant supplements. None of the major clinical studies using mortality or morbidity as an end point has found positive effects of supplementation with antioxidants such as vitamin C, vitamin E or β-carotene (9-13, 16). A simple experiment was performed to test wheter selected supplements on Slovenian market really posess antioxidative properties (determination of redox potential) and whether their antioxidative properties differ in water solution as well as in human blood (more complex matrix). The results from FORD and FORT tests show that there is a sinergistic effect between blood and added supplements, but as said, this sinergism is very complex and mechanisms unknown.

Conclusion

The testing of antioxidant potential of the patient's blood using FORD and FORT tests would be useful for everyday doctor's practice, since many diseases are the cause or consequence of oxidative stress and the tests are quite simple and quick to do. For example people with diabetes, rheumatoid arthritis, heart stroke and cancer could routinely be tested and different measures could be taken to lessen the oxidative stress besides of course controlling the basic disease as a priority. Future studies should be conducted *in vivo* but one should be aware of the important fact and the main difficulty which is that eventhough exogenous influences for the production of free radicals and intake of antioxiant supplements can be strictly controlled there are still many more endogenous proccesses which differ between individuals and are difficult, if not impossibe, to control for the purposes of designing the optimal *in vivo* experiment. Only well prepared and conducted clinical studies on human volounteers could reveal the true importance of food supplements with antioxidative properties on public health.

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Competing interests

The authors declare that they have no financial and personal relationships with other people or organizations that could inappropriately influence this work.

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Evaluation of high sensitivity C-reactive protein assay in cerebrospinal fluid on the Dimension RxL analyzer

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Abstract

Introduction: Low sensitivity and specificity in traditional laboratory tests became insufficient for accurate diagnostics and initiation of proper treatment of patients infected with bacterial meningitis. High sensitivity C-reactive protein (hsCRP) may be an appropriate supplement for rapid diagnosis of bacterial meningitis. The subject of our investigation was the determination of C- reactive protein in cerebrospinal fluid (CSF) during acute bacterial meningitis.

Methods: HsCRP was analysed by a sensitive immunoturbidimetric assay using the Dimension RxL analyser (Siemens). Cerebrospinal fluid concentrations of C-reactive protein have been measured in 20 patients (age range,1 to 50 years) presenting with acute bacterial meningitis and also in a non-infected, non-inflamed control group (n=25).

Results: The accuracy and precision of the method proved to be satisfactory. Repeatability of serial sampling for hsCRP described by coefficient of variation were CV=2.1-4.5%. This assay hsCRP in cerebrospinal fluid demonstrates adequate performance characteristics for routine clinical use. Elevated levels of CRP were found in 95% patients with bacterial meningitis. The mean CRP value in 25 uninfected control group was 0.25 mg/L (range 0.10-0.55). The mean CRP for patients with bacterial meningitis was 21.4 mg/L (range 0.40-100).

Conclusions: A sensitive assay for CRP in CSF would be an useful adjunct to conventional investigation of acute infective meningitis.

Keywords: High sensitivity C-reactive protein, cerebrospinal fluid, bacterial meningitis

Introduction

OC-reactive protein (CRP) is the acute phase protein, historically one of first to be recognised. Intraindividual variation is a major limitation of the assay when the assay is used for directing therapies. Intraindividual variations of the CRP levels are from 30% to 60% (1). Serial measurement maybe required to estimate true mean of CRP depending on the intended application in any specific individual. CRP seems to increase as a result of the inflammatory process, most notably in response to pneumococcal (bacterial) infection, histolytic disease, and a variety of other disease states (2). CRP is composed of five identical, non-glycosylated, subunits each comprised of single polypeptide chain of 206 amino acid residues with a molecular mass of 23.017 daltons. This characteristic structure places CRP in the family of petraxins-calcium binding proteins with immune defence properties found in all vertebrates and most invertebrates (3). CRP is synthesized in the liver as a result of induction by the interleukin-6 family of cytokines. At the peak of an acute phase response as much as 20 % of the liver protein synthetics maybe directed towards this process. Extra-hepatic synthesis makes no contribution to the serum levels. The normal synthetic rate is 1-10 mg/day, increasing to more than 1 gram/day in acute inflammation (4). The functions of CRP include the detection, clearing and elimination of apoptotic tissue cells and their products such as DNA, which can be toxic or allergenic. At the same time, CRP acts as a non-adaptive defense mechanism by opsonizing microorganisms for phagocytosis. CRP bind-

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ing occurs only during targeting of affected cells when the normal structure of the lipid dual layer has been disrupted, leading to exposure of internal phospholipids of the cell membrane (5). Many disorders of the central nervous system (CNS) are accompanied by increased CRP concentration in the cerebrospinal fluid (CSF) (6). Examination of CSF specific proteins used mainly to detect increased permeability of the blood-brain barrier. Several disorders of the CNS such as bacterial meningitis, multiple sclerosis and other CNS inflammatory diseases are associated with an increase in CRP concentration in CFS (7). Patients with symptoms of meningitis usually undergo lumbar puncture and in most cases of bacterial infections this provides a typical image. However in the selected group with negative microscopic evidence of infection the CSF-CRP is a useful diagnostic adjunct (8). Several studies in adults and children of all ages show that an increased CRP level is highly suggestive of a bacterial etiology (9). The subject of our investigation was the determination of C- reactive protein in cerebrospinal fluid (CSF) during acute bacterial meningitis.

Methods

Twenty patients in the age group of 1 to 50 years with clinical diagnosis of bacterial meningitis were, included in the study. The control group included 25 non-infected subjects. A sample of cerebrospinal fluid is collected during a procedure called lumbar puncture. All specimens for investigations were collected before introduction of antibiotics. HsCRP was analyzed in unconcentrated CSF by a sensitive immunoturbidimetric assay using the Dimension RxL analyzer (Siemens) with calibrators and internal controls provided by Simens and according to manufacturer's recommendations. This is a latex immunoassay developed to accurately and reproducibly measure hs CRP. When an antigen-antibody reaction occurs between CRP in a sample and anti-CRP antibody, which has been adsorbed to latex particles, agglutination occurs. This agglutination is detected as an absorbance change(572 nm), with the rate of change being proportional to the quantity of hs CRP in the sample. The procedure of the Siemens assay accuracy evaluation included duplicate calibrators determining as samples (Calibrators levels 0, 5, 10, 20, 40 mg/L),while the accuracy of the method was calculated by linear and regression analyses. Three quality control materials were used for quality control. Precision was calculated by measuring quality control materials in 20 duplicate with a single analytical run. Statistical analyses were performed using Microsoft Office Excel program package 2003, for the function of arithmetic mean and standard deviation. The correlation was analyzed by linear regression test. Values of $p < 0.05$ were considered as statistically significant.

Results

The results of the hsCRP assay in cerebrospinal fluid assay precision analyses are showed in table 1.

TABLE 1. Precision of hsCRP

Sample	Sample value (n)	Mean value (mg/L)	Sd (mg/L)	CV (%)
Control 1	20	0.46	0.02	4.3
Control 2	20	4.9	0.13	2.6
Control 3	20	11.3	0.24	2.1

The coefficients of variation (CV%) values of the precision were 2.1-4.3 %. The results variation was greater at lower concentrations. The hsCRP assay accuracy results were presented in table 2.

TABLE 2. Accuracy of hsCRP assay on Dimension RxL

Calibrators (mg/L)	0	5.0	10.0	20.0	40.0
Measured values* (mg/L)	0.1	4.9	9.8	19.7	38.2

*Mean of two measurements of calibrators as sample.

The statistically significant correlation between labeled and measured hsCRP values was obtained ($r=0.99$; $p<0.001$), presented by the following equation: $y=0.98 x + 0.23$ were y represented the measured hsCRP levels, and x labeled hsCRP levels. An intercept (0.23) presented the systemic error of the method, which was not statistically significant ($p>0.05$) and slope (0.97) was a percentage deviation of -3% (100% - 97% = 3%) and was non-significant ($p>0.05$)..

TABLE 3. Values of the hsCRP in patients with acute infectious meningitis

Examines	N	Minimum value (mg/L)	Maximum value (mg/L)	Mean value (mg/L)
Patients with clinical diagnosis of meningitis	20	0.40	100.0	21.4
Control group	25	0.10	0.55	0.25

We determined the minimum, maximum and mean value(s) hsCRP in cerebrospinal fluid and the results are showed in table 3.
Comparasion data for the group patients with bacterial meningitis (BM) and control subjects are presented in Figure 1.

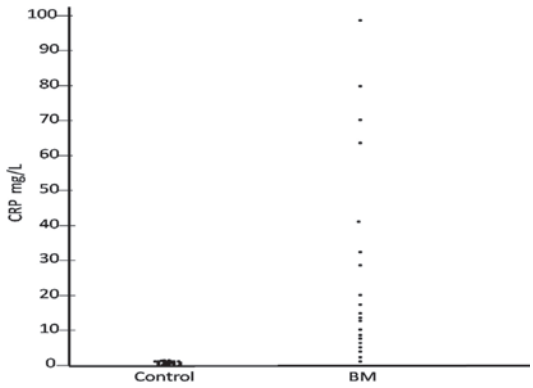

FIGURE 1. CRP distribution in the examined groups

The mean CRP value in 25 uninfected control group was 0.25 mg/L (range 0.10-0.55). The mean CRP for patients with bacterial meningitis was 21.4 mg/L (range 0.40-100). Elevated levels of hsCRP were found in 95 % patients with bacterial meningitis.

Discussion

Biochemical markers for diseases of central nervous system are glucose, lactate, total proteins and C-reactive protein. CRP is an acute phase reactant synthesized by the liver upon stimulation by pro-inflammatory cytokines reflecting both the acute and chronic inflammatory states (10). Acute phase reactant changes reflect the presence and intensity of inflammation, and have been used as a clinical guide to diagnosis and therapeutic management. CRP has many pathophysiologic roles in the inflammatory process (11). A major function of CRP is its ability to bind phosphocholine and thus recognize some foreign pathogens as well as phospholipid constituents of damaged cells. In bacterial meningitis the changes in CRP concentrations are not induced by living bacteria and leukocytes. The anaerobic brain metabolism contributes to the development of increased CSF- CRP concentrations. The cytokinine-endothelium-leukocyte interaction is maybe responsible for the disruption of the blood-brain barrier by opening intercellular junctions and permitting the passage of C-reactive proteins into the subarachnoidal space (12). CSF-CRP has been reported to be one of the most reliable and early indices to differentiate bacterial from non-bacterial meningitis. It is also useful in monitoring the clinical course of the meningitis (13,14). The analysis of CSF-CRP by latex agglutination is rapid and easy to perform. The limit of quantification for hs CRP assay is 0.1 mg/L, which is acceptable for routine clinical use. The CV for the imprecision in this assay is not greater than 5 % at the lowest measurable concentration. The obtained CV% values for precision were 2.1 - 4.3. The hsCRP assay in cerebrospinal fluid showed good accuracy. The obtained CV% values was in accordance with the manufactures recommendation. Linearity was confirmed with calibration curve in 5 points in concentration range from 0 to 40 mg/L. The CSF hsCRP concentration was significantly increased in patients with disease. During our investigation it was noticed that the minimum concentration for hsCRP in patients with clinical diagnosis of bacterial meningitis was 0.40 mg/L. Maximum concentrations of 100 mg/L and mean values of 21.4 mg/L was established during the study. The mean CRP value in 25 uninfected control group was 0.25 mg/L (range 0.10-0.55). In the present study, CSF-hsCRP was positive in 19 of 20 cases of bacterial meningitis giving it a sensitivity rate of 95 %.

Conclusion

The hs CRP assay on the Dimensin RxL analyser demonstrates adequate performance characteristics for routine clinical use. The elevated hs CRP concentration of CSF during bacterial meningitis is caused by an increased permeability of the

blood-brain barrier. The sensitivity determination of hs CRP in cerebrospinal fluid is 95% in case of infective bacterial meningitis. It is concluded that C-reactive protein in CSF is a useful additional test for diagnosis of bacterial meningitis.

Competing interests

Authors have no conflict of interest to report.

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The impact of metabolic risk management on recurrence of urinary stones

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Abstract

Introduction: Urinary stone disease is a common urologic problem and recurrence in stone formation is a very familiar issue to urologists. Although recurrence in stone formation has been linked to metabolic abnormalities, it can be accessible by metabolic risk analysis studies.

Methods: Herein, we present our experience in metabolic risk management on recurrence of urinary stones for 10 years in Akdeniz University School of Medicine department of Urology. We retrospectively analyzed Akdeniz University Urinary Stone Database between dates of January 2000 and December 2010. We found over 3500 patients who were managed by SWL (shock wave lithotripsy) or PCNL (percutaneus nephrolithotripsy) or URS (Ureterorenoscopic lithotripsy) or open surgery.

Results: 525 patients' metabolic risk analysis was ordered due to recurrent urinary stone disease. Only 134 (25.5 %) current metabolic analysis were returned. Mean patient age was 32.2 years (range: 19-82 years). Patients were 103 male and 31 female. Stone analysis results were CaOx monohydrate in 48 (35.8 %), CaOx dihydrate in 8 (5.9 %), CaOx mono and dihydrate in 70 (52.2 %), uric acid in 3, CaOx monohydrate and uric acid in 2, cystine in 2, and struvite in 1 patient, respectively. The metabolic risk analysis showed some abnormality in 54 (40.2 %) patients.

Conclusion: Although compliance to metabolic risk analysis studies is low among recurrent urinary stone formers, some significant metabolic abnormalities could be detected in those who are effectively screened. Recurrence of urinary stones in patients who are started on appropriate metabolic management can be prevented.

Keywords: Metabolic analysis, PCNL, Stone management, SWL, URS.

Introduction

Urinary stone disease is a common urologic problem and recurrence in stone formation is a very familiar issue to urologists. Distinct genetic, congenital, metabolic, and nutritional mechanisms have been found to underlie this common disorder and account for the wide variation in the geographical prevalence and stone patterns in different populations (1). Epidemiologically, urinary stone disease is more common in males (male/female = 3/1), hot climatic zone, fair-skinned people,, people with metabolic disorders (primary hypocitraturia, primary hyperoxaluria, cystinuria, xantinuria), dietary habits (nutrition of mainly protein, carbonhydrate or oxalate) (2, 3). 15 % of the population will develop urinary stone disease over life time (4). Daily life in a western affluent society provides a bundle of factors which impair urine composition and thereby increase the stone formation risk: generally people do not drink enough and only twice or thrice a day, they eat food that is too rich in calories and table salt, but have deficiencies in fiber and alkali. Despite the highly developed health care systems in the western world, the stone disease itself seems to be an unresolved issue (5). Diagnostic tools (especially the high availability of ultrasound and computerized tomography-scans in routine practice) allow today the diagnosis of clinically dumb urinary calculi. Although, it is important to diagnose and treat urinary stone disease, prevention of recurrence is very important (6). Metabolic evaluations have allowed the identification of physiological or environmental causes of urinary cal-

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culi in more than 97 % of patients (7). Although recurrence in stone formation has been linked to metabolic abnormalities which can be accessible by metabolic risk analysis studies, only few data is present proving the management of metabolic risks may effectively decrease the recurrence. In this retrospective study, we analyzed our 10-year urinary stone database to search the effect of metabolic management of risk factors detected by risk analysis studies on recurrent stone formers.

Methods

Patients

We retrospectively analyzed Akdeniz University Urinary Stone Database between dates of January 2000 and December 2010. We found over 3500 patients who were managed by SWL (shock wave lithotripsy) or PCNL (percutaneous nephrolithotomy) or URS (Ureterorenoscopic lithotripsy) or open surgery. All patients were recorded according to their age, sex, previous urinary stone disease, previous and current stone analysis, previous and current metabolic analysis, previous and current metabolic management, current stone burden, current stone location, modality of intervention, results of intervention and current stone status on the last visit date.

Management of urinary stones

We have been using "Siemens lithostar" for SWL (stones in kidney, ureter or bladder) standard PCNL techniques (for kidney stones), semirigid or flexible ureterorenoscopy (for stones in ureter and kidney), and classic open surgery procedures in urinary stones (pyelolithotomy, nephrolithotomy, uretherolithotomy, open surgical procedures for bladder stones) (8-10). We used pneumatic lithotripter or ND – YAG laser for endoscopic procedures.

Urine and metabolic analysis

Subjects were given an order for a metabolic stone evaluation to be performed at home. Two 24-hour urine collections were collected at home and brought to our central laboratory. The evaluation included standard urinary indexes, such as volume, level of creatinine, magnesium, phosphate, albumin, calcium, oxalate, citrate, uric acid and pH, as well as urinary calcium oxalate, calciumphosphate and uric acid supersaturation. Urine chemistry studies, such as calcium, citrate, uric acid and oxalate, were adjusted for urine creatinine. Urine pH, calcium oxalate, calciumphosphate and uric acid supersaturation were assessed but did not require correction using creatinine excretion. As well as urinary analysis, blood analysis was performed to urinary stone disease patients. We analyzed levels of sodium, calcium, potassium, parathormone, albumin, magnesium, phosphate, creatinine, and blood urea nitrogen in the blood.

Stone analysis

We gave a urinary stone analysis form of MTA (Maden tetkik arama enstitüsü – govermental mineral etude institute) to all urinary stone disease patients after they reduced urinary stone or after PCNL or URS operation. Patients have posted MTA form and as least 3 cm^3 stone burden to MTA research laboratory. Urinary stones analyzed with electrospectracally (X-ray defraction methods) in MTA, according to its quality and quantity.

Statistical analysis

Descriptive statistical methods were used.

Results

525 patients' metabolic risk analysis was ordered due to recurrent urinary stone disease. Only 134 (25.5 %) current metabolic analysis were returned. Mean patient age was 32.2 years (range: 19-82 years). Patients were 103 male and 31 female. PCNL procedure was used for 92 (68 %) patients, URS was used for 7 patients (6 %), and SWL was used for 35 patients (26 %). Stone analysis results were CaOx monohydrate in 48 (35.8 %), CaOx dihydrate in 8 (5.9 %), CaOx mono and dihydrate in 70 (52.2 %), uric acid in 3, CaOx monohydrate and uric acid in 2, cystine in 2, and struvite in 1 patient, respectively. The metabolic risk analysis showed some abnormality in 54 (40.2 %) patients. The most common abnormality was hypocitraturia in 31 (57.4 %) patients. The second and third most common abnormalities were hyperoxaluria in 21 (38.8 %) and hypercalciuria in 19 (35.1 %) patients, respectively (Table 1). No primary hyperoxaluria was noted. In 2 hypercalciuric patients primary hyperparathyroidism was found and referred to adenoma removal. In other 2 hypercalci-

TABLE 1. Patient and stone disturbition.

	Hypocitraturia	Hyperoxaluria	Hypercalciuria	Hypocitraturia and hyperoxaluria	Hypercalciuria and hyperoxaluria	Hypocitraturia and hypercalciuria	Hypocitraturia and hyperuricosuria	Hypercalciuria and hyperuricosuria	Hypocitraturia and hypomagnesiuria	Hypocitraturia and hyperphosphatemia
Patient number: 54	16	8	7	7	6	4	2	2	1	1
Patient numbers of recurrent urinary stones Patient number: 6		1	3	1			1			

uric cases renal type hypercalciuria was found and started on thiazide diuretics. Patients were started on metabolic management by urinary alkalization, citrate replacement, Vit B6 replacement, allopurinol and dietary restrictions accordingly. All patients were followed up for a mean of 16 months (range: 2-9 years) with renal ultrasound and KUB (Kidney ureter and bladder x-ray). In 8 (5.9 %) patients, stone recurrence was detected. Recurrent stone formers demonstrated stone types as CaOx monohydrate in 5, cystine in 1, uric acid in 1, CaOx dihydrate and uric acid in 1 patient, respectively. Their metabolic abnormalities were hypercalciuria in 3 (1 rejected parathyroid adenoma removal and 1 stopped thiazides), hyperoxaluria in 1, hypocitraturia and hyperoxaluria in 1, and hyperuricosuria in 1 (stopped allopurinol treatment) patient, respectively (Table 1). Remaining one recurrence was in a cystinuric case while the other recurrence showed no metabolic abnormality.

Discussion

The diverse manifestations of urolithiasis provide a very interesting epidemiological study from the standpoints of geography, socioeconomic status, nutrition and culture, which ultimately affect the stone structure and composition (11). The past 100 years have produced revolutionary changes in the anatomical and clinical pathology of stone disease in the whole World (12). Improved technology has revolutionized the management of stones: the advent of SWL, fiber-optic, semi-rigid and flexible ureteroscopes, and narrow-caliber endoscopes, and minimally invasive options in addition to prevailing open surgical procedures have expanded. The basic idea is to select the best possible modality to make the treatment better controlled. Additionally, to keep in mind the morbidity and cost-effectiveness of the procedure in today's context. After treatment of urinary stone, it is very important to inform patients about the recurrence of urinary stones. Medical treatment, metaflaxi and modifications in dietary habits can help to prevent recurrence of urinary stones. Medical treatment should be based on assessing 24h urinary metabolic abnormalities (13). Drug treatment is advised after a high fluid intake (>3 L/day). Dietary modifications in the long term fail to correct abnormalities or prevent recurrence. Available trials offer urologists excellent treatment strategies for prevention of calcium stones. Since uric acid stones are a consequence of low urine pH, urologists can treat them confidently despite the lack of prospective trials for additional therapeutics. Although with imperfect treatment, the cystine stones could also be prevented. Although potassium citrate salts are effective along with ESWL, they may promote the formation of calcium phosphate stones, the prevalence of which continues to rise with time. Abnormal urine pH and calcium excretion rate are predominant findings that play a major role in the pathogenesis of stone formation (14). Recent evidence strongly supports the concept that dietary calcium restriction does not protect against calcium stone formation and that a reduced calcium diet is detrimental, leading to bone loss, in hypercalciurias other than absorptive type I (15). In fact, it appears that urinary calcium excretion in most renal stone formers is more dependent on the dietary acid load than on the dietary calcium intake itself (16). The excess acid load in a diet rich in animal protein is mainly buffered by the bone, leading to calcium resorption and consequently to hypercalciuria (17). Conversely, decreasing the

acid load either by dietary modifications or alkali therapy has an impact on decreasing stone recurrence, while preventing bone loss. New evidence associates the decolonization of oxalate degrading intestinal flora with a higher risk of calcium oxalate stone formation, possibly opening the door for biological manipulation as a novel approach for the prevention of urinary stone formation. We must not leave the stones unturned. Roughly 25 % of the stone formers belong to the high risk group and definitively need specific measures to prevent frequent stone recurrences. Patients forming "civilization stones" or suffering from the metabolic syndrome, respectively, benefit from the recommended measures of metaphylaxis in a multifold way. As far as children are concerned, keep in mind that most of the stones formed in childhood have a metabolic basis and hence, early diagnosis is mandatory for the purpose of adequate treatment (18). It is the best to treat the "cause" of disease instead of removing its "symptom".

Conclusion

Although compliance to metabolic risk analysis studies is low among recurrent urinary stone formers, some significant metabolic abnormalities could be detected in those who are effectively screened. Recurrence of urinary stones in patients who are started on appropriate metabolic management can be prevented. Patients should be warned about the close relationship between metabolic risk screening and compliance to management and urinary stone recurrence.

Competing interests

The author declares that there are no financial and personal relationships with other people or organizations that could inappropriately influence this work.

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Importance of clinical examination in diagnostics of Osgood-Schlatter Disease in boys playing soccer or basketball

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Abstract

Introduction: Osgood–Schlatter disease is an irritation of the patellar tendon at the tibial tubercle. Sports with jumps, running, and repeated contractions of knee extension apparatus are considered to be important external risk-factors which could cause Osgood–Schlatter disease.

Objectives of the study are to draw attention to the importance of clinical examination in diagnostics of Osgood–Schlatter disease in boys playing soccer or basketball.

Methods: The research included data obtained from 120 boys, average age of 14 years. Examinees were split into two groups, one with young athletes which regularly have soccer or basketball trainings and the second one with boys who do not participating in sports. We performed anthropological measurements and clinical examinations of both knees and hips for both groups. For the statistical analysis we used point-biserial correlation coefficient.

Results: Based on clinical examination, Osgood–Schlatter disease was diagnosed in 51 examinees (42.5%). In "athletic group" Osgood–Schlatter disease had 31 boys or 52%, comparing with "non-athletic group" where we found 20 adolescents with disease (33%). Number of boys with Osgood–Schlatter disease was higher for 19% in "athletic group" comparing with "non-athletic group". Comparing incidence rate for boys in both groups with diagnosed II and III level of Osgood–Schlatter disease we found that rate is higher in "athletic group" 2.25 times comparing with "non-athletic group".

Conclusions: Clinical examination is critical method in the process of diagnosing Osgood–Schlatter disease especially for identifying II and III level of this disease.

Keywords: Osgood–Schlatter disease, growth-zone, overload-syndrome

Introduction

Osgood–Schlatter disease (OSD) is the one of the most common causes of pain in anterior part of knee in young athletes participating in sport activities with a lot of running, jumping and shooting. In spite of commonly used term disease, it is in fact benign, self-limiting, inflammation process of growing apophysis. In sports medicine OSD is of special importance since it limits sports activities of children in adolescent age (1, 2).

Osgood–Schlatter disease or syndrome is an irritation of the patellar tendon at the tibial tubercle. Clinically, the main attribute of the disease is painful and enlarged tibial tubercle. Characteristically, intensity of the pain increases during or after hard training, but disappears during resting. Besides sports medicine and orthopaedics, Osgood–Schlatter disease is in the same time one of the most common problem in primary health care, since it often appears in children during the period of their growth and development and it is not linked to sports' activity. Sports where jumps (basketball, long jump), running (athletics), repeated contractions of knee extension apparatus (soccer, kick-box, dancing, skiing) are predominant, are considered to be important external risk-factor which could

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cause occurrence of Osgood–Schlatter disease. Most authors consider cause for developing of OSD in youth athletes sensibility of apophysis which is not able to tolerate strong stretching forces of chronic repeated traction of quadriceps tendon on immature tibial tubercle (3, 4). Apophysis injuries are characteristic for patients which have not been reached full skeletal maturity (2). Apophysises are secondary ossification centres located on place of attachment of big tendons to a growing bone. They contribute in creating contours and shapes of bones, but they do not play role in longitudinal growth. Because of that, acute or chronic injury which affects traction growth zones generally will not cause disturbance of bone growth in length (3). During the period of physiological physiodesis, apophysis has reduced resistance to mechanical stress which makes it vulnerable and susceptible to injury in the period of rapid growth. Injuries could occur after strong trauma of apophysis itself (strong muscle contraction), repeated micro trauma (often repetition of same moves through running or jumping) or micro trauma of apophysis which preceded multiple episodes of repeated micro trauma (3). With increased participation of youth in sport activities, sports become leading cause of injuries in adolescents (5). Soccer and basketball are currently the most attractive and popular and the most common activities for youths around the world. Those are the sports where dominate activities which activate knee extension apparatus, and during the time they could lead to occurrence of OSD. If the disease is timely diagnosed and cured, prognosis is very good. After the reaching full bone maturity (age of 18), under a patella will stay slight protrusion that would pose an aesthetic defect (6). In order to prevent long run consequences and enable athletes to carry on with sport activities, it is necessary to perform knee examination and diagnose OSD timely. Taking sport anamnesis it is important to get data on possible risk-factors. Depending on clinical presentation sport activity could be stopped, intensity of trainings could be decreased or clinician could propose alternative sport activities. Athlete should be included in the programme of physical therapy and functional rehabilitation (6, 8-10). Characteristics of clinical picture in early stage are feeling of tension or queasy during activities. In the beginning pain is mild, durable and presented for a short period of time. During the time, pain is more intensive and become permanent and it could lead to suspension of sport activities through certain period of time (6, 11, 12). Pain getting worse during the activities with running, shooting, squatting, walking upstairs or downstairs, direct contact and all activities with strong contractions of quadriceps. Clinically, for OSD is typical painful and enlarged tibial tubercle (6, 8). Palpation or percussion will cause pain and in some patients physician can find crepitating quadriceps tendon (13). Skin above tibial tubercle could be slightly red and worm on palpation which guides to existence of inflammation process. Mobility is difficult and painful. In the initial stage of disease pain can be induced by extension of the knee with resistance from the examinee. In acute stage, pain occurs at the very attempt at extension of the knee or leg elevation and at maximum knee flexion. Intense pain can also occur when performing deep squat, when performing jumps as well as the kneeling (2). Because of the knee pain quadriceps contractions were painfully limited what results with the development of hypotonia and hypertrophy of haunch muscles (6, 8). Most authors report that in 20-30% of patients symptoms occur at both sides. It is considered that there is close relationship between the occurrence of this disease and leg which is predominantly involved in jumping or sprinting (14). Eric J. Wall describes three stages of Osgood-Schaltter disease. Criteria for classification are relationship between pain sensitivity and intensity of physical activity (6) (Table 1). The key to successful diagnostic of OSD lies in taking thorough sport anamnesis and history of the disease. It is important to obtain data on pa-

TABLE 1. Three stages of OSD - Criteria for classification

Disease stage	Pain – Intensity of physical activity
I	Pain withdraws after physical activity within 24 hours.
II	Pain occurs only during after physical activity, but it is not restricting and does not disappear within 24 hours.
III	Permanent pain which limits not only physical but also everyday activities.

tient age, type of sport practiced, length of sport experience, frequency, intensity and duration of training as well as changes in training process introducing new techniques or equipment changes, involvement of athletes in other forms of sport activities, the influence of risk-factors (trauma, poor technique, old equipment, hard surface, etc.), sudden changes in weight and height, time of onset of first symptoms, mechanism of injury, previous injury and how it was treated, and the basic characteristics of pain (location, start, duration, intensity changes of pain related to activities and period of resting) (1, 6, 12, 16). Diagnosis is made after clinical examination. The main feature of the clinical examination is painful and enlarged tibial tubercle with the surrounding soft tissue swelling, and painful and restricted mobility. Before definitive diagnosis of OSD, other possible diseases must be considered in differential diagnosis having in mind pain in front of the knee (6, 8). Laboratory test are not required for diagnosis of OSD unless there is suspected inflammatory or other disease aetiology (8, 12). Knee x-ray examination snapshot shows enlarged and fragmented tibial tubercle (1, 8). In most medical centres clinical examination of OSD diagnosis is considered to be sufficient and even routine ultrasound examination is not recommended. However, many authors believe that ultrasound examination should be first option. Ultrasound examination is fast, simple and economic method and reliable as x-ray. CT and MRI examination should be performed only in some atypical or non-clear cases (15, 16). Objectives of the study are to draw attention to the importance of clinical examination for diagnosis of Osgood–Schlatter disease in boys playing soccer or basketball.

Methods

The study was prospective, comparative, clinical and descriptive. Research was performed in the period January – December 2008 at the Institute for Sport Medicine, Canton Sarajevo.

Subjects

120 examinees born in 1994 were included in the study and split into two groups. First group of 60 examinees was made of athletes who actively participate in soccer or basketball trainings. Eligibility criteria for those athletes to be include in the study fulfilled ones who have had trainings five times a week, for one hour and half long for the period of at lest one year. During a week they have one mach and one only day off to rest. Other age groups athletes and athletes who participate in other sport disciplines we excluded from the study, athletes who additionally train some other sport and athletes who have come to visit physician with OSD diagnosis and do not actively practice soccer or basketball. Control group we made of boys who do not actively participate in soccer or basketball trainings, neither in other sports and born in 1994. Sample was made randomly, five examinees from six different soccer and basketball clubs and 15 examinees from four schools in Sarajevo Canton.

Procedures

In accordance with our research goal we wanted to calculate the cumulative incidence of Osgood-Schlatter disease for all patients, then to analyse the relationship between intensity of physical activity and the occurrence of pain sensitivity in patients with symptoms of OSD (analysis of OSD clinical stages by J.Wall Eric method). Also, we wanted to investigate the representation of OSD at one or both knees of all examinees in both groups and to see the correlation between the positive findings of clinical examination of all examinees and OSD. We wanted to analyse the correlation of positive findings of clinical examination of patients and clinical stage of OSD and pain score using a pain scale for all patients with OSD. During the study we completed questionnaire containing personal data of all examinees. Sport history was taken from examinees who actively train soccer of basketball, while for athletes from control group we have asked questions related to physical activities. From all examinees with symptoms of OSD is further taken history of disease. We conducted clinical examination of both knees and hips for all examinees. Examination was consisted of inspection, palpation and percussion. We performed measurements of volumes: maximal thigh volume, lower leg volume in the height of tibial tubercle and below. Examination of knee joint mobility and stability was performed using appropriate tests (Lachman test, lateral

drawer test, anterior and posterior drawer test). After the examinations we classified all examinees in three clinical stages of OSD as per Eric J. Wall classification. Classification criteria were relationship between pain sensibility and intensity of physical activity. Pain score was analysed using a pain scale. Although subjective, the method is important because children assessed intensity of pain independently, without influence of parents or coaches, and approach to the evaluation process very seriously. During the research we also performed electronic research of data bases and manual research of selected scientific journals using key words: Osgood-Schlatter disease, tibia, tibial tubercle, apophysis, knee, rapid growth, growth zones, adolescent age, sport, overload syndromes, apophysitis, juvenile osteochondritis.

Statistical analysis

Point-biserial correlation coefficient was used for the statistical analysis and analysis was performed using SPSS software. Statistically significant differences were considered those in which the p value was less than 0.05 (p <0.05).

Results

The cumulative incidence of OSD of all examinees

Table 2 shows results that we got from a clinical examination of both knees from all examinees. We concluded that the athletes in the study group (n = 60) OSD was diagnosed in 31 patients (52%), while 29 examinees (48%) were healthy (48%). In the control group of non-athletes (n = 60), OSD was diagnosis in 20 examinees (33%), while 40 boys (67%) were healthy. Analyzing given data, we concluded that the number of adolescents with OSD is higher by 19% in the study group of athletes compared to the control group, but the percentage difference is not statistically significant p = 0.0548 (p > 0.05).

$$\mathbf{RR = KI \times S / KI \times NS = 0.52/0.33=1.58}$$

RR = relative risk; KI= cumulative incidence;
S = athletes; NS = non-athletes

OSD cumulative incidence rate in the study group of athletes was 0.52 while in the control group was 0.33. The difference in the incidence rate was 0.18.

TABLE 2. Osgood-Schlatter disease cumulative incidence of all examinees

Examinees	Osgood-Schlatter (%)	Healthy (%)	Total (%)
Athletes	31 (52%)	29 (48%)	60 (100%)
Non-athletes	20 (33%)	40 (67%)	60 (100%)

Analysing obtained results we concluded that the incidence in study group of athletes is 1.58 times higher comparing to the control group (p>0.05).

Clinical stage of examinees with OSD

Out of 60 athletes, 29 (48%) boys were healthy (stage 0). OSD was diagnosed in 31 patients (52%). Analyzing the relationship between intensity of physical activity and the occurrence of pain sensitivity we concluded that 13 examinees (22%) were in stage I, eleven patients (18%) in II, and 7 patients (12%) were in clinical stage III. In the control group of 60 boys who do not train soccer or basketball, 40 (67%) of them were clinically healthy and OSD was diagnosed in 20 boys (33%). Analyzing the relationship between intensity of physical activity and the occurrence of pain sensitivity we concluded that 12 examinees (20%) had symptoms of I stage, 5 examinees (8%) had symptoms of II stage and 3 of them (5%) had symptoms of OSD III clinical stage (Table 3).

TABLE 3. Analysis of clinical stages of examinees with OSD

Examinees	Stage 0 (%)	Stage 1 (%)	Stage 2 (%)	Stage 3 (%)	Total
Athletes	29 (48)	13 (22)	11 (18)	7 (12)	60
Non-athletes	40 (67)	12 (20)	5 (8)	3 (5)	60

Prevalence of OSD in one or both knees

Examining the presence of the disease in one or both knees, the analysis of results showed that in the study group of 60 athletes, 31 patients had symptoms of OSD. The symptoms were present unilaterally in 20 athletes (64.5%), and bilaterally in 11 athletes (35.5%). In the control group of 60 examinees who were not actively involved in sports, 20 patients had symptoms of OSD. 16 (80%) of those had unilateral symptoms, and only 4 patients (20%) had symptoms bilaterally (Table 4). In both groups 51 examinees had OSD diagnosed; unilaterally symptoms had 36 examinees (70.5%) and bilaterally 15 (29.5%) boys.

TABLE 4. OSD disease prevalence estimation in one or both knees

Examinees	One knee (%)	Both knees (%)	Total (%)
Athletes	20 (64.5%)	11 (35.5%)	31 (100%)
Non-athletes	16 (80%)	4 (20%)	20 (100%)
Total	36 (70.5%)	15 (29.5%)	51 (100%)

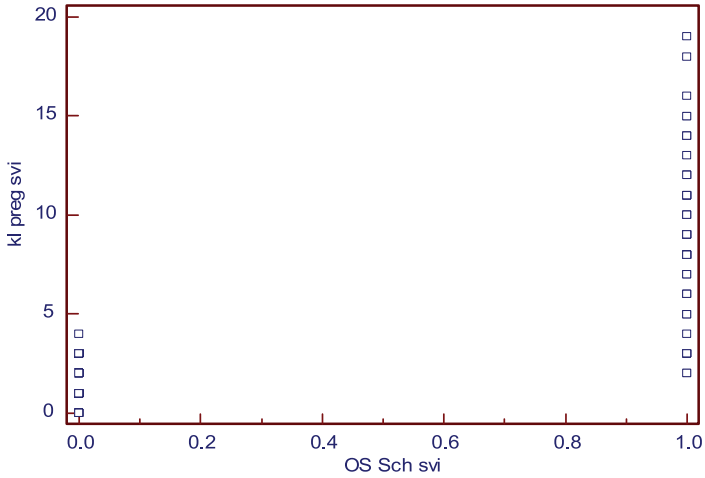

FIGURE 1. Correlations between the positive findings of clinical examination of examinees and OSD

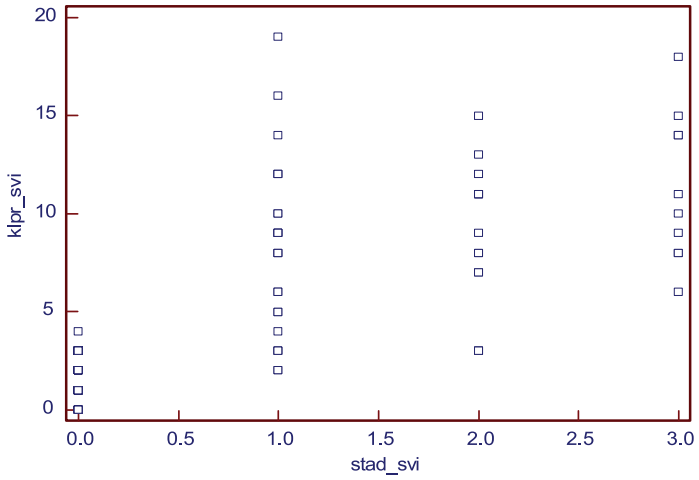

FIGURE 2. Correlations between scores of clinical symptoms and stages of OSD

TABLE 5. Assessment of pain in patients with Osgood-Schlatter disease

	N	Mean	SD	Median	95% CI	Minimum	Maximum
Pain scale - athletes	31	10.58	9.11	9.00	5.17 – 14.41	0.00	35.00
Pain scale - non-athletes	20	10.30	8.96	8.00	4.17 – 11.83	0.00	34.00

Analysis for correlation between positive findings of clinical examination and OSD

Point biserial correlation coefficient (r_{pb}), was used to be examined correlation between clinical findings and the OSD. Preliminary analyzes were done to prove the assumptions of normality, linearity and homogeneity of variances. Strong positive correlation $r_{pb} = 0.78$, n = 120, $p < 0.05$. Based on these results we concluded that the higher the score of the positive findings of clinical examination is more associated with the OSD and that the clinical examination is a key for the diagnosis of this disease (Figure 1).

Analysis for correlation between positive findings of clinical examination and clinical stages of OSD

Point biserial correlation coefficient (r_{pb}), was used to be examined correlation between clinical findings and the OSD. Preliminary analyzes were done to prove the assumptions of normality, linearity and homogeneity of variances. Strong positive correlation $r_{pb} = 0.76$, n = 120, $p < 0.05$. Based on these results we concluded that the higher the score of the positive findings of clinical examination is more associated with the severe stages of OSD (Figure 2).

Analysis of pain scale of all examinees with OSD

Based on subjective evaluation of pain, we compared results obtained for both groups. According to the scale of pain a little more felt sportsmen M = 10.58

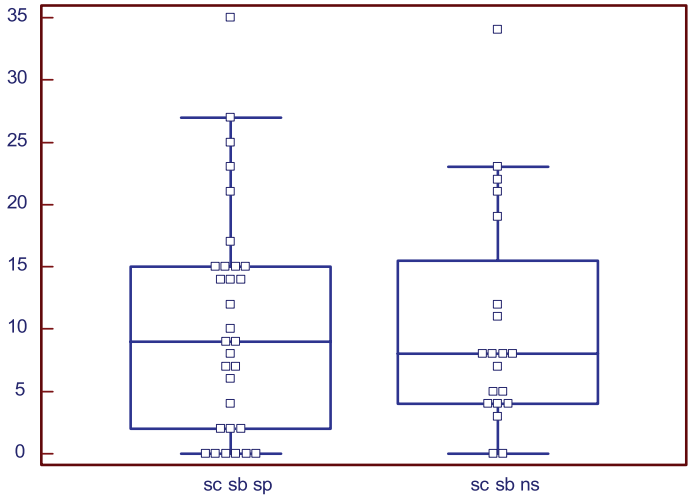

FIGURE 3. Results obtained based on pain scale for both groups

(SD = 9.11), n = 31, compared to non-athletes M = 10.30 (SD = 8.96), n = 20. Mean (Md) score for the athletes was Md = 9.0, for non-athletes Md = 8.0. For the analysis of results it was used Mann-Whitney test which showed no statistically significant difference in pain scale of the test group of athletes compared to the control group (Z= -0.174, $p > 0.05$) (Table 5, Figure 3).

Discussion

The main findings of the study are: 1) By clinical examination of both knees of 120 participants we diagnosed OSD in 51 examinees (42.5%), while 69 were healthy (57.5%); 2) In the group of athletes 31 examinees had OSD (52%), while 29 examinees were healthy (48%). In the control group of non-athletes OSD had 20 examinees (33%), while 40 were healthy (67%); 3) Number of boys with OSD is higher by 19% in athletes group compared with non-athletes group, but the percentage difference is not statistically significant $p = 0.0548$ ($p > 0.05$); 4) In the group of athletes the incidence is higher by 1.58 times compared to non-athletes ($p > 0.05$); 5) The average incidence rate was 2.14 times higher in the exposed group (athletes) in relation to the not exposed group (non-athlets), or the likelihood of exposure was 2.14 times higher among athletes than in non-athletes; 6) Analyzing the differences in the incidence rate among clinical stage I, II, and III of OSD in both groups, we concluded that the incidence rate is greater in athletes than non-athletes, but that was not statistically significant ($p > 0.05$). Analyzing differences in the incidence rate for II and III clinical stage of OSD both groups, we concluded that the incidence rate for athletes is greater 2.25 times then in the non-athletes group and that is statistically significant ($p < 0.05$); 7) Unilaterally presented symptoms had 36 examinees (70.5%), and bilaterally 15 (29.5%) of them; 8) Analyzing the differences in the incidence rate of OSD at both knees in both groups, we concluded that the incidence rate among athletes is higher by 1.77 times compared to non-athletes group and not statistically significant ($p > 0.05$); 9) Clinical examination is essential in the diagnosis of OSD because the higher score of positive findings of clinical examination is more associated with the OSD; 10) Clinical examination has an important role in recognizing the severe stages of OSD because the higher scores of positive clinical examination findings are associated with more severe clinical disease stages. Analyzing the relationship between intensity of physical activity and pain sensitivity J. Wall Eric stated that at the time of diagnosis of Osgood-Schlatter disease are the most affected children in the first, and the least in the third clinical stage (6). We have made the same conclusion in our research. In both groups the most patients were in the first (25), slightly less in the second (16), and at least children were in the third clinical stage. In one-year epidemiological study of orthopaedic diseases that affect adolescent boys who have been training basketball or volleyball, Gigante et al. (14) has diagnosed and treated OSD in 21 boys. 14 boys (66.7%) had expressed unilateral symptoms, and bilaterally 7 (33.3%). Gholve and Bloom considered that about 20% -30% of cases, disease develops at both knees (1, 9). Examining presentation of OSD at one or both knees in our study we concluded that the athletes in the study group had symptoms unilaterally in 20 (64.5%) cases, and bilaterally in 11 (35.5%). In the control group, this ratio was 16:4 (80% : 20%). Conclusion was that the unilaterally expressed symp-

toms had 70.5% and 29.5% examinees bilaterally. Houghton, Cassas and many other authors believe that the most important in the diagnosis of OSD is to take a detailed personal and sport history, medical history, to perform a clinical examination, and sometimes take targeted x-ray examination (13, 16). By analyzing the correlation between the positive findings of clinical examination of examinees and OSD, we concluded that the clinical examination is a key in the diagnosis of this disease, and it is especially significant in recognizing the severe stages.

Conclusions

Sports are the leading cause of injury in adolescents and one half of all sports injuries in children are preventable with proper education and use of protective equipment. Children and adolescents may be particularly at risk for sports-related overuse injuries as a result of improper technique, poorly fitting protective equipment, training errors, and muscle weakness and imbalance. OSD is one of these injuries which can be managed conservatively with proper and timely diagnosis (16, 18). Diagnosis of OSD is clinical and based on history and clinical examination. Patients usually present with onset of pain at the tibial tubercle, relieved by rest and aggravated by exercise, especially sports involving running and jumping like soccer and basketball. Study results have drawn attention to the importance of clinical examination in diagnostics of Osgood–Schlatter disease in boys playing soccer or basketball. Clinical examination is critical method in the process of diagnosing Osgood–Schlatter disease especially for identifying II and III level of this disease. Physician should explain to the patients and their parents that sporting activity does not have to stop completely and that a reduction in activity may be sufficient to control the pain. Young athletes with diagnosed OSD should reduce exercise duration, frequency, and intensity for a limited period of time, sufficient to resolve or tolerate pain. When pain becomes tolerable it should be considered gradual increases in exercise levels, depending to symptoms, adjusting levels, and repeating this process as required. It is very important to educate parents of young athletes and patients on OSD in order to act proactive and preventive. Also, education of health professionals from primary health care level as well hospital-specialist orthopaedists who sometimes unnecessary recommend even cast protector for children with OSD and total sport cessation. Simple leaflet may be a useful source of further information for parents, patients and healthcare professional.

Competing interests

The authors declare that they have no financial or personal relationship with people or organizations that could influence this work inappropriately.

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Comparative study of the results of heel ultrasound screening and DXA findings (lumbar spine and left hip) of postmenopausal women

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Abstract

Introduction: Osteoporosis is a silent and invisible disease of bone, great presence and is considered to suffer from osteoporosis at least 200 million women worldwide. The goal of this paper is to show average age of postmenopausal respondents, values of anthropometric parameters (weight, height, BMI), anamnestic data on clinical symptoms, fractures of women in menopause, analysis of heel ultrasound screening results, analysis of lumbar spine DXA results, analysis of left hip DXA results.

Methods: In retrospective study 61 respondents were involved, 33 to 79 years old, treated in u Center for Physical Medicine and Acupuncture "AD" in Sarajevo during the period from 01.01.2008 till 31.12.2009. All date are shown numerically and percentage account with calculation of mean value, expressed in the form of tables and charts.

Results: Finding of heel ultrosound screening compared to T values of postmenopausal respondents indicates on osteoporosis in case of 17 (27,87%), in case of 44 (72,13%) respondents osteopenia, while normal values were not found. T value with lumbar spine DXA method in postmenopausal female respondents correspond to 43 (70,5%) respondents, in 15 respondents (24,6%) finding corresponded to osteopenia, while 3 respondents (4,9%) had physiological finding. Left hip DXA finding shows 36 (59%) respondents corresponded osteoporosis, 19 (31,2%) respondents corresponded osteopenia, while physiological finding was found in 6 respondents (9,8%). T value of lumbar spine DXA finding was - 2,71 ± 1,16; DXA finding of left hip -2,35 ± 1,36; heel ultrasound screening -2,19 ± 0,54.

Conclusion: Research results indicate that DXA finding in relation to the heel ultrasound screening confirms gold standard in diagnosing osteoporosis.

Keywords: osteoporosis, heel ultrasound screening, DXA finding

Introduction

Osteoporosis is a disease characterized by a decrease in bone mass and disturbed micro architectures of bone beds, the resulting bone fragility and an increase risk of fractures (1). Osteoporosis is a common disease characterized by reduction of bone mass, which can harm integrity of its structure and favor the fracture, although initially without symptoms, micro fractures and distortion of the skeleton eventually cause pain and disability (2). However, "too little" of the bones which remains with normal structure (for example, has a normal ratio of protein matrix and minerals). This condition can occur under different clinical circumstances, but it is mostly related to aging, especially with menopause. Late menarche may be associated with low bone mass maximum. Late menarche may be associated with low bone mass maximum. Early menopause, especially if the surgically induced before the 45th year of life is a strong determiner of bone density and increased risk of fracture (3). The frequent occurrence of osteoporosis in postmenopausal women explains the ratio of women toward men from 2:1 to 3:1.

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About 25% of women get fractures around age 65 and 50% around the age of 90 years of life (2). The most common fractures are compression fractures of the spine, fracture of femoral neck and distal forearm. Hip fracture in old age is accompanied by increased mortality and half of survivors cannot move without assistance, which represents a growing public health problem in the developed world (4). An important factor for the occurrence of fractures is the tendency of elderly falls and the result is poor coordination of movements and slow reflexes (1). Identification of women with reduced bone mineral density is an important strategy to reduce incidence of osteoporosis fractures. The definition of risk profile based on clinical assessment is an important step in the detection of women at increased risk of osteoporosis. Optimal clinical assessment of the risk of osteoporosis in postmenopausal women to determine measures for the prevention, diagnosis and treatment of disease to avoid complications associated with significant morbidity, mortality, material costs of treatment and rehabilitation as well as lowering the quality of life. The diagnostic evaluation of patients related to osteoporosis, must begin a detailed history, clinical examination, inspection of all diseases and conditions that may be a risk factor based on which doubt arises and conduct other diagnostic procedures. The diagnostic procedures include: physical examination, laboratory test, skiagram of thoracic and lumbar spine, ultrasound, DXA, bone biopsy, bone scintigraphy (5). Ultrasonic measurement of the bone mineral density agrees with the results of DXA, there is no X-ray, but it is not suitable for monitoring treatment effects in clinical work with patients because of the oscillation results, and this is a reason while is more used in epidemiological research. The gold standard for diagnosing osteoporosis is a densitometry. Densitometry as a diagnostic tool due to the significant sensitivity and specificity for predicting the risk of bon fractures. The goals of research include analysis of following parameters: average age of postmenopausal respondents, values of anthropometric parameters (weight, height, BMI), anamnestic data on clinical symptoms, fractures of women in menopause, analysis of heel ultrasound screening results, analysis of lumbar spine DXA results, analysis of left hip DXA results.

Methods

Retrospective study was done in sample of 61 respondents, which involved target analysis in the Center for Physical Medicine and Acupuncture "AD". All date are shown numerically and percentage account with calculation of mean value, expressed in the form of tables and charts.

Results

TABLE 1. The average age of postmenopausal women

Age	Number of years
Minimum	39.00
Maximum	79.00
Average	58.90
Standard deviation	± 7.97

TABLE 2. Overview of respondents compared to the average values of anthropometric parameters and BMI

Anthropometric parameters	Arithmetic mean	Standard deviation (SD)
Height (m)	1.64	± 0.06
Weight (kg)	70	± 11.20
BMI	25.70	± 3.50

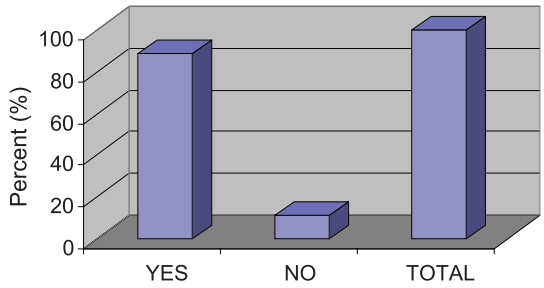

FIGURE 1. The presence of clinical symptoms of patients

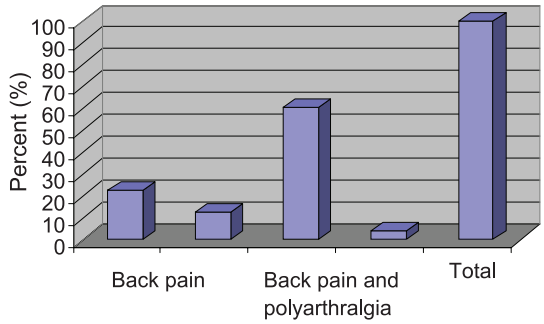

FIGURE 2. The main clinical symptoms in patients

TABLE 3. Localization of the fracture in relation to the average age of postmenopausal women

Fracture	Average age	Standard deviation
Forearm	62.00	± 7.56
Spine	65.75	± 11.38
Hip	59.00	± 8.72
Other	56.71	± 3.68

TABLE 4. Analysis of results of heel ultrasound screening compared to the T values gained of postmenopausal women (n = 61)

Heel ultrasound screening	Number	Percent (%)
Osteoporosis	17	27.87
Osteopenia	44	72.13
Physiological finding	0	0.00
Total	61	100.00

TABLE 5. Analysis of results DXA lumbar spine compared to the T values gained of postmenopausal women (n=61)

Duoenergetic absorptiometry X-ray (DXA) of lumbar spine	Number	Percent (%)
Osteoporosis	43	70.5
Osteopenia	15	24.6
Physiological finding	3	4.9
Total	61	100

TABLE 6. Analysis of results DXA of left hip compared to the T value gained of postmenopausal women

Duoenergetic absorptiometry X-ray (DXA) of left hip	Number	Percent (%)
Osteoporosis	36	59.0
Osteopenia	19	31.2
Physiological finding	6	9.8
Total	61	100.0

TABLE 7. Overview of performed diagnostic procedures of all patients (n = 61) compared to the average T value

Diagnostic method	Average T value (T- score)	Standard deviation (SD)
heel ultrasound screening	-2.30	± 0.55
DXA- lumbar spine	-2.81	± 1.27
DXA- left hip	-2.49	± 1.42

Discussion

In this study 61 respondents were involved, average age of respondents was 58.9 ± 7.97, while the youngest respondent was 39 years old and the oldest 79 years old. Results of tests that are conducted Hadziavdic with associates in the study of 836 patients confirmed the average age of 52.6 years (6). The average values of anthropometric parameters were: 1.64 ± 0.06 m (body height), 70 ± 11.20 kg (body weight). BMI was 25.70 ± 3.50. This corresponds to the literature data in which women with osteoporosis usually have normal or low BMI and patients with higher BMI values, the high BMI preventive action, in the sense that it reduces the risk of fractures- especially hip, while in the work of Milenkovic D., and colleagues report that of 186 patients were older age, lower body height and weight and had lower BMI (7). In paper work of Kapetanovic A. and associates on 60 patients found a lower BMI at 6.66% female respondents (8). In terms of clinical symptoms in patients, 52 patients (85.25%) had significant clinical symptoms, while 9 patients (14.75%) were asymptomatic. The main clinical symptoms were back pain and polyarthralgia (joint), which were demonstrated in 43 patients (70.50%). The literature states that one of the leading symptoms of osteoporosis, back pain due to vertebral compressive fractures (1), which was confirmed here. Compared to the average age of the patients who had fractures, spine fractures in the average age of patients was 65.75 ± 11.38 years, with the forearm fracture 62.00 ± 7.56 years and the average age of hip fracture was 59.00 ± 8.72 years. Here, some discrepancy occurs with respect to the information specified in the literature according to which hip fractures usually aged about 70 years old. The study showed concordance with the literature data related to vertebral fractures because this fractures here also occurred in most of the cases in the sixties years of life. Kern D. states in his study of 50 patients that previously had no fractures in 84% of patients (9). In his paper work Muftic M. states that the analysis of 100 patients with osteoporosis, 28 (28%) patients had a fracture. Most of the interviewees had a fracture of the forearm 18 (64%), followed by patients with fractures of the spine 7 (25%) and lowest number of patients 2 (10.8%) with hip fracture (10). Interpretation of the results obtained T value of

the screening method with the heel in postmenopausal women, came to the conclusion that the US screening method referred to the osteoporosis screening in 17 patients (27.87%), in 44 (72.13%) patients the findings were in favor of osteopenia, while a physiological finding was present even in one patient. Interpretation of results obtained using DXA T score of lumbar spine in postmenopausal women, in 43 patients (70.5%) the findings were in favor of osteoporosis in 15 patients or 24.6% to an osteopenia, and physiological findings have had 3 patients or 4.9%. The literature states that DXA is the gold standard for diagnosing osteoporosis and noted the sensitivity and specificity of this method for predicting the risk of bone fractures (11). In 36 (59%) postmenopausal women left hip DXA finding corresponds to osteoporosis, in 19 (31.2%) corresponds to the findings of osteopenia, and 6 (9.8%) patients the finding was physiologically. Diagnostic procedures were performed in all patients were: heel ultrasound screening, DXA of lumbar spine, DXA of left hip. The mean T score at lumbar spine DXA was -2.81 ± 1.27. The mean T score for DXA left hip was -2.49 ± 1.42, while the average T value of heel ultrasound screening of the fifth sample of 61 postmenopausal patients was -2.30 ± 0.55.

Conclusion

Average age of respondents was 58.9 ± 7.97, while the youngest respondent was 39 years old and the oldest 79 years old. Average value of Body Mass Index (BMI) of respondents total number was 25.70 ± 3.50 SD. Values of BMI have great importance in development of disease. Low BMI values are very important predisposing factor for the development of osteoporosis and fractures as a complication of this disease. On the other hand, higher BMI values have a protective effect, preventing the occurrence of the fracture. The most common clinical symptoms were back pain and polyarthralgia. 52 (85.25%) analyzed patients has had clinical symptoms, while only 9 female respondents (14.75%) had no symptoms. The average age of respondents who had forearm fractures was 62.00 ± 7.56 years, in case of respondents who had spine fractures 65.75 ± 11.38 years, while with hip fractures average age of female respondents was 59.00 ± 8.72 years. There is a certain discrepancy with the literature data mentioned in relation to the age when most fractures occur each. Heel ultrasound screening suggested on osteoporosis at 27.87% of postmenopausal respondents, while on osteopenia in 72.13% of respondents. Physiological finding was not present. In case of 70.5% female respondents in menopause with lumbar spine DXA osteoporosis was found, while 24.6% of postmenopausal respondents had osteopenia and physiological finding in case of 4.9% respondents. With DXA finding of left hip osteoporosis was found in case of 59% respondents, osteopenia in 31.2% postmenopausal respondents, while physiological finding in case of 9.8% respondents. Average T value of DXA lumbar spine was -2.81 ± 1.27. Average T value of left hip DXA was -2.49 ± 1.42, while average T value heel US screening in sample of 61 postmenopausal women was -2.30 ± 0.55.

Competing interest

The authors declare that they have no financial or personal relationship with people or organizations that could influence this work inappropriately.

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Osteoporosis in active working women

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Abstract

Introduction: Osteoporosis is a progressive metabolic bone disease characterized by reduction of mineral density of bone, which leads to reduction of bone firmness, increased fragility and increased risk of bone fractures. The aims of this study were to determine the age structure and average values of BMI in female patients with a diagnosis of osteoporosis and osteopenia, to determine the value of T-score before and after therapy, and to show a correlation of frequency of fractures in relation to already given diagnosed and the presence of menopause.

Methods: A retrospective study was conducted on 50 female respondents with diagnosis of osteoporosis and osteopenia. Included female respondents underwent densitometry or ultrasound screening method of heels in which high degree of osteopenia and osteoporosis is detected.

Results: The average age of the female respondents included in this study was 48.06 ± 11.97 years and all the respondents were in the category of women with normal body weight. There is a difference in the values of T-score of respondents with osteoporosis compared to osteopenia. Value of T-score decreases in relation to increase of number of years, so the older female respondents had lower values of T-score.

Conclusion: The incidence of osteoporosis and osteopenia was higher among active working female respondents in menopause. Respondents with osteoporosis had lower values of T-score, physical and medicament therapy in combination led to improvement of T-score. Female respondents with a low value of T-score, with diagnosis of osteoporosis and in menopause, mostly had bone fractures.

Keywords: Osteoporosis, T-score, fracture

Introduction

Osteoporosis is a progressive metabolic bone disease characterized by reduction of mineral density of bone, which leads to reduction of bone firmness, increased fragility and increased risk of bone fractures. Fractures can occur after minor trauma or even without injury (so-called spontaneous fractures) (1). Osteoporosis is more common during aging when bone mass is progressively disappearing. In women, loss of ovarian function at menopause precipitates rapid bone loss so then many women acquire the criteria for osteoporosis to till 70 year (2). Epidemiology of fractures follows a similar trend of bone density loss. The frequency of distal radius fractures is growing around age of 50 years and reaches a plateau before the age of 60 years with a moderate increase thereafter. In contrast, the incidence of hip fractures doubles every 5 years after the 70th year of age. At least 1.5 million fractures occur annually in the USA due to osteoporosis. As the population has a tendency to a longer life span, the total number of fractures will continue to grow (2). Around 300,000 hip fractures are recorded in the USA each year and most of them require hospitalization and surgical intervention. The probability that 50-year-old white man gets a hip fracture is 14% for women and 5%for men, and the risk for African Americans is much lower. Hip fractures due to the osteoporosis are associated with high incidence of deep vein thrombosis and pulmonary embolism and mortality rate is between 5 and 20%

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during the first months after surgical intervention (3). In the USA and Europe fractures related to the osteoporosis are more common among women than men, especially in women's postmenopausal bone mass loss. However, this gender difference in bone density and hip fractures related to the ages is not so obvious in other cultures, especially due to genetics, physical activity and nutrition (2). "Gold standard" for diagnosing osteoporosis is densitometry. Several types of densitometry methods are differentiated such as DXA (Dual Energy X-ray absorption-metry), SPA (single photon absorptiometry) and DPA (dual photon absorptiometry). Densitometers based on DXA are typically used. DXA is a method that uses x-rays with two intensities in very small doses which are released through a bone and behind the bone there are sensors measuring the x-rays that passed through the bone and the result is computer-processed. Difference between the released and absorbed x-rays allows the assessment of bone mineral density which is expressed in absolute values of g/cm2. BMD (bone mineral density) is the amount of mineral matter per square centimeter of bone. T-score (T value) represents the deviation of the measured value of the BMD from the value of bone mass of young people expressed in standard deviations. Bone density (or BMD) is used in clinical medicine as an indirect indicator of osteoporosis and fracture risk. BMD is measured at the lumbar spine, femoral neck (hip) and the lower third of the thumb bone. The dose of radiation is very low, the search is simple, painless and quick. It takes 10-15 minutes, requires no preparation other than removing the metal parts from clothes. It is performed by sitting and putting the forearm on apparatus bed or lying on it. Advantages of this method are low doses of radiation, high precision and relatively low cost. The dose of radiation received during the densitometry is so low that even people who work with the device do not protect themselves in a special way and it has a value of 1-3 mRem (4). The aims of this study where to determine the age structure and average values of BMI in female respondents with a diagnosis of osteoporosis and osteopenia, to determine the value of T-score before and after therapy, and to show a correlation of fractures frequency in relation to already given diagnosed and the presence of menopause.

Methods

The study was conducted on 50 female respondents with diagnosis of osteoporosis and osteopenia. Testing was conducted at P.I. Department of Occupational Health of Sarajevo Canton in the period from September 2010 year until November 2011year. In the research included female respondents are those who underwent densitometry or ultrasound screening method of heels in which high degree of osteopenia and osteoporosis is detected. There were included and whose respondents who used the services of physical therapy and who had been previously diagnosed osteoporosis. Female respondents in the course of a year, every three months, were using physical therapy (kinesitherapy, TENS, magnetic therapy, Solux combination of UV-and IR and diadynamic current) for 15 days.

Statistical analysis

Nominal and ordinal variables in the study were analyzed with $\chi 2$ test, and when there was the lack of expected frequencies Fisher's exact test was used. For continuous variables in the study the symmetry of their distribution was firstly analyzed by using the Kolmogorov Smirnov test. When the distribution of continuous variables was symmetrical, arithmetic mean and standard deviation were used to show the mean values and degree of dispersion. For comparison of variables parametric tests were used (Student-test and ANOVA test). When the distribution of continuous variables was asymmetric, to show the mean values and degree of dispersion median and interquartile range were used, and for their comparing nonparametric tests (Mann-Whitney U test, Kruskal-Wallis test).

Results

Analysis of age structure of female respondents in relation to the diagnosis led to the information that the average number of respondents with osteoporosis was 50 ± 11 years, with osteopenia 45.59 ± 12.93 years. The average number of age for all female respondents included in this study was 48.06 ± 11.97 years. By applying nonparametric Mann-Whitney test, we came to the statistical conclusion that the average number of age of female respondents with osteoporosis is statistically significantly different compared to respondents with osteopenia, Z = -1322, p = 0186 (Table 1).

TABLE 1. The average age of female respondents based on diagnosis

Diagnosis	No. of female respondents	Average age	Standard deviation	Median	Minimum	Maximum
Osteoporosis	28	50.00	11.00	54.00	29.00	63.00
Osteopenia	22	45.59	12.93	46.50	26.00	65.00
Total	50	48.06	11.97	53.00	26.00	65.00

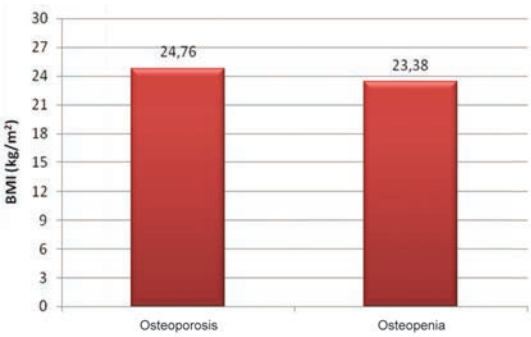

FIGURE 1. The average BMI values of female respondents based on diagnosis

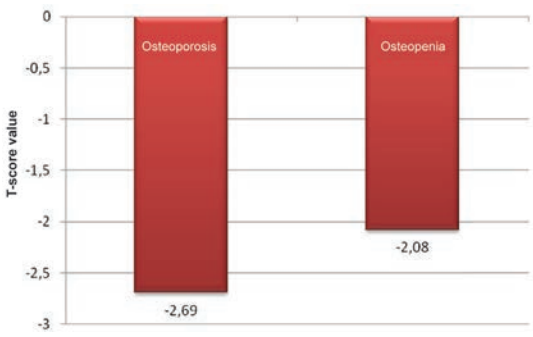

FIGURE 3. Average values of T-score based on diagnosis before therapy

Mann-Whitney test showed a statistically significant difference in mean BMI values of female respondents with osteoporosis compared to osteopenia, and that rewspondents with osteoporosis had a higher BMI, Z = -0847, p = 0384. Although there is statistically significant difference in mean values of BMI, both groups were in the category of women with normal body weight (Figure 1). Using Pearson's correlation we found that there is no correlation between the age of the respondents and their BMI, p = 0.115 (Figure 2). Mann-Whitney test showed a statistically significant difference in mean T-score values of female respondents with osteoporosis compared to osteopenia, and that respondents with osteoporosis had lower values of T-score, Z = -5690, p = 0.001 (Figure 3) .

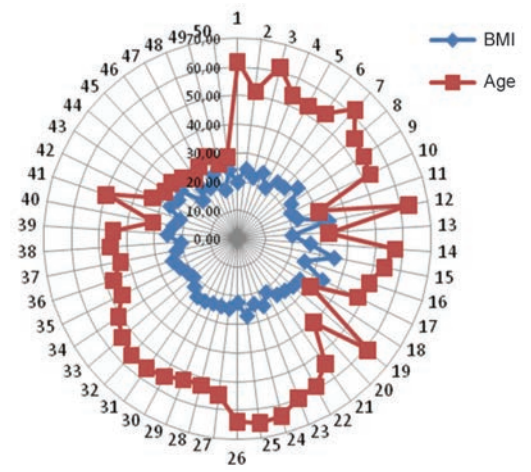

FIGURE 2. Correlation of age and BMI of female respondents

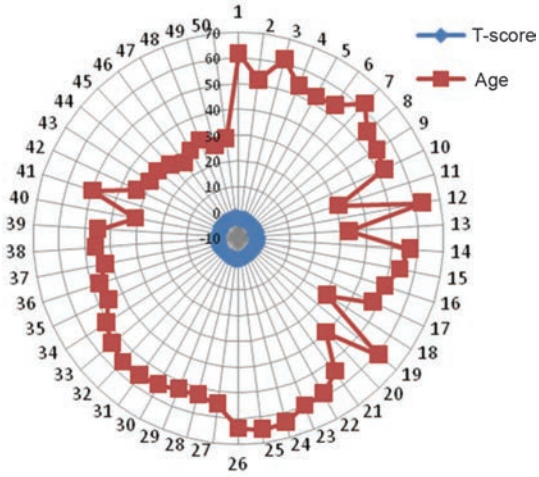

FIGURE 4. Correlation between T-score and age of the female respondents

TABLE 2. Correlation of frequency of fractures in female respondents in relation to the diagnosis, menopause, and BMI and T-score values

Fracture	T-Score	BMI	Menopause	Diagnoses	Minimum	Maximum
Yes	T_Score	Pearson Correlation	1	-.331	.330	.885**
		Sig. (2-tailed)		.319	.322	.000
		N	11	11	11	11
	BMI	Pearson Correlation	-.331	1	-.141	-.215
		Sig. (2-tailed)	.319		.680	.526
		N	11	11	11	11
	Menopause	Pearson Correlation	.330	-.141	1	.607*
		Sig. (2-tailed)	.322	.680		.048
		N	11	11	11	11
	Diagnoses	Pearson Correlation	.885**	-.215	.607*	1
		Sig. (2-tailed)	.000	.526	.048	
		N	11	11	11	11

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

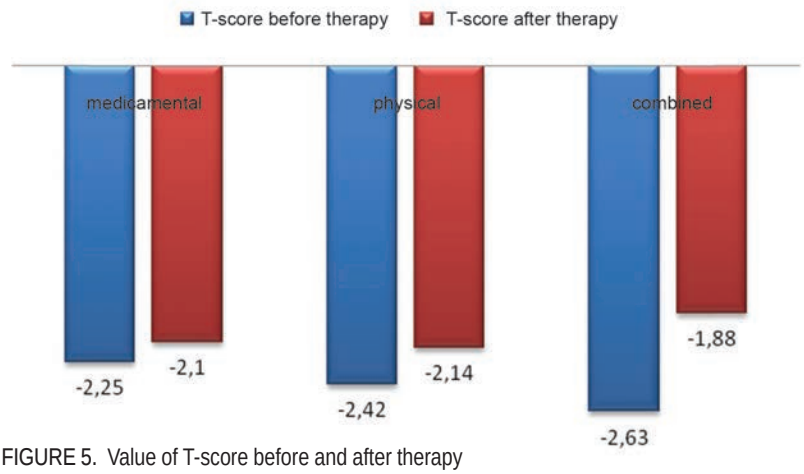

FIGURE 5. Value of T-score before and after therapy

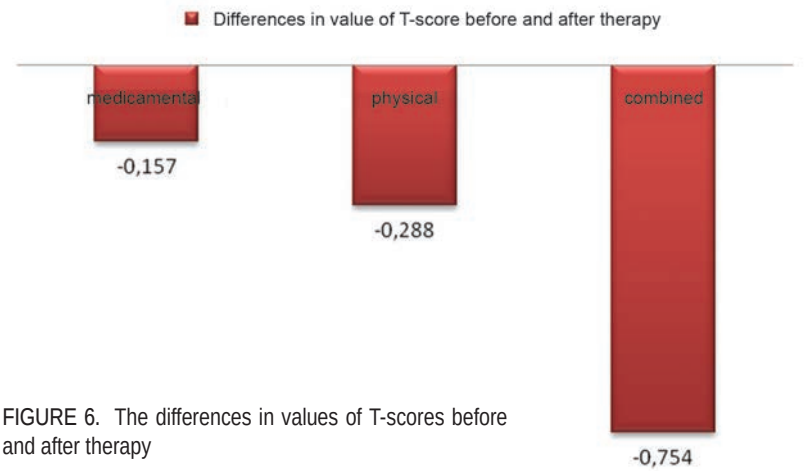

FIGURE 6. The differences in values of T-scores before and after therapy

Using Pearson correlation has led to the information that the T-score and age of the female respondents are in direct negative correlation, and that the values of T-score are reducing compared to the increase in the number of age, and that older respondents have a lower value of T-score, p = 0.002 (Figure 4).

Discussion

Osteoporosis is characterized by reduced bone strength, and has a higher prevalence in postmenopausal women although it also occurs in men and women who have risk factors for bone demineralization. Its main clinical manifestations are fractures of the spine and hip. Osteoporosis is represented in more than 10 million people in the

USA, but only 10-20% are diagnosed and treated. It is estimated that currently in BiH there is 162 000 people suffering from osteoporosis. (1) In a conducted study in the USA, 2007 year 3276 patients were included. From the total number of female respondents 1800 (54.6%) of them had symptoms of ostepenia and osteoporosis, and were older than 40 years (5). By analysis of BMI it is established that they were on the verge of a normal body weight and malnutrition BMI 18.54 kg/m2. Today, a true image about involvement of the osteoporosis in population is now revealing in the world, as the collected measurement data began to crystallize and analyze it is all the clearer picture of actual conditions in the world today. Information about the involvement of osteoporosis in the world's population now give such a proportion of osteoporosis, so called the silent epidemic. Therefore, the decade of 2000-2010 years was declared "The decade of bones and joints" by the WHO. The data are, unfortunately, so alarming (6). It is a disease of modern era, largely depending on our lifestyle. Osteoporosis is a progressive bone disease, manifested by balance disorder in which bone is being built up and decomposed. Eventually there is a significant reduction of bone mass and bone, and as the person gets older all the worse image, exacerbated by natural outflow of calcium. Such a thin bones with reduced bone mass, are more fragile and prone to fractures. And it reveals the real problem of this disease - it has no symptoms until the actual fracture. No symptoms, no pain, no restrictions are warning. It is estimated that 8-10% of the world population is suffering from osteoporosis. In the next 20 years of this century double increase in the number of patients is expected. Osteoporosis is popularly considered "women's disease" and is often associated with menopause. This is partially true, since one in three women and one in eight men are at risk of the most serious complications of osteoporotic fractures (7). It is important to assess risk factors in adults. After evaluations (assessments) of risk factors for osteoporosis, measurements of bone mineral density (BMD, Bone Mineral Density) should be done by ultrasonic densitometry - a fast, economical method without radiation. Measurements are made on the heel bone. This method can be used as a screening method, and later more precise DXA method, which is based on the application of low-energy X rays, according to WHO recommendations (1). Jankovic, in the study that included 688 women aged 45-69 years, implemented densitometry, and based on the T-score we found that osteooporosis occurred in 141 female respondents (T-score ≤ -2.5), 400 osteopenia (T-score ≤ -2.5 to -1), and 147 of them had normal T-score (8). Once osteoporosis develops, it definitely becomes a condition that can not be cured but its further progress can be stopped and partially repaired bone mineralization. Although the occurrence and the development of osteoporosis are genetically conditioned, undeniable fact is that its occurrence and intensity of progression largely depend on external factors, or lifestyle. Increased risk of early development and rapid progression of osteoporosis have women who do not feed in an appropriate manner in the life, do not take sufficient quantities of calcium and vitamin D (especially during the second decade of life), are not sufficiently physically active, consume cigarettes and excessive amounts of alcoholic beverages. To avoid unintended consequences, it is necessary to diagnose osteoporosis at the time. Early diagnosis and timely beginning of treatment are of utmost importance, especially in people who have one or more risk factors for occurrence of osteoporosis (9,10). The analysis of mean values of T-score before and after therapy has led to information that T-score has been improving after all forms of therapy, and that there is statistically significant difference in values before and after therapy, $p = 0.000$. The greatest improvement occurred by combination of physical and medicamental therapy, then in female respondents with only physical therapy (three times per year for 15 days), and the least improvement in the respondents on medicamental therapy (Figure 5). In the framework of physical therapy exercises for osteoporosis are used which necessary to continue in the home is setting too, daily, with the advice for proper nutrition, long walks, swimming and dancing. Adding exercise with light weights or elastic bands can be helpful for the upper body. Many medications can create conditions that reduce bone density. Long-term use of corticosteroids such as prednisone, is a huge risk for the loss of calcium. People who consume corticosteroids should increase their daily calcium intake to 1500

mg, vitamin D to 1000 IU, and if possible consume medications from the group of biphosphonates (alendronate or etidronate). Excessive doses of thyroid hormones can also contribute to osteoporosis; fortunately adjustment of the dose can prevent such an action. Medications for anti-epileptic seizures, such as phenytoin and barbiturates, also contribute to calcium loss. People who take large amounts of aluminum containing antacids can also suffer from calcium loss. Good alternative are calcium containing antacids. Other drugs that increase bone loss are immunomodulators (eg, methotrexate, cyclosporine) and some hormones for treatment of endometriosis and cholestyramine (a drug for cholesterol reduction) (11). Bone fractures in female respondents are in correlated with the values of T-score, given diagnosis and menopause. Female respondents with lower values of T-score, with a diagnosis of osteoporosis and in menopause often had bone fractures. BMI and bone fractures are not correlated (Table 2). Jaganjac, in her study, did not establish a causal relationship between the number of fractures in female respondents with osteoporosis and osteopenia. (12)

Conclusions

The results of research show that the incidence of osteoporosis and osteopenia was higher among active working age female respondents who were in menopause, and that respondents with osteoporosis had a lower BMI. Female respondents with osteoporosis had lower values of T-score, and that physical and medicamental therapy in combination led to improvement of T-score. Female respondents with lower values of T-score, with a diagnosis of osteoporosis and in menopause often had bone fractures.

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Prevalence of depression in residents of gerontology centre in Sarajevo

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Abstract

Introduction: Depressive disorder, as a major problem of public health, takes high fourth place in its prevalence in general population, and is considered to be the second most frequent health problem of female population. Depression is the most frequent mental problem of persons in their third age of life. The aim of this study is to evaluate prevalence of depression and establish the ratio between the current number of diagnosed and of unrecognised depression among the residents of Gerontology Centre in Sarajevo.

Methods: This is a cross-sectional, descriptive, and analytical study undertaken throughout May and June 2011 on the sample of 150 residents of "The Gerontology Centre" in Sarajevo that were above 65 years of age. The following instruments were used for the research: the Geriatric Depression Scale (GDS), modified questionnaire consisting of two parts (general data and data related to health state), and the medical records of the residents. For statistic analysis of data was used the SPSS program for Windows.

Results: According to GDS, prevalence of depression was 65.3%, out of which mild depression occurred in 46.7% cases and severe depression in 18.7%. The prevalence of verified (diagnosed) depression was 11.3 per cents.

Conclusions: According to the GD scale, unrecognised depressions seem to be almost six times more frequent (65.3:11%) than is the case with depressions diagnosed in medical records of the protégées of the Gerontology Centre in Sarajevo. Timely recognition of depression and its treating in institutions for protection of health of persons in third age of life can substantially improve the quality of life of these patients.

Keywords: persons of third age, depression, Geriatric Depression Scale – GDS

Introduction

Ageing is universal, natural process that involves members of all the biological species that are alive. The ageing becomes one of the main topics in many sciences ranging from biological through social to psychological ones. The main reason for increased exploring of the subject has to do with swift increase of percentage of elderly people in general population of the developed countries (1). Continuous growth of elderly population is evident in our country, too (2). Each community is burdened with increased needs of elderly persons, mainly those concerning the health and social protection, and this is especially case with poorer countries as is ours (3). The entire world is tending to indulge all the relevant factors – health services, scientific researches, social services, education, etc. - in synchronised efforts to create environment in which the extended life span is as good as possible, meaningful, and dignified; it is the only way of life that is worthwhile (4). According to the World Health Organisation, the main threats to the health of elderly people are: dementia, depression and suicide, as well as the cancer, cardiovascular illnesses, osteoporosis, incontinency, and injures (5). Depressive disorder, as major problem of public health, takes the high fourth place in its prevalence in general public, and is the second most frequent health problem of female population. WHO predicts that by the year of 2020 the depression would became the second health problem of the world

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and the leading health problem of the women (6). Regardless of the fact that the depression seems to be less common in later stages of life (1-3%) than is the case with middle aged persons (6-8%), the depression still represents the most frequent mental disorder among the elderly persons (7). The depression affects the quality of life of elderly persons in many negative ways, such as their productivity, relations with other persons, but also influences somatic illnesses, especially those characteristic for the third age of life (1). The researches indicate that 15% of depressive patients commit suicide; more frequently men of older age. Timely recognition and adequate medical treatment of depression in the institutions for care of persons in third age of life, along with therapies available today, may substantially improve the life of these patients. Patients suffering from depression demand multidisciplinary approach to the treatment. Its early recognition is very important, as well as the efficient and sufficiently long treatment to avoid consequences and chronic outcome of the illness. Majority of countries strive to gradually introduce new, comprehensive types of non-institutional care of persons in third age that are oriented towards the elderly person in question and his/her family (3). The principal aim of this study is to evaluate prevalence of depression and establish the ratio between the current number of diagnosed and unrecognised depression among the residents of Gerontology Centre in Sarajevo.

Methods

The research was undertaken throughout May and June 2011 among the residents of C.P.I. "Gerontology Centre" in Sarajevo. The research included randomly selected 150 protégées over 65 years of age, who voluntarily consented to be part of the research. The criteria for inclusion of examinees into the research was that they are residents of Gerontology Centre in Sarajevo, that they are over 65 years of age, and that they are psycho-physically capable to answer the questionnaire. The criteria for exclusion of residents of Gerontology Centre in Sarajevo from the examination: they were under 65 years of age or they were not psycho-physically capable to answer the questionnaire. This is a descriptive and analytical research of cross-sectional study. The instrument used for this research was the Geriatric Depression Scale (GDS), consisting of 30 Yes-No questions recommended by both the British Society of Gerontology and the Royal College of Physicians (8). Legend: 0-9 answers: no depression; 10-19: mild depression; 20-30: severe depression. The survey covered modified questionnaire consisting of 17 questions seeking general information as well as the data on health condition. Secondary source of data: medical records of the residents of Gerontology Centre in Sarajevo were used for verification of certain data. For statistical analysis of data was used the SPSS program for Windows (Version 13.0, SPSSINC, Chicago, Illinois, SAD) and Microsoft Excell (Version 11, Microsoft Corporation, Redmond, WA, SAD). Descriptive statistical analysis were used to present demographic data. Chi Square test was used for analyse nominal and ordinal variables.

Results

This was a cross-sectional study on unrecognised depression among residents of Gerontology Centre in Sarajevo. The sample covered 150 examinees of both genders over 65 years of age. Out of the total number, 60% (90) were women, while the rest of samples were men, 40% (60), as seen on the Figure 1. The age of examinees varied from 65 to 105 years, where the average value of years was Me=80 years. The interquartille range (Q1-Q3) was between 75 and 84 years of age.

The Figure 2 shows the educational structure of examined sample, clearly indicating that the big-

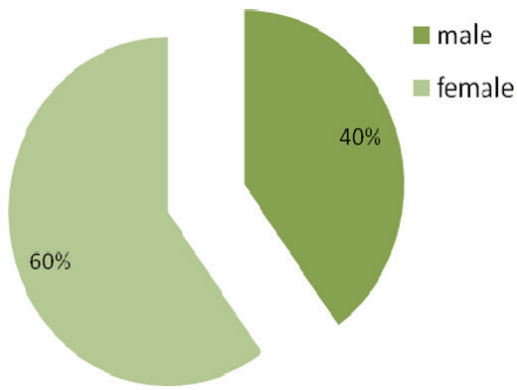

FIGURE 1. Gender structure of samples

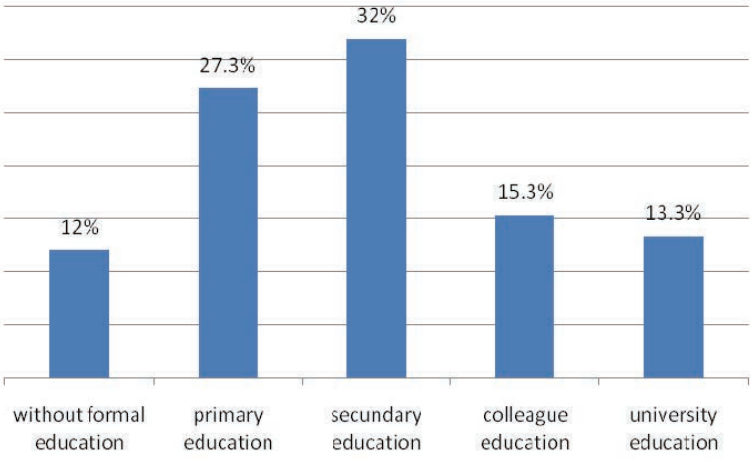

FIGURE 2. Percentual representation per level of education

gest number of examinees (32%) was of secondary education, and 27.3% of examinees had primary education. Slightly less percentage was of those with colleague (15.3%) and university degree (13.3%). The total sample had the least percentage of examinees without formal education (12%). When considered marital status of the examinees, analysis of Figure 3 clearly shows that the biggest percentage of examinees, 69% (103), involves the category of widowed persons. The results on the rest of the groups of examinees were tight: (17) 11 % - divorced, (16) 11% - married and (14) 9 % - single. By making insight into the medical records of the examinees, we had verified diagnoses of depression of 17 examinees (11 %), while the remaining number of 133 (89%) residents of Gerontology Centre had no records on such diagnose, as shown on the Figure 4. Table 1 presents the geriatric scale of depression where the examinees who got scores on the scale equal or less than 9 had no signs of depression, examinees in category from 10 to 19 scores had mild depression, and those with score from 20 to 30 suffered from severe depression. Out of the total sample measured by GDS, 34.7% (52) persons had no signs of depression, 46.7% examinees (70) had mild presence of depression, and 18.7% examinees (28) were in the scale of severe depression. The depressiveness of examinees was measured by Geriatric scale of depression and varied from 1 to 27 with average value of Me= 13, and interquartille range from 7 to 18. 133 examinees had no registries on diagnosed depression in their medical records. Out of this number, the GD scale showed mild depression in 62, and severe depression in 22 cases. 17 examinees had in their medical records registries on confirmed diagnose of depression. Out of this number only three examinees were not depressive, eight persons had mild depression, and six of them suffered from severe depression, which means that we managed to recognise through the GD scale 14 examinees as being mildly or severely depressive.

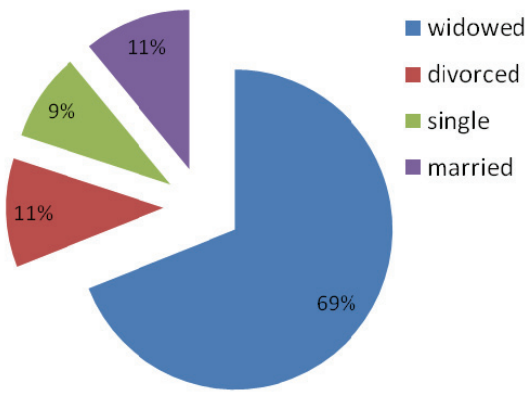

FIGURE 3. Marital status of examinees

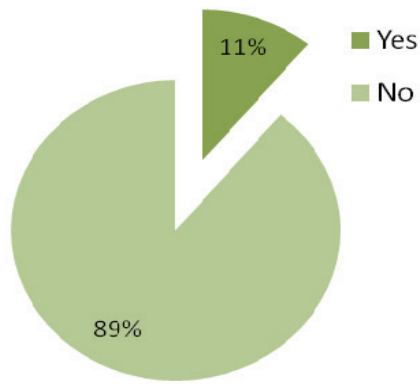

FIGURE 4. Prevalence of diagnosed depression

TABLE 1. Geriatric scale of depression evidenced on examinees

Categories of GD Scale	Number	Percentage
No depression <= 9,00	52	34.7
Mild depression 10,00 - 19,00	70	46.7
Severe depression 20,00 - 30,00	28	18.7
Total	150	100,0

TABLE 2. Rate of verified diagnose of depression and unknown depression according to GDS

Diagnosed depression	GDS categories of depression			Total
	<= 9,00	10,00 - 19,00	20,00 - 30,00	
Without	49	62	22	133
With	3	8	6	17
Total	52	70	28	150

Chi-squared test of independence showed that the connection between diagnose of depression and geriatric scale of depression is statistically significant, p=0.039. RR – risk ratio = 2.54

The examinees from the group with depression, according to GDS, have 2.5 times bigger risk of having diagnose on depression then those in group without depression according to GDS. OR – odds ratio= 2.72

Odds ratio is approximating to RR. Odds on having the diagnose of depression in the group "With depression according to GSD" is 2.7 times bigger than in group "Without depression according to GSD".

Discusion

The latest data indicate high prevalence of depression in institutions providing long-term protection and care (9). Presence of depression among residents of Gerontology Centre in Sarajevo was checked by using simple screening instrument – Geriatric Depression Scale (GDS). Depressiveness of examinees that is defined by the GD scale does not necessarily mean diagnosed depression, but is a warning sign that the person has or may have a serious problem, without being aware of it. Either mild or severe depression defined by the GD scale indicates the need for engaging entire team of experts aimed at prevention of major development of depression or provision of adequate treatment, when needed. Early recognition and treatment of depression of persons in the third age of life considerably improves the quality of life of both the elderly and those who take care of them (10). Our research had shown very high prevalence of depression occurring with residents of Geriatric Centre in Sarajevo. According to the received results, 46.7% examinees suffer with mild, and 18.7% severe form of depression, which covers 65.3% of total number of depressive protégées. By analysing our sample, we can see that: the gender structure was in favour of women, which is demographic characteristic of industrialised countries; majority of examinees had completed secondary education; and, the largest percentage of them are in status of widowed persons. When compared to researches from 2011 when Huang and associates conducted among elderly people living in nine nursing homes of Great Britain, we see that the data on their depression prevalence was 32.3% (11), and, as such, is two times lesser than ours (65.3%). Statistical data on prevalence of depression among residents of nursing homes in USA amounting to 43% also show lesser prevalence in depression than is the case with us (65.3%) (12). In 2003, Jongenelis and associates from Netherlands had gathered 36 different Dutch studies on prevalence in depression in nursing homes and found that, in average, 43.9 per cents of examinees had presence of depressive symptoms (13). The research conducted in Australian nursing homes back in 2008 showed the information that 41.1% examinees were depressive according to the GD scale (14). Somewhat bigger frequency of depression in comparison to the above mentioned research, but also lesser than in our case (65.3%), was shown in the 2011 research on elderly people in New Jersey that was conducted in eight nursing homes from 1999 to 2007 by Gaboda and associates (51.8%) (15). Throughout the year of 2010, Aribi and associates had performed analytic and descriptive study in a nursing home in Tunisia establishing that the

prevalence of depression there was 51.4% (16). Very similar data on prevalence in depression (57.7%) (17) were got in 2007 by Chahine and associates who conducted the pilot study among residents of nursing homes in Lebanon. Cross-cut study conducted in China in 2011 revealed prevalence of depression in 27% of elderly persons of urban community (18). Its comparison to previous researches on the subject proves that the prevalence of depression among elderly persons in China is constantly growing. In 2005, by using the GD scale on elderly persons living in own houses situated in urban environment of Selangor, Malaysia, Sherina and associates got the impressive result of 6.3% (19), which is incomparably less than in all of the listed researches. A research conducted in our country on the DG scale depressiveness of persons over 65 of age that were treated in ambulances for primary health protection. This research resembled to ours in sense that the sample mainly consisted of women, though the average age was 73,2±5,15 years, while in our research the age of examinees varied from 65 to 105 years, with average value of (median) Me=80 years. Their research showed that the depressiveness was present in 55% examinees (20), which do not show considerable difference in percentage when compared to our examinees (65.3%). In Serbia, the research conducted throughout the year of 2010 in the Ćuprija Medical Centre among persons of third age showed the prevalence of depression in 55% (21), which is identical to the depression prevalence results got in a BiH research on elderly persons treated in ambulances for primary health protection (55%). Prevalence of depression (55%) is somewhat lesser then in our research (65.3%), but one has to consider the fact that these two researches were conducted among elderly population living in their houses.

Conclusions

Prevalence of depression among residents of Gerontology Centre in Sarajevo was determined by GD scale and reached figures of 65.3%, out of which mild depression was registered in 46.7% cases and severe depression in 18.7% cases. The prevalence of verified (diagnosed) depression was 11%. Unrecognised depression by GD scale was almost six times more frequent (65.3:11.3%) than it was the case with diagnosed depression in medical records of residents of Gerontology Centre in Sarajevo. The connection between the diagnosed depression and geriatric scale of depression is statistically significant, p=0.039. It is necessary to draft a protocol on prevention of manifested depression in persons of third age of life that are settled in institutions for providing long-term health care, and to define preventive programmes of this disease for persons of third age living in house conditions.

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Transfusion treatment impact in the improvement of haematological parameters in patients with gastrointestinal bleeding

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Abstract

Introduction: Transfusion treatment (TT) is necessary in patients with gastrointestinal bleeding (GIB) for lost blood substitution. This study was aimed at assessing the changes in haematological parameters (hemoglobin, hematocrit, red blood cell count, white cell count, platelet count and prothrombin time) before and after TT in anaemic patients with GIB in order to analyse the effect of this treatment.

Methods: There have been included 293 patients with GIB (the average age was 57.3, ranged from 18-89 years) who were treated with TT at the Internal Clinic at the University Clinical Center Prishtina during one year period. Data for applied blood product and results of the coagulation screen (PT) were collected from the Kosovo's Blood Transfusion Center (KBTC).

Results: TT has been carried out in 404 episodes, with 714 units of concentrated red blood cells (78.6%), 189 units of fresh frozen plasma (20.8%) and concentrated platelets (0.6%), with an average dose 3.1 for transfunded patients. Average values of Hb before and after TT were 71.8 g/L and 81.4 g/L, respectively; while the average values of hematocrite before and after TT were 22.9% and 25.6%, respectively. The average erythrocytes count before TT was 2.6 respectively after treatment 2.8($p<0.0001$). The PT was carried out in the 43% of patients with GIB before treatment with FFP, but after that only in 2% of cases.

Conclusions: Having in mind difficult clinical and unsustainable situation in patients with gastrointestinal bleeding, the Transfusion Treatment resulted in the considerable improvement of the specific blood indicators.

Keywords: Transfusion Treatment, gastrointestinal bleeding, blood products, hemoglobin, hematocrit.

Introduction

Transfusion treatment (TT) is a basic element in the treatment of acute, persisting gastrointestinal bleeding, which may present a high mortality rate ranging from 5 to 10% according to the various series (1, 2). One of the main aims when treating patients with upper or lower gastrointestinal bleeding is to treat hypovolemia resulting from loss of blood (3, 4). The early management of GIB is based on resuscitative measures of fluid infusion or blood transfusion to reverse the direct consequences of bleeding; prevention of end-organ damage induced by the bleeding, such as hypoxia (5). The amount of transfusion of red blood cells and blood products must be individualized, depending on the characteristics of each specific case (speed of blood loss, state of cardiovascular reserve, other organ or vital system pathology, injury causing bleeding, re-bleeding etc.) (6, 7). According to the guidelines, in the absence of risk factors and symptoms, the patients should not be given a blood transfusion regardless of their haemoglobin level. However, few studies have attempted to validate appropriateness of blood transfusion according to these criteria (8).

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At the present time it is very hard to establish the appropriateness of RBC transfusion in GIB (9). Assessing whether a patient is actively bleeding or not at the time of transfusion is sometimes difficult and the haemoglobin value alone at presentation may not accurately reflect blood loss and or help decision-making about the need for RBC transfusion (10). An Hb of >10g/dL has been used as a cut off for inappropriate transfusion in those patients who did not present with signs or symptoms of shock, as per BSG guidelines (11). RBC transfusion is not indicated in haemodynamically stable patients where no haemoglobin value is available (1). Transfusion in those who are haemodynamically unstable at presentation with acute bleeding is regarded as appropriate (12). For patients who have stopped bleeding but are regarded as being at high risk of re-bleeding or death, a top-up transfusion to the haemoglobin of 10g/dL is reasonable (13-15). Coagulopathy (defined as an international normalized ratio of prothrombin time >1.5) or thrombocytopenia (<50,000 platelets/μl) should be treated using fresh frozen plasma or platelets, respectively (4). Also laboratory investigations: full blood count, urea and electrolytes, liver function tests and coagulation screen should be measured at presentation with acute GIB for transfusion data (16). The initial haematocrit on admission is best interpreted when a recent prior baseline haematocrit is available for comparison. Serial haematocrits are helpful to assess the severity of the GIB but should be integrated with the hemodynamic assessment because overhydration falsely depresses the haematocrit (5). Equilibration of hemoglobin concentration after transfusion has been estimated to take about 24 hours, in persons who have not bled recently (17). This study was aimed at assessing the changes in haematological parameters (hemoglobin, hematocrit, red blood cell count, white cell count, platelet count and prothrombin time-PT) before and after treatment with blood products in anaemic patients with GIB in order to analyse the effect of this treatment.

Methods

Study Subjects

The study included 293 patients with gastrointestinal bleeding during one year period, who had been treated at the Internal Clinic in the University Clinical Center in Prishtina (UCC). The males were represented at 174 or 59.4% of cases with GIB compared to females with only 119 or 40.6% of cases. Average age of patients was 57.3 with SD 16.03 (range 18 to 89 years) (Table 1).

TABLE 1. Mean age of patients with GIB treated with blood products

Statistics parameters	Age (years)
Mean ± SD	57.3 ± 16.03
Sample size	293
Range	18-89
Median	59
Confidence Interval (CI) < 95%	55.8
Confidence Interval (CI) > 95%	58.85

Medical history record, diagnosis and treatment of patients were performed at the Internal Clinic in UCC. The overall treatment of gastrointestinal bleeding included also TT. During bleeding episodes, treatment with transfusion therapy was performed with concentrated red blood cells, fresh frozen plasma (FFP) and occasionally with concentrated platelets. The data were collected from protocols and medical history at Internal Clinic in the UCC in Pristine. Also it was collected the data for prepared and applied units of concentrated red blood cells, fresh frozen plasma and concentrated platelets and results of the coagulation screen from the protocols of Kosovo's Blood Transfusion Center in Pristine (KBTC). In separate database it was evidenced all collected data for the patients with GIB which had been treated by TT. Patients with GIB treated only with FFP or concentrated platelets were excluded. Also there were excluded patients without hematological parameters before and after TT. In addition, the type of used therapy (concentrated erythrocytes, frozen fresh plasma or concentrated platelets) and the type of GIB would be interesting to investigate, with the purpose to have greater experience in order that for the future to draw up a long-term strategy for more successful use of the transfusion therapy. All the patients involved in this work are divided into groups as per their age, gen-

der, and localization of bleeding (the patients with upper GIB and the patients with lower GIB) which were treated with blood product. In addition to this, it's interesting the therapy use percentage studying with blood components and that as per the type of the product (concentrated erythrocytes, frozen fresh plasma and concentrated platelets), overall group of GIB. Also, it was calculated the mean transfused dose per patients for all applied blood products. All this is done with the purpose to have greater experience in order that for the future to draw up a long-term strategy for more successful use of the transfusion therapy. Especially, there were analyzed hematological results (hemoglobin, hematocrit, red blood cell count, platelets count, and white blood cell count) before and after transfusion treatment with blood products (the measurements of hematological results were performed in blood counter Medonic 3200 at the department of biochemistry in Diagnostic Center-University Clinical Center in Prishtina). The patients who were treated with plasma have carried out the haemostatic tests before and after the transfusion of fresh frozen plasma (Prothrombine time - PT was performed in Dia Med-x Haemostasis), at the Department of haemostasis in BTC). Also the patients were divided into groups on the basis of the hemoglobin value (after bleeding episodes): group I Hb level was <50 g/L, group II 50-70 g/L, and group III with Hb >70 g/L, which have been treated with concentrated Erythrocytes.

Statistical analysis

Statistical analysis was performed using INSTAT 2 statistical software system. A *t* test was used to calculate the difference (p value) in the hematological parameters before and after transfusion treatment in the patients with gastrointestinal bleeding. There were calculated average values, standard deviation, minimum values, maximum values, and median, for all hematological parameters. For all blood products were calculated average transfused dose/unit per patient.

Results

Transfusion treatment with blood products it has been carried out in 293 patients with GIB, who received 908 units of blood products with mean transfused unit 3.1 for patient. TT is more often needed in upper GIB (783 units of blood products were used in treatment of 234 or 79.9% patients), than in lower GIB (59 patients received 125 blood product units). Mean transfused units of blood products in upper GIB was higher than in lower GIB (3.3 respectively 2.1), Table 2. Upper GIB is more often recorded than lower GIB in all patients (males and females). This treatment resulted in significant improvement of blood specific indicators (Hemoglobin) after treatment with the concentrated red blood cells of patients with gastrointestinal bleeding. Mean values of Hemoglobin prior to transfusion were 71.8 g/L (with SD 19.2, minimal and maximal values 47-145); and after receiving transfusions of concentrated erythrocytes was 81.35 g/L (with Standard Deviation 18.8 minimal and maximal value 47-130 g/L), with p <0.0001 (Table 3).

TABLE 2. Transfusion treatment with blood products in patients with Gastro Intestinal Bleeding

Blood products	Upper GIB N (%)	Lower GIB N (%)	Total GIB N (%)
Concentrated Erythrocytes Unit	613 (78.3)	101 (80.8)	714 (78.6)
FFP Unit	165 (21.1)	24 (19.2)	189 (20.8)
Concentrated platelets Unit	5 (0.6)	0	5 (0.6)
Total Units	783 (100)	125 (100)	908 (100)
Total Patients	234 (79.9)	59 (20.1)	293 (100)
Patients-Male	134(72.8)	40(27.2)	174(100)
Patients-Female	100(85)	19 (15)	119 (100)
Mean transfused unit/patient	3.3	2.1	3.1

TABLE 3. Changes of Hemoglobin before and after transfusion treatment in patients with Gastro Intestinal Bleeding

Statistics parameters	Hb g/L before	Hb g/L after
Mean ($\bar{X}$) ± SD	71.9 ± 19.2	81.4 ± 18.8
Sample size	404	402
Range	47-145	47-130
Median	70	81
Confidence Interval (CI) < 95%	70.03	79.5
Confidence Interval (CI) > 95%	73.7	83.2
	p <0.0001	

TABLE 4. Changes of Hematocrit before and after transfusion treatment in patients with Gastro Intestinal Bleeding

Statistics parameters	Htc % before	Htc % after
Mean ($\bar{X}$) ± SD	22.85 ± 5.4	25.61 ± 5.06
Sample size	404	402
Range	10-45	10-38.6
Median	22.6	26.0
Confidence Interval (CI) < 95%	22.3	25.1
Confidence Interval (CI) > 95%	23.36	26.09
	p <0.0001	

TABLE 5. Changes of Erythrocytes count before and after transfusion treatment in patients with Gastro Intestinal Bleeding

Statistics parameters	Red blood cell count $x10^{12}$/L before treatment	Red blood cell count $x10^{12}$/L after treatment
Mean ($\bar{X}$) ± SD	2.6 ± 1,1	2,9 ± 0.65
Sample size	404	402
Range	1.06 - 20.5	1.1 – 4.8
Confidence Interval (CI) < 95%	2.5	2.8
Confidence Interval (CI) > 95%	2.75	2.9
	p<0.0001	

TABLE 6. Changes of White blood cells count before and after transfusion treatment in patients with Gastro Intestinal Bleeding

Statistics parameters	White blood cell count $x10^9$/L before treatment	White blood cell count $x10^9$/L after treatment
Mean ($\bar{X}$) ± SD	11.2 ± 9.04	10.8 ± 9.2
Sample size	404	402
Range	0.9 – 20.5	1.8 – 4.8
Median	10.4	9.9
Confidence Interval (CI) < 95%	10.3	11.7
Confidence Interval (CI) > 95%	12.7	2.9
	p<0.001	

TABLE 7. Changes of platelet count before and after transfusion treatment in patients with Gastro Intestinal Bleeding

Statistics parameters	Platelet count $x10^9$/L before treatment	Platelet count $x10^9$/L after treatment
Mean ± SD	221.98 ± 109.7	230.4 ± 108.1
Sample size	404	402
Range	24 – 696	38 - 631
Confidence Interval (CI) < 95%	211.5	219.9
Confidence Interval (CI) > 95%	232.5	240.99
	p<0.001	

TABLE 8. Application of concentrated red blood cells according to the Hb values after bleeding episodes in patients with gastrointestinal bleeding

Patients No (293) %	20 6.8%	189 64.5%	84 28.7%
Hb level g/L	<50 g/L	50-70 g/L	>70 g/L
No of episode (404)	30	174	200
Mean Hb ($\bar{X}$) ± SD	42.6 ± 3.8	61 ± 5.6	83.5 ± 10.5

It was found a significant difference between the mean value of hematocrit before and after blood transfusion treatment in patients with GIB (22.9% respectively 25.6% with p<0.0001) Table 4. The changes were evident in the values of red blood cells count before and after application of blood transfusion in GIB, where, the average values of red blood cells count were 2.65, and after the transfusion of this treatment the values rose in $2.867x10^{12}$/L with value p<0.0001 (Table 5). Mean values of the white cell count before and after transfusion treatment have undergone a slight decrease (11.21 respectively $10.8x10^9$/L) value p<0.001(Table 6). Blood component therapy has resulted in improvement of the situation, causing increased platelet count. Mean values of the platelet count before blood transfusion were 221.99 (SD 109.72; minimal and maximal value 24.0- 696.0) and after transfusion were 230.42 (SD 108.1 with minimal and maximal value 38.0-631) and value p<0.001 (Table 7). Only 6.8% of patients with GIB who were treated with concentrated red blood cells have hemoglobin values lower than 50 g/L, while the most of them (82.9%) have been treated when Hb values was above 50 g/L (Table 8).

TABLE 9. Values of PT before and after application of Fresh Frozen Plasma in patients with Gastro Intestinal Bleeding

No of cases treated with FFP	Statistical Parameters of PT	Before Treatment	After treatment
	Nr	51	2
	%	44.0	1.7
Upper GIB	Mean PT	70.5	80
No 116	SD	24.6	7.1
	Min	10	75
	Max	120	85
	No	10	1
	%	38.5	3.8
Lower GIB	Mean PT	74.8	56
No 26	SD	22.3	56
	Min	40	56
	Max	109	56
	Nr	61	3
	%	43.0	2.1
TOTAL	Mean PT	71.2	72
No 142	SD	24.1	14.7
	Min	10	56
	Max	120	85

In Table 9 have been presented 142 patients who were treated with plasma; only 61 of them were tested with PT, before treatment with Fresh Frozen Plasma, and after that only 2.1% of cases were tested with PT. Fresh Frozen Plasma are given to patients with GIB with average values of PT 71.2% before transfusion and after transfusion this value rise to 72%.

Discussion

GIB should be always appreciated as a major emergency, regardless of the amount of blood lost and gravity of the clinical situation (18). Despite the progress that has been made in past years, in determining the early lesion responsible for gastrointestinal bleeding (19), and in assessing the gravity of the situation accurately and to control its overall, mortality still remains high 10% (20) to 33% (11). It is important to determine the exact amount of blood lost, which is difficult to do at the moment of meeting with the patient. The decline in hematocrit reflects the degree of blood loss after a delay of 24 hours or more from an acute GIB. Serial hematocrits are helpful to assess the severity of a GIB but should be integrated with the hemodynamic assessment because overhydration falsely depresses the hematocrit (5, 21). Anemia is common in the critically ill patients with GIB and results in the frequent use of red blood cell (RBC) transfusions (22, 23). The initial hematocrit on admission is best interpreted when a recent prior baseline hematocrit is available for comparison (5, 24). Other important laboratory parameters include the coagulation profile; routine serum chemistries, especially the blood urea nitrogen (BUN) and creatinine levels; and serum biochemical parameters of liver function, also are helpful to assess the severity of a GIB (5, 11). Application of blood products should definitely be followed by the determination of hematological parameters before and after treatment in order to know when to start and stop the transfusion treatment, considering that this treatment carries the possibility of early and later transfusion complications (25). The transfusion treatment with blood product in patients with GIB has been carried out in 404 transfusion episodes which resulted in improvement of specific blood indicators. Our data showed that the post-transfusion rise of hemoglobin was about 10 g/L after the treatment with the concentrated erythrocytes in patients with GIB. The administration of 2 units of packed red cells elicited a 24-hour increase of 22.4 +/- 6.8 g per L in haemoglobin concentration, data represented by Elizalde et al (26). Hematocrit levels experienced similar changes after TT in patients with GIB. Post transfusion change of hematocrit was 2.8%. Data showed by Khilnani represented post transfusion hematocrit change up to 3% (3). But data showed by other authors represented more changes in hematocrit value after TT (5.8%) (27). The changes of value of red blood cell before and after TT were $0.2x10^{12}$/L in patients with GIB. Data offered by Ho CH presented more post transfusion change of red blood cell count up to 0.7 x 10^{12}/L after the transfusion treatment in patients with chronic anemia. Serious situation in patients with GIB should evaluate not only with determining the red blood cell count, the hemoglobin and hematocrit level, but also through other indicators as the white cell

count, platelet count, PT and other indicators (28). Transfusion treatment with blood products has resulted in declining the leucocytes average count after transfusion: (11,2 x 10^9/L before transfusion, i.e. 10,8x10^9/L after transfusion). Data showed by Barkun - International consensus recommendations on the management of patients with GIB (5) represented that leukocytosis may be secondary to the stress of acute bleeding. The transfusion treatment with blood products, erythrocytes and platelets, was not marked by significant increase of average values of platelet count before and after transfusion, where the post transfusion change was 7,5x10^9/L. Data from other authors indicate decrease in the platelet count with post transfusion change, -40x10^9/L (27). There are many recommendations about Application of concentrated red blood cells according to the Hb values: Hebert et al. (28) (Canada, 1993) with pretransfusion hemoglobin mean level 8.6 g/dl; Vincent et al.(29) (Western Europe 1999) with pretransfusion hemoglobin mean level: 8.4; Rao et al.(30) (UK 1999) with pretransfusion hemoglobin median level: 8.5 g/dl; Corwin et al.(31) (USA 2000 – 2001) with pretransfusion hemoglobin mean level: 8.6; Walsh et al.(32) UK (Scotland 2001) with pretransfusion hemoglobin median level: 7.8 g/dl; French et al. (33) (Australia and NewZealand 2001) with pretransfusion hemoglobin median level: 8.2 g/dl; Vincent et al. (34) (Western and Eastern Europe 2002) with pretransfusion hemoglobin median level: 8.2 g/dl; Westbrook et al.(35) (Australia and New Zealand 2008) with pretransfusion hemoglobin mean level: 7.7 g/dl.

Erythrocytes will be transfused when the patients had Hb less than 70 g/L with stable homodynamic condition without bleeding; then when the patients had Hb below 80g/L with over 65 years, with stable homodynamic condition and without bloodshed; and patients with various serious cardio respiratory diseases, patients who received blood transfusion with Hb values over 100 g/L and who had stable homodynamic condition counted as unnecessary transfusions (10). The application of transfusion therapy in patients with GIB according to data of some authors (36), is made in the average values of hemoglobin 84 g/L while other authors referred mean values of Hb 94 g/L before application of TT (37). Other data from the literature (38), have resulted in greater participation of patients (up to 92%), who as a criterion for treatment with blood transfusion had Hb levels below 70 g/L, compared with our data where this participation of the patients was 71.3%. The data showed by Mathoulin-Pelssier et al, represented TT in patients with GIB in 175 hospitals in France. They found that transfused mean dose of blood product was 3.7 per patient. Patients with GIB were treated with concentrated erythrocytes (83.4%), FFP (14.8%) and concentrated platelet (1.73%) (39). The similar data we found in our patients, who were treated with blood products: erythrocytes, FFP and concentrated platelet (78.6%, 20.8%, and 0.6%) with mean transfused dose 3.1 per patient. Data showed by other authors (29, 30, 33) found the mean transfused dose between 4.8-6.75 per patient. The data from UK wide audit of GIB showed inappropriate transfusion more common for platelet and FFP transfusion than for red blood cells. In this study, PT testing was performed in 71% of patients with GIB who have received FFP. 27% of the tested patients have had normal values of PT and INR 1,5 and these are regarded as unnecessary transfusions (10). Therefore the application of Fresh Frozen Plasma should be used when the values of PT are prolonged for 3 seconds and INR is under 1,5. PT testing was performed in 43% of our patients (61/142) before transfusion treatment with Fresh Frozen Plasma, but after that, only 2, 1% where retested, with minimal and maximal value of PT 20% respectively 120%. But Lee et al found INR values of PT 2,1 plus SD 0,11 in patients (68/71) with gastrointestinal bleeding (40). Also and data showed by Defreyne Luc et al presented PT < 50% in 25 % of patients with GIB (41).

Conclusions

Based on this study it can be concluded that the transfusion treatment with blood and blood products is more than necessary for the patients with gastrointestinal bleeding. Having in mind difficult clinical and unsustainable situation of these cases the treatment of the patients with gastrointestinal bleeding with blood respectively with blood products has resulted in the considerable improvement of the specific blood indicators.

Competing interests

This study is supported by Kosovo' Blood Transfusion Centre in Pristine and Internal Clinic in the UCC in Pristine.

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Nutritional awareness and habits of Premier league sportsmen in the Sarajevo Canton

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Abstract

Introduction: Selection of optimal nutrition for physical activity of sportsmen depends on several factors, and includes the type and duration of exercises, total energy consumption, time needed for recovery, and nutritional preferences. Proper nutrition of sportsmen relies on adequate combination and participation of all the macronutrients. The aim of this research was to analyse and determine the nutritional awareness and habits of sportsmen depending on their age and type of sports they indulge.

Methods: This is a cross-sectional, descriptive, and analytical study undertaken from May to July 2011 on the sample of 100 examinees/sportsmen of the Football Club "*Željezničar*" and Basketball Club "*Bosna*".

Results: General awareness of sportsmen on basic principles of proper nutrition is unsatisfactory. Statistical significance per type of sport and age of sportsmen is proved through representation of macronutrients in their nutrition. For 49.1% footballers and 52% sportsmen over 19 years of age the most important combination of macronutrients resembles the model of carbohydrates-proteins-fats, while 48.9% of basketballers and sportsmen under 18 prefer proteins-carbohydrates-fats. The study had shown a statistically significant difference (p=0.01) between the footballers and basketballers with regard to the type of meal they consume before the trainings.

Conclusion: Insufficient knowledge on the subject reflects in bad nutritional habits, especially those related to the number and arrangement of daily meals in comparison to respective sports activities.

Keywords: sportsmen, nutritional habits, macronutrients

Introduction

Nutrition of sportsmen seems to get more and more attention of scientists striving to acquire even better results while preserving their health, composition of the body and mass, as well as to fulfil the energetic needs for their physical activities. Sportsmen nutrition should be focused on: satisfying the energetic needs, and providing sufficient amount of energy for work of muscles and other tissues. Importance of proper nutrition is placed right behind the talent and the exercise. Nutrition of sportsmen must be organised in a way to provide for certain types of activities, such as speed and anaerobic endurance. The energy released in chemical processes of decomposition of carbohydrates, fats, and proteins is used for work of muscles and conduction of basic processes in organism (1). The general public is suggested to consume carbohydrates in amount of 50-55% of the total number of calories (2), while the official nutritional guidelines for sportsmen unanimously recommend nutrition that is 60-70% rich in carbohydrates. However, a better way for determining actual carbohydrate needs of a sportsman has to do with recommendation that the amount of carbohydrates is proportional with the body mass, and is to be expressed in grams per kilogram of body mass (g/kg BM). Daily intake of carbohydrates for common needs varies from 5 to 7 g/kg, while the needs for increased endurance of sportsmen vary from 7 to 10 g/kg/a day. Burke and associates proved that amplified availability of carbohydrates improves the endurance during increased physical activity (3). A sportsman needs carbohydrates for they: secure energy sufficient for satisfying the majority of calo-

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rie needs, create optimal reserves of glycogen, provide recovery of muscles after the physical activity, and secure quick and easily accessible source of energy for maintaining the level of glucose in blood (4). Recommended level of protein intake for the general public varies from 12 -15% of total calories intake, or daily intake of 0.8 g/kg of body mass (2). There are several reasons why the sportsmen need to take more proteins than is recommended to general population: they have lesser fat free mass, they lose proteins trough urine (proteinuria) where the amount of proteins excreted through urine proportionally increases with increase of intensity and length of exercise, that during the physical activities they burn small amount of proteins (approximately 5%), and they need additional amount of proteins for recovery of muscles damaged during the trainings (5). The research undertaken by Kerksick and associates showed that sportsmen indulged in intensive trainings have increasing need for proteins so their daily intake should vary from 1.4-2.0 g/kg. Sportsmen who in their nutrition use smaller amount of proteins than the indicated one, demonstrate slower recovery after trainings and are facing increasing risk of loss in body mass (6). Useful effects of omega-3 fatty acids may influence the performance of sportsmen in following manner: increase in supply of oxygen and nutriments to the muscles and other tissues, increase in aerobic metabolism, increased secretion of somatotropin (growth hormone), and reduction of muscle soreness, which can contribute to the time needed for recovery after trainings (7). The study conducted by Klein and associates proved that sportsmen that regularly indulge endurance sports for the source of energy in a moderate exercise more frequently use fatties than is the case with recreational sportsmen (8). The dynamics of intake of the energetic substances or the arrangement of meals should be harmonised with the dynamics of the expenditure of energy. The researches show that obedience to this rule helps sportsmen to maintain their fat free mass, lower the level of body fats, increase the feeling of wellbeing and improve results gained in the sports. The sports nutritionists indicate that the sportsmen generally do not drink nor eat enough (9, 10). Additionally, intake of nutrients is not adequately arranged and affects both the body conformation and the results (11). The research conducted on national level by Bernadot and associates indicates the fact that the common pattern of sportsmen nutrition, characterised by irregular meals and intake of bountiful meals by the end of day, is not a path to good results acquired in sports, for it causes a major loss of energy (12). There are many studies on frequency of taken meals, which ascertain that more often meals lead to lessening of body fats and increasing of the body mass. Additionally, gastrointestinal tract difficulties occurring due to bountiful meals seem to lessen (13). The aim of this research was to analyse and determine level of awareness on nutritional habits of sportsmen depending on their age and type of sports they indulge.

Methods

The study was conducted from May to July 2011 in the area of Sarajevo Canton, and covered participation of 100 sportsmen from two clubs, the Football Club "*Željezničar*" (43 football players) and Basketball Club "*Bosna*" (57 basketball players). The research involved all the senior and cadet players from the two clubs. The inclusion criteria: voluntary consent to participate in the research, and to regular exercises/trainings. The exclusion criteria: unwillingness to participate in the research, and irregular exercises/trainings. The survey was carried in a way that sportsmen were given questionnaire consisting of 50 questions to provide their written opinion. The survey covered modified questionnaire on general principles of proper nutrition (number of meals, type of groceries used, and frequency in use), and specific items on sportsmen nutrition (presence of macronutrients, type and time of meals in comparison to trainings, the supplements). The survey was aimed to provide sufficient amount of data on nutritional habits and risks related to nutrition of sportsmen. Through 18 questions was checked the knowledge of sportsmen on general principles of proper nutrition. Depending on the number of correct answers, the knowledge of sportsmen was evaluated as: unsatisfactory (0-8 correct answers), satisfactory (9-13 correct answers), and excellent (14-18 correct answers). For statistical analysis of data was used the SPSS program for Windows.

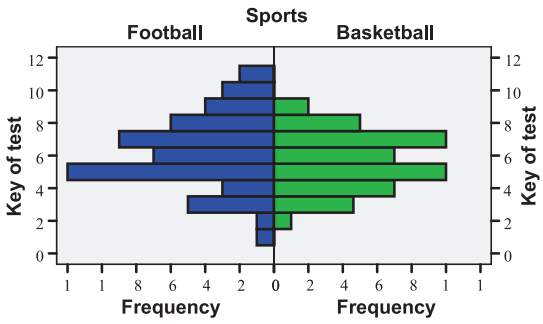

FIGURE 1. Test resultson awareness of sportsmen per type of sport and age

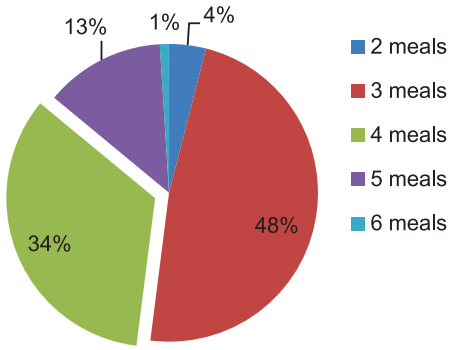

FIGURE 2. Number of daily meals

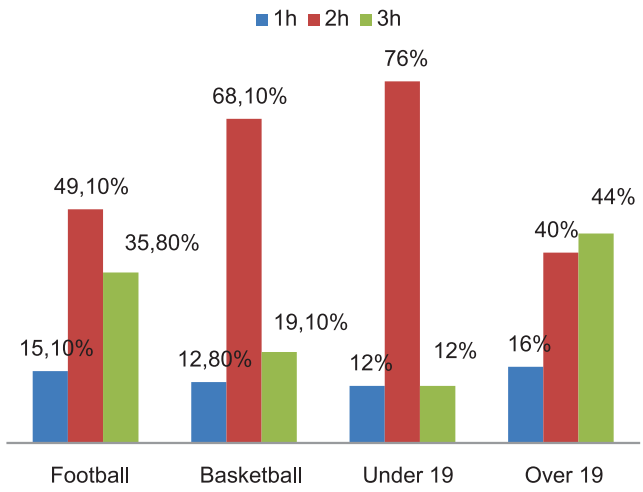

FIGURE 3. Time of consumption of the last meal prior to the training, depending on age and type of sports indulged

TABLE 1. Macronutrients per importance in nutrition depending on age and type of sports

Type of sports		Carb.hyd-Prot.-Fats	Carb.hyd.-Fats-Prot.	Prot.-Carb. hyd.-Fats	Fats-Carb. hyd.-Prot.	Total
Football	N	26	5	20	2	53
	%	*49.1*	*9.4*	*37.7*	*3.8*	*100*
Basketball	N	13	1	23	10	47
	%	*27.7*	*2.1*	*48.9*	*21.3*	*100*
Total	N	39	6	43	12	100
	%	*39.0*	*6.0*	*43.0*	*12.0*	*100*
Age						
Under 19	N	13	3	22	12	50
	%	*26.0*	*6.0*	*44.0*	*24.0*	*100*
Over 19	N	26	3	21	0	50
	%	*52.0*	*6.0*	*42.0*	*0*	*100*
Total	N	39	6	43	12	100
	%	*39.0*	*6.0*	*43.0*	*12.0*	*100*

Results

Differences in knowledge on proper nutrition between the sportsmen are insignificant, for both the football and basketball players had in average under 8 points. Sportsmen over 19 years of age had 6.28±2.27, while those under 19 had 5.64±1.80.Sportsmen usually have 3 meals a day (48%);next category has 4 meals a day(34%), five meals take 13% of sportsmen, and 2 meals a day-take4%.Footballers for the most important combination of nutrients find carbohydrates-proteins-fats (49.1%), then proteins-carbohydrates-fats (37.7%), while the least important combination for them concerns fats-carbohydrates-proteins (3.8%). For basketball players the most important combination is proteins-carbohydrates-fats (48.9%), then carbohydrates-proteins-fats (27.7%), fats-carbohydrates-proteins (21.3%), and carbohydrates-fats-proteins(2.1%). For sportsmen over 19years of age the most important combination covers carbohydrates-proteins-fats (52%), while those under 19 think that the most important combination is that of proteins-carbohydrates-fats(44%). The examinees most frequently have their last meal 2 hours prior to the training, though those over 19 usually have their last meal 3h prior to the training (44%). Footballers most frequently have meal with carbohydrates (50.9%), while the basketballers choose proteins(48.9%).

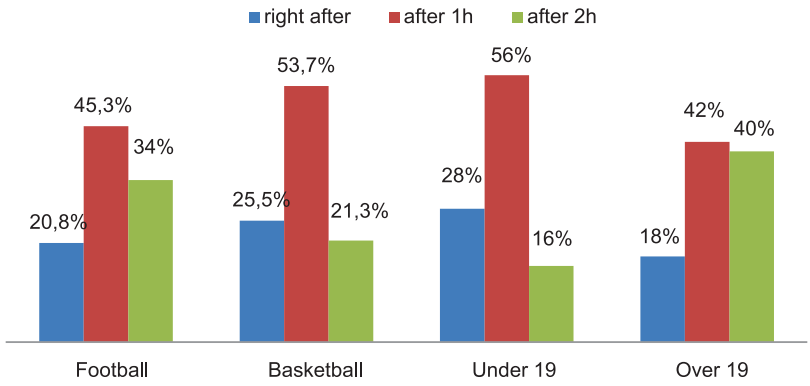

FIGURE 4. Time of consumption of meal after the training per type of sports and age

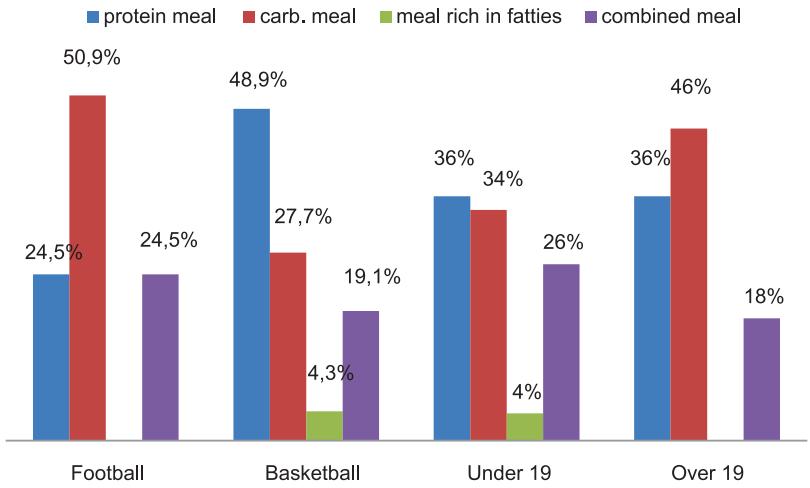

FIGURE 5. Type of meal most frequently used after the training per type of sports and age

TABLE 2. Type of meal most frequently used after the training per type of sports and age

Type of sports		Meal rich in proteins	Meal rich in carbohydrates	Meal rich in f atties	Combined meal	Total
Football	N	25	13	0	15	53
	%	*47.2*	*24.5*	*0*	*28.3*	*100*
Basketball	N	25	10	1	11	47
	%	*53.2*	*21.3*	*2.1*	*23.4*	*100*
Total	N	50	23	1	26	100
	%	*50.0*	*23.0*	*1.0*	*26.0*	*100*
Age						
Under 19	N	29	9	1	11	50
	%	*58.0*	*18.0*	*2.0*	*22.0*	*100*
Over 19	N	21	14	0	15	50
	%	*42.0*	*28.0*	*0*	*30.0*	*100*
Total	N	50	23	1	26	100
	%	*50.0*	*23.0*	*1.0*	*26.0*	*100*

With regard to the age, the sportsmen over 19 most frequently take carbohydrate meal, 46%, where sportsmen under 19 take the one with proteins, 36%. After the training, the examined sportsmen usually consume food rich in proteins, which is the case for 47.2% footballers, 53.2% basketballers, 58% sports men under 19 and 42% sports men over 19.The food rich in fats is the least consummated food.

Discussion

The researches made up to now show that the sportsmen possess minimum knowledge on nutrition. Sportsmen who educate themselves on nutrition

demonstrate considerably higher level of awareness, which results in more adequate nutrition and in avoiding groceries that can harm them (14). Education on nutrition is very important for sportsmen, because the proper nutrition is, along with talent and training, the key to success and preservation of health of each sportsman. When it comes to nutrition, their main field of interest should concern the adequate proportion of macronutrients. Proper representation of macronutrients important for good health and performance in sports provided the footballers (49.1%) unlike 48.9% of basketballers, who had proteins on the first place. Such view of basketballers can be explained by the fact that they were younger than the footballers who wanted to increase their muscle mass through intake of proteins. This was additionally supported by results per age, because the elder sportsmen preferred carbohydrates (52%), while44% of those under 19 were for proteins. Researches on intake of nutrients of footballers showed that their nutrition is similar to that of general population. It should be highlighted that the research undertaken by Kirkendal showed that sportsmen consume considerably lesser amount of carbohydrates, and high percentage of fats (15). Similar results were gained in Croatia, where the greatest discrepancies in daily intakes were determined for carbohydrates and fats. Daily intake of carbohydrates was lesser, while the intake of fats exceeded the recommended values (16). High percentage of sportsmen from our research even believes that the food rich in fats should come first. Such attitude is not good, for high percentage of fats in nutrition can have negative consequences on both the health and the sports performance. It is the fact that burned fats release the biggest amount of energy, but the sportsmen should keep in mind that this process requires expenditure of more oxygen. Thus, with 1 litre of oxygen used for burning carbohydrates one gets 5kcl of energy, unlike 4.7 kcal got through burning the fats (4). Fats are important for nutrition of sportsmen, especially for those indulging the endurance sports, because they represent reserve source of energy. However, one should pay attention to the type of fats included in nutrition. The nutrition should include mostly unsaturated fatty acids. This is the rule that applies for both the sportsmen and general population. The researches on influence of omega 3-fatty acids on sports performance did not prove any advancement in strength and endurance, nor in relieving ore muscles (7, 17). Our study shows that even 46% of sportsmen consider proteins for the most important nutrients. Sportsmen need to know that the main role of proteins is of constitutive character, so they are not good source of energy because their combustion results in lot of metabolic waste. Aside to number of daily meals, it is also very important the keep in mind the time before and after trainings when the food was taken, as well as the type of groceries consummated. Footballers most frequently consume their last meal 2 hours before prior to training (49.1%), which also applies for basketballers (68.1%). When the age is considered, the majority of sportsmen under 19 consume their last meal 2 hours prior to training (76%), unlike those over 19 who take their last meal 3 hours before the training. The meal taken before the training should prepare them for the fore coming physical activity. One should be careful of the timing of food consummation because indulging in training with food still present in stomach can cause nausea and vomiting. At the same time, one should also keep in mind the type of groceries used, because on them depends the speed of gastric emptying (18). The researches had shown that the abundance of meal taken before the training and timing of its consumption are interlinked. Since the majority of sportsmen do not like to train with full stomachs, they should have smaller meals rich in carbohydrates that are consummated 2-3 hours before the training. In case the meal consists of proteins and fats, the consumption time extends to 4 hours before the training (19-22). The meal to be consumed after the training should refill the spent reserves of glycogen in shortest time possible, and that is why its consumption should be initiated right after the training. Researches of Bloom and associates showed that the fastest refilling the glycogen depots occurs with highest rate of enzyme of glycogen-synthesis, which is just after the training. Each delay in meal for one hour or more is slowing the regeneration of glycogen reserves and extends the recovery time (23). There is about the same number of footballers and basketballers who eat their mail one hour after the training. Sportsmen under 19 have better habits than

the elder ones, because 84% of them do eat after the training, unlike the elder sportsmen who in 40% of cases eat after two hours after the training. The researchers showed that the consumption of carbohydrates right after the training results in higher level of glycogen after 6 hours, than is the case if the meal is taken 2 hours after the training (24, 25). Time of pre-training meal consumption is tightly connected to the type of meal consummated. Footballers most frequently consume food rich in carbohydrates (50.9%), and the same percentage of them also take both protein and combined meals. Before the training, basketballers most frequently consume food rich in proteins(48.9%), and 4.3% consume food rich in fatties. When considered their age, we can say that sportsmen over 19 have better habits, because 46% of them before the training take meal rich in carbohydrates, while sportsmen under 19 have almost the same intake of proteins (36%) and of carbohydrates (34%). According to recommendations of the American Institute for Sports Medicine, as well as both American and Canadian Dietitian Association, sportsmen should have pre-training intake of a meal rich in carbohydrates to maintain the level of glucose in blood, moderate amount of proteins and relatively small amount of fatties and fibres to ease the stomach discharging and evade gastrointestinal difficulties (26). Post-exercise meals of sportsmen are of great importance, too, influencing the recovery of used reserves of glycogen and the speed of the process. Lesser number of sportsmen involved in this research have a good habit of post-exercise consumption of food rich in carbohydrates (24.5% of footballers, 21.3%basketballers, 18% of sportsmen under 19, and 19. 28%sportsmen over 19). Such routine will not help sportsmen to refill empty depots of glycogen, to recover and adequately prepare for the following training. American Institute for Sports Medicine, as well as the American and Canadian Dietitian Association recommend consumption of carbohydrates within 30 minutes after the training (27). Researches showed that consumption of smaller amount of proteins will not affect refill of glycogen in muscles and liver (28), but will contribute to quicker recovery of muscles (29).

Conclusions

Sportsmen showed insufficient level of awareness in field of general principles of proper nutrition and of specific nutrition needed for sportsmen. Footballers and basketballers have the same level of knowledge on the subject, where slightly better knowledge was evidenced with sportsmen above 19 years of age over those under 19. The sportsmen do not have knowledge on daily needs for macronutrients, role of macronutrients in nutrition, nor on the basic principles that are specific and important for nutrition of sportsmen. Insufficient knowledge is reflected in bad nutritional habits evidenced in the number /organisation of daily meals and the sporting activity they indulge. When considered the type of meal and the sporting activity, the footballers seem to have better habits that the basketballers, and in respect of their age, sportsmen over 19 win over those under 19.

Conflict of interest

Authors declare that there are no conflicts of interest associated with this study.

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Blood urea nitrogen/creatinine index is a predictor of prerenal damage in preeclampsia

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Abstract

Introduction: Preeclampsia is a disease whose etiology is not very clearly explained. The aim of this study was to investigate the importance of blood urea nitrogen (BUN)/creatinine ratio in diagnosing preeclampsia and evaluating prognosis.

Methods: The patients in this research were examined and diagnosed in the Department of Obstetrics and Gynecology, University Clinical Centre of Kosovo. Control group included 25 pregnant women with a normal blood pressure and with a gestational age of more than 20 weeks, whereas the investigation group included 25 women diagnosed with preeclampsia. The patients were not administered therapy four days before the examination. For the determination of biochemical parameters we used end point bichromatic enzymatic rate and enzymatic conductivity rate.

Results: BUN/Creatinine index in the preeclamptic group was 19±7.7, uric acid 280±70 μmol/L, lactate dehydrogenase 198±63 U/L, while the number of platelets was 195±5061 x 10^9/L. In control group BUN/Creatinine index was 12±3, lactate dehydrogenase was 165±57 U/L, uric acid 197±79 μmol/La and the platelet number was 243±61 x10^9/L. Albumin/Globulin index in the preeclamptic group was 0.8±0.12, whereas in the control group it was 0.9±0.16.

Conclusions: BUN/Creatinine ratio in pregnant women with preeclampsia was significantly increased (t=-4.14; p=0.00013) in comparison to the control group. It indicates the prerenal source of azotemia. This index can be important for the evaluation of preeclampsia severity.

Keywords: preeclampsia, BUN/Creatinine ratio, Albumin/Globulin ratio.

Introduction

Preeclampsia is a specific state of pregnant women which involves an increase of arterial blood pressure, accompanied by proteinuria, oedema or both. Eclampsia, on the other hand, is defined as a state with convulsion, coma or both in patients with preeclampsia signs (1-6). The incidence of preeclampsia is 5-7% in all pregnancies (1-6). One of the causes of preeclampsia can be considered the disbalance between prostacyclin (prostaglandin I2) and thromboxane A2, an active metabolite of arachidonic acid (1,5,6). This disbalance causes vasospasm, a central change in preeclampsia (1). Presence of brain edema at MR imaging in patients who were presented with preeclampsia-eclampsia and neurologic symptoms is associated with abnormal red blood cell morphology and elevated LDH levels. These findings indicate microangiopathic hemolysis, which suggests endothelial damage, after 20th week of pregnancy (7). A number of biochemical and haematological parameters change in preeclampsia in comparison to the normal pregnancy (3,8-10). Therefore, laboratory evaluation of women who develop hypertension after midpregnancy is conducted and it usually includes: haemoglobin and haematocrit determination, blood smear, platelet count, urinalysis as well as the determination of serum oxaloacetic transaminase, lactic acid dehydrogenase, serum albumin, uric acid and creatinine (7, 9-13). The literature suggests that no single marker is currently adequate to predict the development of preeclampsia and that a combination of indices would be most effective (14-16). Increased plasma

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urea with normal creatinine concentrations giving rise to high ratios may be seen with any of the prerenal states (17). However, blood urea nitrogen/creatinine has been used as a crude discriminator between prerenal and postrenal azotemia (17-18). The purpose of this research was to investigate that BUN/Creatinine index is a preeclampsia predictor together with the other diagnostic parameters which would help diagnosing, treatment and prognostic evaluation of preeclamptic women.

Methods

Study Subjects

We have studied 25 pregnant women of the preeclamptic group and 25 patients of control group. Control group has resulted with no symptoms related to preeclampsia while in the preeclamptic group there were pregnant women with preeclampsia signs, hypertension, oedema and proteinuria. The patients were selected in the Obstetrical and Gynaecological Clinics of University Clinical Centre of Kosovo, whereas the sample analysis took place in the Department of Biochemistry of the Faculty of Medicine, University of Prishtina, during 2011. The women of the preeclamptic group were in the gestational age of 20 weeks, with an arterial pressure of over 140 mm Hg for the systolic and over 90 mm Hg for the diastolic. Hypertension appeared during pregnancy. Proteins in urine were over 0.5 g/L. All the patients had oedema of lower extremities while 80% had oedema of upper extremities and face as well. On the other hand, control group included pregnant women with a gestational age of over 20 weeks, normal arterial pressure (<135 /85 mmHg) and a lack of symptoms as those described in the preeclamptic group.

Detailed analysis

The blood was taken from patients with vacutainer tubes (SARSTEDT) containing the anticoagulant lithium heparin and in tubes without anticoagulants. Platelets were determined in the automatic reader (Medonic 630, Sweden). Biochemical parameters were determined in the biochemical analyzer Synchron CX7 of Beckman Coulter Company, USA. The used reagents were of Beckman Instrumental, Inc. Galway. Ireland. Urea nitrogen concentration was determined by an enzymatic conductivity rate method; creatinine by means of the Jaffe rate method; Lactate dehydrogenase activity was measured by the enzymatic rate method. Uric acid concentration was measured by a timed-endpoint method with the enzyme uricase. Proteins in serum were measured by a timed-endpoint biuret method and albumins were determined with brome cresol purple (BCP), a timed endpoint method as well (26). We have determined proteins in urine with the end point method with pyrogallol red, a reagent of Cromatest- Linear Chemicals Company, Spain.

Statistical analysis

The statistics were made with the Vassar-Stats system. T-test was conducted and the average, correlation (r) and standard deviation were counted. These are shown in the tabular presentation. With the t-test we have compared control and preeclamptic group by including the pregnancy age, gestation age, systolic and diastolic arterial pressure as well as biochemical parameters such as urea, creatinine, proteins, albumins, LDH, uric acid, Bun/Creatinine index, A/G index and platelets. The average and standard deviations were calculated for all the parameters and indexes. The correlation between Bun/Creatinine and Albumin/Globulin, Bun/Creatinine and Uric acid, Bun/Creatinine and LDH was calculated in control group. The same correlations were calculated for the pathologic group. The differences in which the p value was less than 0.05 (p <0.05) were considered statistically significant.

Results

The patients of control group (n=25) were 28±6 years old, while the preeclamptic group (n=25) 30±6. The age of pregnancy for both groups was > 20 weeks with an average of 33 weeks gestation. The preeclamptic group's diastolic arterial blood pressure was (DATP) 115±14 mmHg, while that of control group was 75±5 mm Hg. Systolic arterial blood pressure was 115±5 mm Hg for the control group, while for the group with preeclampsia 175±13 mm Hg. Parameters like urea, creatinine, protein, albumin, uric acid, LDH (lactate dehydrogenase), the number of platelets, blood urea nitrogen/creatinine index and albumin/globulin index, have been presented in Table 1. In table 3 we have presented the difference between Blood urea ni-

TABLE 1. Some characteristics and parameters in the control and preeclamptic group

	CG	PG	T	p
N	25			
Year	28±6	30±6	-0.72	0.47
Gestational age, wk	33±4	33±4	0.09	0.928
SATP (mmHG)	115±5	175±13	-20.77	< 0.0001
DATP (mmHg)	75±5	115±14	-13.49	< 0.0001
Urea (mmol/L)	2.46±0.8	4.6±1.7	-4.92	<0.0001
Creatinine (µmol/L)	53±10	64±22	-1.62	0.11
Total protein (g/L)	65±4.6	59.4±5.8	1.69	0.09
Albumin (g/L)	31.3±2.8	27±3,6	2.2	0.03
URIC (µmo/L)	197±79	280±70	-3.39	0.0013
LDH (U/L)	165±57	198±63	-1.73	0.093
Blood urea nitrogen/creatinine index	12±3	19±7.7	-3.92	0.00027
A/G	0.9±0.16	0.8±0.12	1.28	0.2
Protein (in urine)	0.13±0.1	1.41±0.9	-6.81	<0.0001
Platelet x10^9/L	243±61	195±50	+2.06	<0.045

trogen/Creatinine ratio in the group with a normal blood pressure and the preeclampsia group, as well as the A/G ratio between the two groups with t-test.

Discussion

Creatinine, urea and uric acid are non-protein nitrogenous metabolites that are cleared from the body by the kidney following glomerular filtration. Measurements of plasma or serum concentration of these metabolites are commonly used as indicators of kidney function and other conditions (14,17). Therefore, their determination in serum during pregnancy is of a major importance to diagnose kidney function especially at women with preeclampsia signs. This would be used to evaluate kidney function as well as the possibility of a secondary source of urea or of the nitrogen part of urea increase (Blood urea nitrogen) in plasma. The significant difference between arterial systolic and diastolic blood pressure between control group and the pregnant women with preeclampsia signs is clearly shown (t=-20 and for diastolic t= -13 , Table 2). The difference occurs in BUN/Creatinine ratio,

TABLE 2. The correlation between Blood urea nitrogen/Creatinine ratio and parameters such as uric acid, LDH and A/G ratio in both groups has been summarized.

Ratio	Number	r	p
Bun/Creatinine -Albumin/ Globulin(CG)	13	0.035	0.87
Bun/Creatinine-Albumin/ Globulin(PG)	22	0.420	0.04
Bun/Creatinine-uric(CG)	12	-0.162	0.59
Bun/Creatinine -uric(PG)	21	0.294	0.18
Bun/Creatinine -LDH(CG)	12	-0.021	0.95
B/C-LDH(PG)	21	-0.042	0.86

which is characterized with an increase of this ratio in the pathologic group (BUN/Creatine ratio =19±8) in comparison to control group BUN/ Creatinine=12±3 (t=-3.92; p=0.00027, Table 2). This can be explained with the occurrence of microangiopathic haemolysis, which is related to the injury of endothelium in the group with preeclampsia changes (Fig. 1, 1,4,8,20-24,27- 28). As a consequence, urea synthesis in liver would be increased as well as the incapability of kidneys to excrete urea from blood with such a high concentration. This way we would have a more complete data. There is no significant difference between the A/G ratio of control group and the preeclamptic one, although a tendency for a decrease is seen in the group with preeclampsia (Table 3). The difference between albumins of CG and those of PG is statistically significant (p=0.03).This is because the protein removal in urine, in the group of preeclamptic women, is increased with an average amount of 1.41±0.9 g/L (Table 1) which brings to the decrease of albumins in serum with an average value of 27±3.6 g/L (25). The level of urea in serum at the patients of preeclamptic group is significant-

TABLE 3. T-test Blood urea nitrogen/Creatinine and A/G index between control and preeclamptic group

	Blood urea nitrogen/Creatinine-CG	Blood urea nitrogen/Creatinine -PG	A/G-CG	A/G-PG
N	25		25	
Mean	12±3	19±7.7	0.9±0.16	0.8±0.12
T	-3.92		1.28	
P	0.00027		0.2	

*Mean of two measurements of calibrators as sample.

ly increased p<0,0001, in comparison to control group(Table 1). The comparison between creatinine in the serum of control group and of pregnant women with preeclampsia is also shown there and in this case an evident increase of creatinine at the preeclamptic group is obvious(p=0,11). The difference between the increase of blood urea nitrogen and creatinine in blood, shows a secondary source of urea related to the increase of its synthesis. As a consequence of the increase of BUN and the decrease of albumins, there exists a regressive correlation between BUN/Creatinine and A/G index at the preecplamptic group (Table 2). Also, in the preeclamptic group there was a significant decrease of platelets (Table 1) as a result of the increased rate of coagulability in this group (8,21-22, 25).

Conclusion

In this research, blood urea nitrogen/creatinine index was significantly increased in pregnant women with preeclampsia in comparison to the group of pregnant women with normal blood pressure. It indicates the prerenal source of urea. This index can be important to estimate the severity of preeclampsia.

Acknowledgments

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Competing interests

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Blastocystis hominis and allergic skin diseases; a single centre experience

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Abstract

Introduction: *Blastocystis hominis* in stool samples of individuals with allergic cutaneous symptoms were evaluated to study a possible link between them.

Methods: The study was done from June 2010 to December 2011, in dermatology and parasitology department of central laboratory, Alnoor Specialist Hospital, Ministry of Health, Makkah, Saudi Arabia. A total of 218 stool sample for patients who attended dermatology clinic and diagnosed as chronic urticaria, atopic dermatitis, or pruritus of unknown origin were included in the study. Standard laboratory tests for the detection of allergic etiology were performed for all patients. Detection of *Blastocystis hominis* has been made by microscopic examination of stool samples by direct examination and concentration technique.

Results: Overall, 30(13.7%) stool samples were infected by *Blastocystis hominis* with age group (26-35) and male predominace 15(6.9%) and 18(8.2%), respectively. No other allergic cause of urticaria was discovered.

Conclusion: *Blastocystis hominis* could be the etiology of chronic urticaria.

Keywords: Blastocystis hominis, urticaria, parasitology

Introduction

Blastocystis hominis (*B. hominis*) is an enteric parasite which has long been considered as an innocuous commensal living in the intestinal tract and is still the subject of controversy regarding its pathogenicity and possibly opportunistic character (1,2). Urticaria is a common and frequently debilitating disease (3). Etiologic grounds of acute urticaria are generally identified, but remained unknown in most of the chronic cases. The studies on the roles of parasitic infections in the etiology of urticaria have indicated that the most responsible protozoa are *Giardia intestinalis* and *B. hominis* (4). The presence of urticaria associated with *B. hominis* infection has been described in very few studies (5). Extra-intestinal manifestations of *B. hominis* infection have rarely been reported and include skin disorders such as palmoplantar or diffuse pruritus and chronic urticaria (6-9). A large number of parasites have been correlated with urticaria but few data exist as regards *B. hominis* infection. Considering that *B. hominis* is a modest pathogen for humans, the mechanism is probably the typical one of cutaneous allergic hypersensitivity; antigen parasites induce the activation of specific clones of Th2 lymphocytes, the release of related cytokines and the consequent IgE production (10). Our study revealed the presence of *B. hominis* infection in patients of chronic urticaria.

Methods

The study was done from June 2010 to December 2011, with the collaboration of dermatology department and parasitology department of central laboratory, Alnoor Specialist Hospital, Ministry of Health, Makkah, Saudi Arabia. This hospital is a 550-bedded referral teaching hospital delivering tertiary care throughout the Makkah region of Saudi Arabia. During the study period the patients with age of (5-65 years) diagnosed as chronic urticaria, pruritis of unknown origin, and atopic dermatitis

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by dermatology department were included in the study. In addition to other laboratory investigations, stool specimens from each subject was collected in a clean stool cup by medical laboratory technicians and transported into laboratory. All stool examinations were performed by direct method and concentrated Techniques. Direct method was performed in the same way as described earlier (11,12). With the concentration technique using fecal parasite concentrator (FPC), three spoons of stool was added to 9 ml of 10% Formalin provided at the flat-bottom tube. The specimens were mixed thoroughly and allow 30 minutes for fixation. Three drops of Triton were added to the mixed specimen followed by 3 ml of ethyl acetate. The FPC strainer was tightly attached to the flat-bottomed tube containing the fecal specimen and shaken vigorously for 30 seconds. Pointing the conical end downward; the specimen was shaken through the strainer into a 15 ml centrifuge tube. The FPC strainer was then unscrewed with the flat-bottomed tube still attached. The transport tube and strainer were discarded in an appropriate manner in biohazard bags. The 15 ml tube was capped and centrifuged at 500 x g for 10 minutes. After centrifugation, the specimen was clearly separated into four layers. The debris layer was rimmed using an applicator stick and the debris and supernatant fluid were poured out. With the tube still inverted, a cotton-tipped applicator stick was used to clean and remove the remaining debris and ethyl acetate, and the tube was returned to an upright position and two to three drops of 5% or 10% formalin, saline were added and the sediment was mixed thoroughly. The slides were prepared with a transfer pipet, cover slip, and were examined using low (x10) and high (x40) power microscope (13). The study protocol was approved by our institutional review board. Descriptive analysis was done by using Microsoft excel version 7 on personal computer.

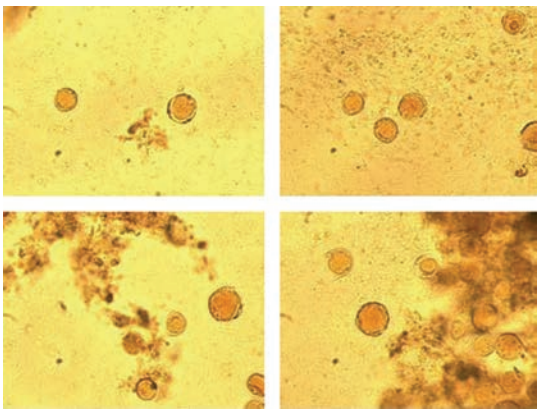

FIGURE 1. Blastocystis hominins Cyst-like in a wet mount stained in Iodine (vacular form) 40x

Results

A total of 218 stool samples for patients diagnosed as chronic urticaria were subjected to direct and concentration methods and only 30 (13.7%) were found to be infected by *B. hominis* with male predominance 18 (8.2%). More frequent age group was 25-35 years, 15(6.9%). Laboratory investigations failed to disclose any systemic diseases, including malabsorption, endocrinological, autoimmune and rheumatological disorders. Full blood count, including eosinophil count, erythrocyte sedimentation rate, C-reactive protein, cryoglobulins, circulating immune complexes, C3, C4, C1-INH, IgE and other immunoglobulins were all within the normal range. One stool sample of male patient aged 47 years old has long history of chronic urticaria showed positive results for three types of parasites, i.e., *B. hominis*, *Entameoba histolytica* and *Giardia lamblia.*

TABLE 1. Demographical distribution of *Blastocystis hominins* infection among allergic skin diseased patients

Variables		Total cases N=218	Infected cases n=30
		N	n(%)
Gender	Male	115	18(8.2)
	Female	103	12(5.5)
Age groups in years	5-15	16	3(1.4)
	16-25	45	4(1.8)
	26-35	75	15(6.9)
	36-45	73	6(2.8)
	>45	9	2(0.9)

Discussion

In our results we found 13.7% infected cases by *B. hominis* which was agreed with other studies in the perspective that *B. hominis* has some link with urticaria (2,5,6,10,14). A study from Switzerland

found parasites in stool in 35% of 46 patients with chronic urticaria, most of them with *B. hominis* (15). In one study 29.1% of the patients were found to have protozoan (*B. hominis* & *G. intestinalis*) infections (16). Extra-intestinal manifestations of *B. hominis* infection have rarely been reported and included skin disorders such as palmoplantar or diffuse pruritus and chronic urticaria (6, 7, 8, 9). In Taiwan, the association of clinical symptoms and *B. hominis* could not be delineated from study, even in immunocompromised patients. All of the patients improved without receiving any specific therapy (17). In contrast to our study, in Australia no correlation was found between clinical symptoms and *B. hominis* (18). In Japan and Canada, *B. hominis* positive individuals had no reported symptoms with *B. hominis* that proved no correlation (19, 20). Thus, *B. hominis*, though commonly seen in stool samples submitted to this laboratory, is thought to be a commensal organism. Thirty stool samples became positive after using both methods in our study, i.e., 28(93.6%) cases by direct method and 2 (6.7%) by concentration method. Our results agreed with a number of reports indicated that the formol ethyl acetate concentration technique (FECT) have poor sensitivity than Lugols iodine staining for protozoal detection so it should be discouraged (21-23). Acute urticaria of unknown etiology and chronic idiopathic urticaria patients who are resistant to the ordinary regimen of urticaria treatment might be examined for infection with *B. hominis*, in order to prescribe the proper specific anti-protozoan treatment (24).

Conclusion

Protozoan should be considered in the etiology of chronic urticaria and stool examination should be done in these patients routinely especially by direct method.

Competing interests

We declare that we have no financial or personal relationship(s) which may have inappropriately influenced us in writing this paper.

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Effectiveness of treatment of patients affected by trochanter major enthesitis

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Abstract

Introduction: Enthesitis of the trochanter major is characterized by pain and often by limping when walking, then pain, tension, swelling, increased warmth and redness in the area of trochanter, and hip weakness especially when performing exercises with resistance.

Research goals: Determine the effectiveness of treatment of major trochanter enthesitis, and analyze the representation of it in patients of both gender, different ages and professions.

Methods: Retrospective analysis of data from the clinic "Praxis" in the period from 01.01.2001. to 31.12.2011. year because of the major trochanter enthesitis 30 patients were treated. Criteria for inclusion in the study were those people with symptoms and diagnosis of of the trochanter major enthesitis who have accessed treatment, while the criteria for exclusion were inadequate diagnosis, treatment abandonment and lack of patient data. The process of therapy included the evaluation of the functional status of patients graded 0-5, then conducted physical therapy that included: bed rest, manual massage and local instillation of depot corticosteroids, and assessment of treatment success ranging from 0 to 5.

Research results: The mean score for condition of respondents was 3.27 before therapy, while after treatment it was 4.33. The mean score for status of respondents was 3.13 before treatment, and after therapy it was 4.33.

Conslusion: Based on these data we can conclude that treatment in the clinic "Praxis" leads to the improvement in patients suffering from the enthesitis of trochanter major.

Keywords: Enthesitis, trochanter major, treatment.

Introduction

Enthese is the place of attachment of tendons, ligaments, joint capsules or fascia to bone. It consists of Sharpey's connective fibers which enter the bone under different angles. This ensures the distribution of force over a larger area. In entheses are embedded proprioceptive nerve endings which send signals during the excessive contractions to the higher, extrapyramidal centers, and by the feedback signals muscle tension is decreased (1-3). Enthesitis is an inflammation of the insertions of tendons, ligaments, joint capsules or fascia to bone. (4-7). Enthesitis of the trochanter major is characterized by pain and often by limping when walking, then pain, tension, swelling, increased warmth and redness in the area of trochanter, and hip weakness especially when performing exercises with resistance (3, 8). The trochanter major enthesitis can occur due to increased intensity of activity, prolonged contractions, frequently repeated rapid contractions of low intensity or strong stretching. The disease can also be metabolic, infectious, degenerative, or professional (2, 3, 8). The clinical examination reveals pain, tension and swelling of affected structures. Conventional radiography and computerized tomography (CT) allow proper evaluation of entheses such as soft tissue calcification, erosions and changes in bone formation at the affected site. Magnetic resonance imaging and diagnostic ultrasound are in advantage in detecting enthesitis due to detailed review of the status of bones and soft tissues at the point of enthese. (1, 2, 5, 9) In the treatment of trochanter major enthesitis are used nonsteroidal antiinflammatory drugs (Aspirin, Ibuprofen), physical therapy, bed rest and orthoses to achieve the relief of the

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joint. In severe cases, corticosteroid injections are used to ensure the reduction of inflammation and pain of the affected place. (2, 3, 8, 9) The aim of this study is to determine the efficacy of treatment of patients with trochanter major enthesitis, and analyze its representation in patients of both genders, different ages and professions.

Methods

Patients

The study included all patients who reported to the clinic "Praxis" because of the trochanter major enthesitis in the period from 01.01.2001 to 31.12.2011 year. During the monitoring period, because of the problems caused by the trochanter major enthesitis, 30 patients were treated. The study inclusion criteria were the professions: doctor, veterinarian, teacher, engineer, lawyer, economist, administrative worker, laborer, artisan, farmer, housewife, retired, pupil, student, diagnosed trochanter major enthesitis on the basis of clinical examination (inspection and palpation of the affected part) and radiographic tests (CT, MRI, Ultrasound diagnostic). Criteria for exclusion from the study were inadequate diagnosis, and respondents who quit treatment or lacked documentation needed for research.

Study design

The study is designed as a descriptive, analytical, non-experimental before-and-after study. Data were retrospectively collected using specialized software, which includes required variables that will be analyzed in the study. Condition of patients was evaluated before therapy by the following score (10): 0 – immobile, 1- difficult mobility with help, 2 - difficult mobility with help of hand tools, 3- satisfactory functional status and capable for daily activities, 4 - good functional status, 5 - neat functional status for ASZ and work, 6 - quit the treatment, 7 - further medical rehabilitation required. The method of treatment of enthesitis in the clinic "Praxis" is composed of bed rest, manual massage and local instillation of depo corticosteroids. Condition of patients was evaluated after therapy by the following score (10): 0 - unchanged condition, 2 - minimal improvement, 3 - satisfactory improvement with outcomes of injury or illness, 4 - good improvement with satisfactory functional restitution, 5 - good functional restitution without sequels, 6 - quit the treatment, 7- further medical treatment required (diagnostic or operative). Status of patients was evaluated before and after therapy by the following methodology (10): 1 - difficult mobility by the help of others, 2 - difficult mobility by the help of hand tools, 3 - independently mobile by the help of hand tools, 4 - good functional status with minimal sequels, 5 - neat functional status The resulting data is analyzed by age, gender, occupation and treatment results.

Statistical analysis

We used descriptive statistical methods, percentage representation and the mean score of condition and status before and after therapy.

Results

TABLE 1. Precision of hsCRP

Gender structure	No. of respondents	Percent
Male	4	13.33%
Female	26	86.67%
TOTAL:	30	100%

TABLE 2. Structure of respondents by occupation

Occupation	No. of respondents	Percent
Doctor	0	0%
Veterinarian	0	0%
Teacher	0	0%
Engineer	3	10%
Lawyer	1	3.33%
Economist	2	6.67%
Laborer	0	0%
Farmer	0	0%
Administrative worker	4	13.33%
Artisan	0	0%
Housewife	4	13.33%
Pupil	0	0%
Student	0	0%
Retired	16	53.33%
Others	0	0%
TOTAL	30	100%

TABLE 3. Age structure of respondents

Age structure of respondents	No. of respondents	Percent
00 - 07 years old	0	0%
08 - 14 years old	0	0%
15 - 24 years old	0	0%
25 - 34 years old	0	0%
35 - 44 years old	0	0%
45 - 54 years old	2	6.67%
55 - 64 years old	7	23.33%
Over 65 years old	21	70%
TOTAL:	30	100%

TABLE 4. Condition of patients before therapy

Rating	Rating 0	Rating 1	Rating 2	Rating 3	Rating 4	Rating 5	Total:
No. of respondents	0	0	2	18	10	0	30
Percent	0%	0%	6.67%	60%	33.33%	0%	100%

$\overline{X}$ = 3.27

TABLE 5. Condition of patients after therapy

Rating	Rating 0	Rating 2	Rating 3	Rating 4	Rating 5	Total:
No. of respondents	0	0	5	10	15	30
Percent	0%	0%	16.67%	33.33%	50%	100 %

$\overline{X}$ = 4.33

TABLE 6. Status of patients before therapy

Rating	Rating 1	Rating 2	Rating 3	Rating 4	Rating 5	Total:
No. of respondents	0	2	25	0	3	30
Percent	0%	6.67%	83.33%	0%	10%	100 %

$\overline{X}$ = 3.13

TABLE 6. Status of patients after therapy

Rating	Rating 1	Rating 2	Rating 3	Rating 4	Rating 5	Total:
No. of respondents	0	0	9	2	19	30
Percent	0%	0%	30%	6.67%	63.33%	100 %

$\overline{X}$ = 4.33

The mean duration of therapy for the patients with trochanter major enthesitis in the clinic "Praxis" is 4.1 day.

Discussion

According to analysis of data from the clinic "Praxis" in the period from 01.01.2001. to 31.12.2011. year, because of the major trochanter enthesitis, 30 patients were treated. In the total sample 4 (13.33%) respondents were male and 26 (86.67%) respondents were women. The largest number of patients with trochanter major enthesitis by occupation were retired (16 or 53.33%), followed by equally represented administrative workers and housewives (4 or 13.33%). Fewer respondents (3 or 10%) were engineers, then economists (2 or 6.67%), and a lawyer (1 or 3.33%). The most represented age group was over 65 years (21 or 70%), followed by respondents age group of 55-64 years (7 or 23.33%) and respondents from the age group of 45-54 years (2 or 6.67%). The mean score for condition of respondents was 3.27 before therapy, while after treatment it was 4.33. The mean score for status of respondents was 3.13 before treatment, and after therapy it was 4.33. The mean duration of therapy for the patients with trochanter major enthesitis in the clinic "Praxis" is 4.1 day.

Conclusions

On the basis of this research we can conclude that treatment in the clinic „Praxis“ leads to improvement of condition and status of the respondents who suffer from trochanter major enthesitis. Research has shown that the trochanter major enthesitis is more frequent in women. The disease has occurred the most on respondents age groups above 65 years of age who have been retired by profession.

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Evaluation of bad habits as risk factors for cardiovascular diseases in Sarajevo Canton

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Abstract

Introduction: Cardiovascular diseases by its frequency, epidemic expenditure, socio-medical consequences and with high mortality are becoming the biggest problem of modern medicine. Mortality from cardiovascular diseases declines due to prevention measures in developed countries, in developing countries and countries in transition it increases. The aim of this study was to determine the prevalence of harmful habits and connection as a risk factor for cardiovascular disease in economically active population in the Canton of Sarajevo.

Methods: The study was conducted among the active population of Sarajevo Canton. Randomly selected 443 respondents from different groups of workers aged 18-65 years, who voluntarily joined the study. We performed a study intersection descriptive method of research. Instrument for conducting research was a set of questionnaires, designed for research purposes.

Results: The results study showed that the study group, current smokers occupy 45%, 1.8% occasional smokers who smoke and the rest of nonsmokers. It was shown that subjects who consume alcohol in biggest percentage 73.4% consumed the same day, while the smallest percentage 2.7% comprise the same subjects who consumed annually.

Conclusions: The prevalence of harmful habits as risk factors for cardiovascular disease among subjects in the Sarajevo Canton is evident represented. It is a significant development of the country, because it affects the health promotion strategy, which consequently changes the behavior based on individual needs. Health education and promotion of health can be reduced or completely prevented by a number of risk factors for cardiovascular disease.

Keywords: risk factors, cardiovascular disease, prevention

Introduction

According to the World Health Organization (WHO), cardiovascular diseases are the leading cause of death in the world die annually of which about 17 million people, of which 5 million in Europe. World Health Organization estimates based on monitoring the demo-demographic trends, trends in mortality and morbitideta and economic models, the further increase of cardiovascular diseases especially in developing countries. The estimates for 2020. one predicts that the world will be ischemic heart disease reside in the first place, and cerebrovascular disease on the fourth of all patients.

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Over the centuries the health risks are significantly changed, and the most health risk changes have occurred in the second half of the twentieth century. Many changes have happened in lifestyle and habits of people, particularly in nutrition, physical activity, consumption of cigarettes and alcohol These changes in the way life have huge impact on public health in the 21st century and they represent a health risk transition which is caused by an alarming increase of risk factors in developing countries and least developed countries (1). Risk factors of cardiovascular diseases are already established than two decades ago. The American Heart Association has identified several risks (2). Some of them can be treated or kept under control, and some may not. The more risk factors are present and united the better the chances of developing cardiovascular disease are (3). The term,, the risk factor "is often used to describe those

characteristics that are found in healthy individuals, and for which an epidemiological study that associated with the subsequent emergence of the disease, in the case of cardiovascular diseases (4). Risk factors that can not be affected: the age, gender, heredity and race. Risk factors that can affect: smoking, the value of cholesterol in the blood, blood pressure, physical activity, obesity and overweight, diabetes, excessive alcohol consumption, stress. The prevention of cardiovascular disease is significant daily physical activity, ability, moderate alcohol consumption, smoking cessation, and avoiding stress, which is particularly important, adequate nutrition. It includes foods low in fat, eating a lot of partspital fiber (oats, apples, legumes). It is also significantly reduced intake of simple and refined carbohydrates, as early as those in sugar and sweets. In patients with hypertension-known tea to limit dietary salt. Justifying the application of vitamins and minerals on the basis of the available studies are still quite ambivalent. The prevention and treatment of cardiovascular disease when it is necessary to take medication for lowering fat, medications for lowering blood pressure, well-regulated diabetes and take medications that protect blood vessels. This drug can have some very undesirable to the action, but it is a negligible benefit to the patients by taking regular treatment. Heritable component is significant in the development of cardiovascular disease, but the of prop-preventive measures and treatment can delay the emergence of the disease. The lipid-lowering therapy is now widely used statins, and fibarati. Their work-suboptimal effectiveness in primary and secondary prevention of disease was documented in a series of studies (5,6). With the reduction in fat and they contribute to the calming of inflammation in blood vessels. There should also be noted that proper low fat diet is crucial. The European Society of Cardiology in collaboration with the European Atherosclerosis Society and European Society of Hypertension summarize all of these risk factors in 1994 and first published recommendations for the prevention of coronary heart disease in clinical practice. From then on the basis of new insights these measures are supplemented and 1998 as published recommendations for primary and secondary prevention of coronary heart disease. The priorities are first of all give a reduction in the campaign against smoking, healthy eating, increasing physical activity, and this applies to the entire population. Use of medication is recommended only for those who have coronary disease or other diseases caused by atherosclerosis, or people who have increased risk factors for the development of such diseases in the near future (7,8). Objective of this research was to determine the incidence of harmful habits and link them as a risk factor for cardiovascular disease in economically active population in the Canton of Sarajevo.

Methods

The study was conducted among the active population of Sarajevo Canton. Randomly selected 443 respondents from different groups of workers of the age range 18-65 years, who voluntarily joined the study. Criteria for inclusion of subjects in the study is that they reside in the Canton of Sarajevo, that are employed and aged between 18-65 years of life. Criteria for exclusion of subjects that are not residing in Sarajevo, that are younger than 18 and older than 65 years, and are not employed. We performed a study intersection (cross-sectional study) descriptive method of research. Instrument for conducting research was a set of questionnaires, designed for research purposes.

Results

Fat in the blood never measure of 59 (13.3%) patients, more than 5 years 22 (5.0%), with 1-5 years 93 (21%), in the last 12 months, 94 (21.2%), and in the past six months 175 (39.5%) (Table 1).

TABLE 1. Control of blood fats (cholesterol)

Blood Fat	Number	*Percent %*	Valid Percent %	Cumulative percent %
In past 6 months	175	39.5	39.5	39.5
In past 12 months	94	21.2	21.2	60.7
1 - 5 years ago	93	21.0	21.0	81.7
More than 5 years ago	22	5.0	5.0	86.7
Never	59	13.3	13.3	100.0
Total	443	100.0	100.0	

TABLE 2. Control of blood pressure

Blood Pressure	Number	*Percent %*	Valid Percent %	Cumulative percent %
In past 6 months	226	51.0	51.0	51.0
In past 12 months	88	19.9	19.9	70.9
1-5 years ago	90	20.3	20.3	91.2
More than 5 years ago	23	5.2	5.2	96.4
Never	16	3.6	3.6	100.0
Total	443	100.0	100.0	

TABLE 3. Control of blood sugar

Blood Sugar	Number	*Percent %*	Valid Percent%	Cumulative percent %
In past 6 months	192	43.3	43.3	43.3
In past 12 months	99	22.3	22.3	65.7
1-5 years ago	93	21.0	21.0	86.7
More than 5 years ago	20	4.5	4.5	91.2
Never	39	8.8	8.8	100.0
Total	443	100.0	100.0	

TABLE 4. Minor physical activities (walking)

	Number	*Percent %*	Valid Percent%	Cumulative percent %
I go to work by car or public transportation	107	24.2	24.4	24.4
Less than 15 min daily	84	19.0	19.1	43.5
15-30 min daily	170	38.4	38.7	82.2
31-60 min daily	58	13.1	13.2	95.4
More than 1 hour daily	20	4.5	4.6	100.0
Total	439	99.1	100.0	
No response	4	.9		
Total	443	100.0		

TABLE 5. The current attitude towards smoking

	Number	*Percent %*	Valid Percent%	Cumulative percent %
Yes, daily	194	43.8	45.0	45.0
Yes, occasionally	8	1.8	1.9	46.9
No, I don't smoke	229	51.7	53.1	100.0
Total	431	97.3	100.0	
No response	12	2.7		
Total	443	100.0		
No response	4	.9		
Total	443	100.0		

TABLE 6. Tendency to quit smoking

	Number	*Percent %*	Valid Percent%	Cumulative percent %
I don't smoke	239	54.0	54.6	54.6
No	18	4.1	4.1	58.7
Yes	39	8.8	8.9	67.6
Not sure	142	32.1	32.4	100.0
Total	438	98.9	100.0	
Not questioned	5	1.1		
Total	443	100.0		

TABLE 7. The attitude towards alcohol consumption in the past 12 months

	Number	*Percent %*	Valid Percent%	Cumulative percent %
Yes	151	34.1	34.6	34.6
No	286	64.6	65.4	100.0
Total	437	98.6	100.0	
Not questioned	6	1.4		
Total	443	100.0		

Blood pressure was never measure 16 (3.6%) patients, which is not insignificant number, more than 5 years 23 (5.2%), before 1-5 years 90 (20.3%), in the last 12 months, 88 (19.9%), and 226 (51%) is a measure of blood pressure in the past 6 months (Table 2). Blood sugar control has never worked for 39 (8.8%) patients, more than 5 years were 20 (4.5%) subjects, before 1-5 years 93 (21%) of respondents in the past 12 months that number was 99 (22.3%), and in the past 6 months (43.3%) (Table 3). Walking of 15-30 minutes daily practiced 170 (38.4%) respondents, 107 (24.2%) goes to work by car, transport and walk more than an hour practiced 20 (4.5%) patients (Table 4).

TABLE 8. Frequency of alcohol consumption

	Number	*Percent* %	Valid Percent%	Cumulative percent %
Daily	325	73.4	79.9	79.9
Couple times per week	37	8.4	9.1	88.9
1x weekly	14	3.2	3.4	92.4
Couple times per month	19	4.3	4.7	97.1
Couple times per year	12	2.7	2.9	100.0
Total questioned	407	91.9	100.0	
Not questioned	36	8.1		
Total	443	100		

Currently, daily smoking 194 respondents (43.8%), occasionally 8 (1.8%), 229 (51.7%) non-smoking (Table 5). Of the total number of respondents 18 (4.1%) said they did not want to quit smoking, 39 (8.8%), wanting to quit smoking, while others are not sure 142 (32.1%) (Table 6). In the past 12 months 151 (34.1%) of respondents consumed alcohol, and not consumed 286 (64.6%) (Table 7). Concerned about the frequency of alcohol consumption on a daily basis which is present in 325 (73.4%) patients, once a week, 37 (8.4%), several times a month 19 (4.3%), and several times a year, 12 (2.7%) (Table 8).

Discussion

Cardiovascular disease is its frequency, momentum epidemic, socio-medical consequences, with high mortality are becoming the biggest problem of modern medicine. The biggest mortality from these diseases in developed countries, then come to a country in transition and the lowest in developing countries. However, while mortality from cardiovascular disease prevention measures due to declines in developed countries, developing countries and transition increases (9). Longitudinal studies and meta-analysis studies have demonstrated a clear ability cardiovascular diseases prevention (9). Modification of lifestyle, reducing risk factors, particularly by changing the way non-nourished, smoking cessation, increasing physical activity, blood pressure control can operate effectively in the prevention and reduction of cardiovascular disease. It is necessary to introduce the Prevention of Cardiovascular diseases as an integral part of health care for the population and an integral part of treatment of disease, which is widely accepted in developed countries (9). Tobacco smoking is an independent risk factor for cardiovascular disease. Adverse effects are proportional to the length and amount of cigarettes smoked. Adverse effects also affect men and women canceling the relative protection of women against atherosclerosis. The risk for cardiovascular disease is particularly high if smoking starts before 15 years of age. Passive smoking also increases the risk of cardiovascular disease and other diseases that are etiologically associated with smoking. In tobacco smoke there are a large number of chemicals that are harmful and nicotine, tar and carbon monoxide are the major component (10). Causal link between tobacco smoking and cardiovascular disease is strong, continuous and independent. Given that smoking falls into the category of major risk factors, prevention of smoking is of great importance (10). The results of our study showed that the study group, current smokers (smokers who smoke every day) occupy 45%, 1.8% occasional smokers who smoke and take the rest of nonsmokers. Of the total number of smokers in the questionnaire 9% said they did not want to quit smoking, 19.5% want to quit smoking, and 71.5% not sure. The results of our study showed that in the study group, 34.1% in the last 12 months, consumed alcohol, while the other 65.9% had consumed alcohol. It was shown that subjects who consume alcohol in biggest percentage (73.4%) consumed the same day, while the smallest percentage (2.7%) comprise the same subjects who consumed annually. Moderate alcohol consumption is not harmful to the cardiovascular system, but because of adverse social and health effects of alcohol on the population can not make recommendations for the safe amount of alcohol use (11). In the plasma lipids such as cholesterol and triglycerides associated with various proteins to form lipoproteins. Effect of the atherosclerotic process depends on the size of the lipoprotein. Small high density lipoproteins (HDL) do not cause atherosclerosis, in contrast, lipoprotein-labeled low density (LDL) and very low density (VLDL) penetrate the artery wall, and if

they are modified by oxidation is retained in the wall of arteries causing atherosclerosis. The highest power-molecules Chylomicrons are too large to enter the artery wall and are not atherogenic. Correlation LDL cholesterol and cardiovascular diseases have been proven in many epidemiological and clinical trials. Also, at moderate elevations LDL cholesterol, if present additional risk factors such as smoking, hypertension or diabetes, significantly worsens the effect of LDL. At high LDL cholesterol (7-10 mmol / l) leads to cardiovascular disease and without other risk factors. Importance of reducing total cholesterol and LDL fraction is extremely important. Triglycerides - increased concentration of triglycerides in the blood increases the risk for cardio-vascular diseases but not so much as LDL cholesterol. In many studies, the concentration of triglycerides over 5.0 mmol / l the risk of cardiovascular disease. This relationship is somewhat stronger among women and young men. Epidemiological studies have indicated that the combination of triglycerides greater than 2.0 mmol / l HDL cholesterol lower than 1.0 mmol / L indicates high risk for cardiovascular disease, especially if the relationship between cholesterol and HDL greater than the fifth Increase LDL cholesterol increases the risk for cardiovascular disease by approximately 20%. Almost all studies have shown that reducing cholesterol can significantly inhibit the progression of cardiovascular disease (12). The results of our study showed that the highest percentage (43.3%) in the study group was in control of fat in the blood in the past 6 months, and the lowest percent (4.5%) was in control of the same more than 5 years. The results of the questionnaire showed that the highest percentage (97.5%) using vegetable oil as the fat is in food preparation. There was a correlation between education level and control blood fats. Nutrition is an important cardiovascular risk. Saturated fatty acids in the diet increased LDL cholesterol. Replacing saturated fat with unsaturated fatty acids in the diet lowers LDL cholesterol HDL cholesterol not changed. As a good child adopted are those that have a lot of unsaturated fat and low in saturated, or those with small amounts of saturated fat with complex carbohydrate rich. WHO research has shown that a healthy diet reduces cardiovascular disease by 18% and other diseases by 28%. In many epidemiological studies have demonstrated the importance of increased blood pressure as a major risk factor for cardiovascular disease. Comparing normotensive and hypertensive individuals showed that individuals with hypertension often have with other risk factors like diabetes mellitus, dyslipidemia, obesity and overall have a higher cardiovascular risk. After middle age, systolic pressure is a stronger predictor of cardiovascular disease. In some studies, increased systolic and diastolic blood pressure above 120/80 showed a higher risk, and if the tension reaches 160/100 risk was increased times. Besides genetic factors may be caused by hypertension, obesity, alcohol consumption, intake of large quantities of salt-form, high intake of animal fats, and other factors. Monitoring of blood pressure, often measuring largely be prevented progression of hypertension, which may often remain unnoticed, and if blood pressure is not measured regularly (13). Our results, research showed that 51% of respondents in the past 6 months measured blood pressure, 19.9% in the past 12 months, 20.3% in the prior 1-5 years, and the remaining 5 years ago. Epidemiological studies have shown that passive sedanteran life without physical work and activities have a negative impact on health and is determined by the risk of disease from all cardiovascular diseases. It is assumed that physical activity has a positive effect on reducing the risks of changing factors like blood pressure, serum lipid profile, glucose tolerance and obesity. It is believed that the best result among those with higher energy consumption of 2000 calories per week of physical activity, which represents about 1 hour of daily exercise (14). The results of our study showed that the highest percentage (38.4%) patients a day to walk 15-30 minutes, 24.2% of respondents could not walk, and the lowest percentage (4.5%) patients a day hike of more than one hour. According to numerous epidemiological studies there is a linear relationship between total body mass and mortality. The risks for cardiovascular disease increased with increasing body weighs-term because it increases blood pressure and blood fat, and reduced glucose tolerance. As per separate center-harm profile indicates the type of central obesity with increasing intra-abdominal adipose tissue. Reduction of

body weight decreases and alters other risk factors for cardio-vascular diseases. Monitoring of body weight, maintain optimal weight and body mass index has a significant preventive effect in reducing the risk of cardiovascular disease (15).

Conclusion

The prevalence of harmful habits as risk factors for cardiovascular disease among subjects in the Sarajevo Canton is evident represented. Smoked significantly more patients (p = 0.007), degree of alcohol consumption is very high (73.4%). Causal link between tobacco smoking and cardiovascular disease is strong, continuous and independent. Given that smoking falls into the category of major risk factors, prevention of smoking is of great importance (10). Taking high amounts of alcohol increases blood pressure, increases the risk of stroke, increased incidence of cardiomyopathy and cardiac arrhythmias (11). It is a significant development of the country, because it affects the health promotion strategy, which consequently changes the behavior based on individual needs, whose positive direction is one of the important goals. Health education and promotion of health can be reduced or completely prevented by a number of risk factors for cardiovascular diseases.

Competing interests

Authors state that there are no conflicts of interests related to this study.

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Effectiveness of physical treatment at De Quervain's disease

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Abstract

Introduction: De Quervain's disease is a stenosing tenosynovitis of common tendon sheath of abducktor policis longus and extensor policis brevis muscles. Due to the superficial positions it can easily lead to mechanical injuries of tendons and their sheaths. The disease more often affects women over 40 years old and people with certain professions who intensively use hand and fingers in their daily work. Pathological changes consist of sheath's fibrous layer thickening. The clinical condition develops gradually with the pain of varying intensity. It is localized above the radial styloid process and radiates from the back side of the thumb. The aim is to determine the efficacy of physical therapy at De Quervain's disease.

Methods: The study was conducted on 50 patients with De Quervain's disease who were reported to the CBR "Praxis" Sarajevo. With retrospective analysis the data was processed for the period from 01.01.2001. to 31.12.2011. year. Before the initiation of physical therapy assessment of functional status scored from 0 to 6 was performed. In the chronic phase physical therapy was performed, after which it underwent assessment of therapy success scores of 0-5. Criteria for inclusion in the study were patients with confirmed De Quervain's disease, patients of both sex and of all ages, and criterion for exclusion was non-compliance with treatment protocols.

Results: In the CBR "Praxis" with De Quervain's disease total of 50 patients were treated in that period, of which 34 women and 16 men. 38% of respondents received a score of 4, while 56% of patients at the end of treatment received a score of 5.

Conslusion: Physical therapy and kinesiotherapeutical procedures have greatly contributed to the elimination of symptoms and consequences of De Quervainove disease.

Keywords: De Quervain's disease, tenosynovitis, physical therapy

Introduction

De Quervain's disease is a stenosing tenosynovitis of common tendon sheath of abducktor policis longus and extensor policis brevis muscles. These two tendons, after separation from the back surface of the forearm, pass from the most lateral osteofibrous section of radii, crossing the outer surface of styloid process to be merged on the basis of the thumb (1). In doing so, they pass through a radiocarpal tunnel which only consists of bone and ligamentum anulare dorzale. In this osteofibrous channel tendons have a common synovial sheath. Due to the superficial positions it can easily lead to mechanical injuries of tendons and their sheaths. The disease more often affects women over 40 years old and people with certain professions who intensively use hand and fingers in their daily work (pianists, typists, tailors ..). Pathological changes consist of sheath's fibrous layer thickening (2). Changes can be so intense that the wall of the sheath thickens two to three times more than normal. In extreme cases a true cartilaginous 3-4 cm long ring is creating, which narrows tendons (3). The clinical condition develops gradually with the pain of varying intensity. It is localized above the radial styloid process and it's base, radiates from the back side of the thumb and radial side of forearm (4). Some patients complain of dropping things out of the hands. Radiographically, there is usually no changes, although it some-

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times can be spotted periosteal reaction. The disease is difficult to distinguish from styloiditis of radial procesus. After several months the disease can pass gradually, spontaneously, but there are cases known that lasted many years (5). The classic diagnostic test to confirm the disease is Finkelstein's test which is performed in the following manner: thumb in the palm bent and clasped with other fingers, and then bend the whole hand to the opposite side. In case of De Quervain's disease this maneuver causes severe pain in the tendons above and we say that the test is positive (6). Treatment begins with application of orthoses for the wrist and thumb. This prevents movements that cause symptoms, tendons rest, and thus a chance to heal is provided. Therapeutic effect is achieved with nonsteroidal antirheumatics and local infiltration of corticosteroids (5). As soon as the acute phase passes physical therapy is applied. Here benefits the application of ultrasound, light therapy, galvanization, diadynamic and interferential currents and iontophoresis (7). If recovery after conservative treatment fails, surgical treatment can be accessed (8). The aim is to determine the efficacy of physical therapy at De Quervain's disease and to determine the most common structure, occupation and age of the patients who suffer from enthesopathies of the upper extremities.

Research Methods

Patients

The study included all patients who reported to the ambulance CBR "Praxis" because of the pain in the area of styloid process and diagnosed De Quervain's disease in the period from 01.01.2001 to 31.12.2011 year. Based on a database of community clinic (CBR) "Praxis" in Sarajevo, in the period above due to pain caused by De Quervain's disease 50 patients of all ages and both gender were treated. To determine in which profession De Quervain's disease usually occurs, we included in the study the following professions: doctor, veterinarian, teacher, engineer, lawyer, economist, administrative worker, laborer, artisan, farmer, housewife, pupil, student, retired and others. Criteria for inclusion were diagnosed De Quervain's disease of any age and either sex. Criteria for exclusion was failure to adhere to treatment protocols, as well as patients lost for follow up. Research was descriptive and analytical. For data collection we use the retrospective method. Establishing a diagnosis is conducted based on: patient history, clinical examination and radiographic findings.

The application of therapeutic procedures In the acute phase a following rehabilitation program was applied: inaction - the appeasement of pain, with immobilization for 7 days, cryotherapy - for reducing pain and swelling during -10 days in duration of 2-5 min. depending on the patient's subjective feelings, analgesic TENS - due to the reduction of the pain during 7-10 days in duration of 20 min., and the use of corticosteroids for local application with prolonged action. In the chronic phase ultrasound therapy, diadynamic currents, magnetic therapy, manual massage and kinesiotherapy were used.

Assessment of functional status of respondents Assessment of functional status of respondents was performed before and after treatment, and by the following methodology and the following grades:

- The rating "0" zero - unable to use hand
- The rating "1" - difficult to use the hand with the help of second-hand
- The rating "2" - difficult to use the hand with the help of hand tools
- The rating "3" - moves the hand without the help, but with severe pain
- The rating "4" - good functional status with min. sequelae
- The rating "5" - neat functional status
- The rating "6" - further medical treatment required (diagnostic or operative)

Evaluation of treatment The outcome of treatment is valorized with assessment of treatment success. The success of treatment is presented by evaluation of the results of the clinical condition after treatment, objectively valorized according to the following scheme:

- The rating «0» zero - unchanged condition (without treatment outcomes),
- The rating «2» - minimal improvement,
- The rating «3» - satisfactory functional improvement with sequels (sensory or motor),

- The rating «4» - good improvement and satisfactory functional restitution with minimal sequelae,
- The rating «5» - good restitution without outcomes of injury or illness
- The rating «6» - quit the treatment,
- The rating «7» - further medical treatment required (diagnostic or operative).

Statistical analysis

From the descriptive statistical methods, the most used is percentage representation.

TABLE 1. Age structure of respondents

Age structure of respondents									
Age	0-7	8-14	15-24	25-34	35-44	45-54	55-64	65-99	Total:
No. of patients	0	0	3	6	7	15	15	4	50

TABLE 2. Gender structure of respondents

Gender structure of respondents			
Gender	female	male	Total
Number of patients	34	16	50
Percent	68%	32%	100%

TABLE 3. Structure of respondents by occupation

Occupation	No. of respondents	Percent	Total
1 Doctor	3	6%	50
2 Veterinarian	0	0%	100%
3 Teacher	2	4%	
4 Engineer	6	12%	
5 Lawyer	0	0%	
6 Economist	3	6%	
7 Laborer	5	10%	
8 Farmer	0	0%	
9 Administrative worker	12	12%	
10 Artisan	1	2%	
11 Housewife	4	8%	
12 Pupil	1	2%	
13 Student	2	4%	
14 Retired	9	18%	
15 Others	2	4%	
Total:	50	100%	

TABLE 4. Structure of professional activities

Structure of professional activities		Percent
1 Administrative worker	26	52%
2 Laborer occupations	9	18%
3 Housewife	4	8%
4 Retired	9	18%
5 Others	2	4%
Total:	50	100%

Results

The study was conducted in a medical institution, "PRAXIS", Center for Physical Medicine and Rehabilitation Sarajevo. Number of patients diagnosed with the De Quervain's disease is 50.

Discussion

According to information we received, and are found in Table 1, it can be rightly said that the greatest number of people who suffer from De Quervain's diseases is present in the active working population and the elderly. Most patients with this problem, in this study, 30 respondents were in the age from 45 to 64 years. Wolf JM, Sturdivant, RX, Owens BD, in his study "Incidence of de Quervain's tenosynovitis in a young, active population" have proven that the age over 40 years is a significant risk factor for the development of the De Quervain 's disease and that in female respondents this disease is significantly more frequent (9), which is consistent with our research. In Table No. 2 the gender structure of respondents is shown, where we can see that the number of female respondents is 34 or 68%, while the number of male respondents is 16, which is 23% of the total number of respondents who were involved in the study. Based on these data it can be clearly concluded that the problem of De Quervain's disease is far more pronounced in female respondents. Karen Walker-Bone and others, in their study "Prevalence and impact of musculoskeletal disorders of the upper limb in the general population", found that from the total sample of 6038 patients who had musculoskeletal problems in the upper extremities at De Quervain's disease accounted 0,5% of male respondents and 1.3% of female respondents (10), what is consistent with our study which also showed a significant difference in the prevalence of De Quervain's disease between the sexes.

TABLE 5. Functional status of respondents

Assessment of functional status of respondents	No. of patients before treatment	No. of patients after treatment
0 - Unable to use hand	0	0
1 - Difficult to use the hand with the help of second-hand	0	0
2 - Difficult to use the hand with the help of hand tools	0	0
3 - Moves the hand without the help, but with severe pain	19	0
4 - Good functional status with min. sequelae	28	21
5 - Neat functional status	0	26
6 - Further medical treatment required (diagnostic or operative)	3	3
Total:	50	50

TABLE 6. Results of treatment

Assessment of treatment results	Number of respondents	Percent
0 - unchanged condition	0	0%
2 - minimal improvement	0	0%
3 - satisfactory improvement with outcomes of injury or illness	0	0%
4 - good improvement and satisfactory functional restitution	19	38%
5 - good functional restitution without sequels	28	56%
6 - quit the treatment	0	0%
7 - further medical treatment required (diagnostic or operative)	3	6%
Total:	50	100%

From Table 3 and 4 it can be clearly seen in which profession has often occurred De Quervain's disease (52% for administrative workers and 18% for the laborer occupations). People with this problem are mostly dealing with job that requires repetitive movements of upper extremities. This problem also affects people who spend much time working on the computer which provokes pain due to constant repetition of stereotyped movements, and it is very common appearance for retired people. Shiro, T., Martin P., Lorraine C. in their study, "Prevalence and risk factors of tendinitis and related disorders of the distal upper extremity among U.S. workers: Comparison to carpal tunnel syndrome", found that from the 588 000 respondents 28% complained of various discomforts in hands which they called tenosynovitis, De Quervain, synovitis, etc., and the medical staff associated that problems with professional activities performed by respondents. It is stated in this study that these problems with hands are associated with movements of ulnar and radial deviation, flexion and extension of the hand, what corresponds with movements of the hands performing administrative and blue-collar occupations (11). Our study also showed that the De Quervain's disease usually affects administrative workers and laborers. Table 5 shows the functional status of respondents before and after treatment, which clearly shows a significant difference in favor of the functional condition of patients after therapy. Specifically, before therapy 19 respondents had grade 3 and 28 respondents had grade 4, after therapy 21 respondents had a 4, and 26 respondents had a grade of 5. After the therapy it can be concluded that the procedures of physical therapy gave good results what can be seen from the table below. Good improvement with satisfactory functional restitution has been shown in 38% of respondents, while 56% of respondents showed a good functional restitution without sequelae after treatment.A need for further medical treatment is indicated at 6% of respondents.

Conclusions

On the basis of this research we can conclude that the application of physical therapy is very effective for patients with De Quervain's disease. The most affected occupations are administrative workers because their work is directly associated with inadequate position and activities of the hands during work. Observing the gender structure of respondents, we can conclude that De Quervain's disease occurs more frequently in female population. Considering the age of the respondents, we come to the conclusion that De Quervain's disease most commonly affects people between 45-64 years old, and from this problem is most frequently affected the active working population.

Competing interests

None to declare

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Anthropometric measurements of students athletes in relation to physically inactive students

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Abstract

Introduction: Anthropometry is a method of anthropology that refers to the measuring and testing the human body and to the relationship between the size of its individual parts.The task of anthropometry is as accurately as possible quantitatively characterize the morphological features of the human body.Measurements are made due to the anthropometric points which can be: fixed (standard on the site of prominence) and virtual (change due to the bodyposition).

Goals of research: To evaluate the impact of basketball on the growth and development of seventeen years old adolescents and prevention of deformities of the spinal column and chest.

Methods: The study included 40 respondents. Criteria for inclusion: male respondents aged 17 years who played basketball for more than one year, male respondents aged 17 years who are physically inactive. Criteria for exclusion: female respondents, respondents who played basketball for less than one year, respondents who are engaged in some other sport professionally or recreationally, respondents younger and older than 17 years. In the study,there were made measurements of thorax scope in the axillary and mamilar level, measurements of body weight and height and measurements of Body mass index.

Results of research: Out of 40 respondents 20 are basketball players and 20 physically inactive. Compared to the average value between the two groups of respondents certain differences were observed, which are most noticeable in body weight (basketball players had more weigh about, 5 kg on average) and height (basketball players are taller, about 7 cm on average). During the anthropometric measurements of thorax deformities of the spinal column have been observed which affect the deformation of the thorax. Of the 20 players one has a deformity of the spinal column, and out of the same number of physically inactive students even 12 have deformed spine.

Conclusion: Basketball has a positive effect on the proper growth and development of adolescents.

Keywords: Anthropometry, athletes, physically inactive.

Introduction

Anthropometry is a method of anthropology that refers to the measuring and testing the human body and to the relationship between the size of its individual parts. Measures are the distance between some points on the body (motor measurement) and the angles produced by a certain planes and the lines of the body (goniometric measurement). The task of anthropometry is as accurately as possible quantitatively characterize the morphological features of the human body (1-3). Types of variables in the anthropometric measurements are: a) Static anthropometric variables, b) dynamic anthropometric variables, c) mesostabile anthropometric variables, d) mesolabile anthropometric variables. Static anthropometric variables are parameters of static anthropometry, which measures all dimensions of the body at rest. Dynamic anthropometric variables are parameters of dynamic anthropometry, which mea-

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sures all dimensions of the body in motion. Unlike static anthropometry, dynamic anthropometry is based on biomechanics, ie on the application of mechanics in biological systems. Mesostable anthropometric variables are the parameters for which the law of the relatively uniform growth applies which allows to predict a series of different dimensions in relation to body height. Mesolabile anthropometric variables are the parameters where the law of the relatively uniform growth does not apply, because they are substantially influenced by the external environment (3 -5). Anthropometric point must be the standard. We distinguish between fixed and virtual anthropometric points. Fixed anthropometric points are the ones that are always on the same body part. They are located on bone prominences and there fore are clearly visible. Their position is also determined by using some clearly detectable morphological characteristics of the soft parts of the body. Virtual points are changing in relation to body position. Depend on the plane on which the respondent stands during measurement, because this plane is considered as the starting point from which we measure. Anthropometric points can be an indicator of the presence of deformities of the chest, spinal column and other parts of the locomotor system (6-8). Body dimensions are changing during the life, but also their interpersonal relationship. An infant has a relatively large head, short limbs and long torso which makes up about 70% of its total length. During development of the organism to adulthood that situation is changing and completely different ratios perform. Thus, in an adult man torso takes up about 50% of the total length. Highest growth rate in boys is approximately in fourteenth year and according to some estimates, ends in about twentieth year of age. According to the opinion of some authors growth in men finally stops in about thirtieth year of age.Influence on the development of the organism have: genetic factors and environmental factors (9). BMI is an anthropometric measure that shows the ratio between body weight and height, however it does not consider the individual's physique, so its use is restricted. BMI can not illustrate the percentage of body fat compared to muscle or bone mass which are the main criteria for assessing whether a person is obese or skinny. Individuals with high body mass and high BMI index can not be automatically categorized as obese; for example, in bodybuilders and hugely built men the proportion of muscle and bone mass in relation to height is large, but that does not mean they are obese. Therefore, BMI can not be a criterion for assessing health or obesity, but it is used as a good statistical measure of nutrition. Human nutritional status can be ranked with index from 15 to 40 and more (4). Aims of research are to evaluate the impact of practicing basketball on the growth and development of seventeen years old adolescents and determine the impact of basketball on prevention of deformity development of the spinal column and chest.

Methods

Respondents

The study was conducted in the period from 13.09.2009. to 05.10.2009. year. The research included 40 respondents, half of them are practicing basketball in the basketball club Spars, and the other half are physically inactive students from the Secondary Dental School in Sarajevo. Criteria for inclusion of respondents in the study were male respondents aged 17 years who played basketball for more than one year and male respondents aged 17 years who are physically inactive. Criteria for exclusion of respondents from the study were female, respondents who played basketball for less than one year, respondents who are engaged in some other sport professionally or recreationally, respondents younger or older than 17 years.

Research methods

Research method is descriptive, analytic, nonexperimental with control group. In the study, there were made measurements of thorax scope in the axillary and mamilar level, measurements of body weight and height and measurements of Body mass index.

Statistical analysis

The obtained data were statistically analyzed, average values were calculated and compared between the two groups of respondents.

Results

The results are shown in Tables.

TABLE 1. Comparison of average values of anthropometric measurements of thorax scope in adolescent basketball players and physically inactive adolescents.

	Comparison of average values of anthropometric measurements of thorax scope	Mean value (mg/L)	Sd (mg/L)	CV (%)
	Basketball players	Physically inactive	Difference	4.3
Mammillary thorax scope during guiet brething	91. 04 cm	90. 04 cm	1 cm	2.6
Mammillary thorax scope during max. inspiration	92. 27 cm	91. 69 cm	0. 58 cm	2.1
Mammillary thorax scope during max. expiration	89. 32 cm	87. 85 cm	1. 47 cm	
Axillary thorax scope during guiet brething	95. 19 cm	93. 46 cm	1. 73 cm	
Axillary thorax scope during max. inspiration	96. 26 cm	94. 75 cm	1. 51 cm	
Axillary thorax scope during max. expiration	93. 45 cm	90. 85 cm	2. 60 cm	

TABLE 2. Comparison of average values of anthropometric measurements of weight, height and Body mass index in adolescent basketball players and physically inactive adolescents.

	Comparison of average values of anthropometric measurements of weight, height and Body mass index	Mean value (mg/L)	Sd (mg/L)	CV (%)
	Basketball players	Physically inactive	Difference	4.3
Body Height	188. 95 cm	181 .80cm	7. 15 cm	2.6
Body Weight	76. 61 kg	71. 66 kg	4. 95 kg	2.1
Body Mass Index	20. 31	19. 90	0. 41	

TABLE 3. Comparison of the number of spinal deformities in adolescent basketball players and physically inactive adolescents.

	Scoliosis	Kyphosis
Adolescents who practice basketball		1
Physically inactive adolescents	8	4
Total number of respondents	20	20

Discussion

By the analysis of data obtained in the study we can see that the average values of all measurements of thorax scope are 1.48 centimeters higher in basketball players, compared to the teenagers who are physically inactive.(Table No.1) If we consider the fact that the exercises for muscle trophic begin to intensively practice with sixteen years, we can assume that the difference in the coming years will be even bigger. Teenagers who are engaged in basketball are on average 7.15 centimeters taller and 4.95 kg heavier than the physically inactive teenagers. The average value of Body Mass Index was 0.41 higher in basketball players.(Table No.2) The reason why the basketball players are taller is that the sport in which someone will be engaged is chosen according to the physical qualities , and the difference in weight and Body mass index is present because the basketball players have some more muscle mass. Of the 20 respondents who practice basketball one has a deformity of the spinal column, and out of the same number of respondents in physically inactive adolescents even 12 have deformed spine.(Table No.3) Deformities were confirmed visually, but not accessed for further diagnosis.

Conclusions

Based on these data we can conclude that practicing basketball has a positive impact on growth and development of seventeen years old adoles-

cents and that long-term practicing basketball has a significant impact on prevention of deformity development of the spinal column and chest.

Competing interests

Anthropometric measurements, which were the subject of this research, were conducted by graduate physiotherapist without any financial compensation. The basketball club and high school in which measurements were performed were selected by random method, and the research was conducted anonymously, with the consent of representatives of institutions and respondents.

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The role of CBR in the rehabilitation process in home conditions

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Abstract

Introduction: Community Based Rehabilitation (CBR) is a strategy within community development for rehabilitation, equalizes opportunities and social integration of incapacitated people. This is a comprehensive strategy of involving people with disabilities in their communities through the development program. CBR system provides for the people with disabilities equal access to treatment and rehabilitation, education, promotes health and healthy living, and also indicates the existence of other features that make these people become full members of society and the community in which they live and is currently used in over 90 countries around the world.

Methods: Research was conducted in two CBRs (CBR-Kumrovec and CBR-Saraj Polje) in the department of physical medicine and rehabilitation in the Sarajevo Canton. The study included and statistically treated 97 patients during the period from 01.01.2008 to 31.12.2008 year.

Results: In a study from the total number of respondents 65% were women, 35% male respondents, and the most represented were respondents of age group from 71-80 years - 40%. Of all diseases, the most represented were respondents with ICV, 43%.

Conclusion: This type of treatment in the home conditions is providing necessary medical rehabilitation services by qualified physical therapists through a sufficiently long period for successful medical rehabilitation in the natural environment of patients (home conditions), and the presence of family members who we can also educate for the enforcement of basic physical procedures and instruct them on the condition of the patient and his perspective.

Keywords: CBR, rehabilitation, home conditions.

Introduction

Community Based Rehabilitation (CBR) is a strategy within community development for rehabilitation, equalizes opportunities and social integration of incapacitated people. This is a comprehensive strategy of involving people with disabilities in their communities through the development program. Expansion of the rehabilitation was so big that the bulk of financial resources was spent, and greatly impede progress in other areas. Development of scientific and clinical basis of rehabilitation took place simultaneously with the appearance of the consumer movement through which people with disabilities and their families become aware of their individual rights and needs (1). In the last decade of the twentieth century in our country, in the area of habilitation and rehabilitation of persons with disabilities, own concept appropriate to the current specific socio-economic conditions and overall economic development was trying to define, which resulted in the creation of significant financial, technical and personnel resources. However, socio-political and health care system opted for the most expensive, institutional model of rehabilitation development, which required a huge investments in stationary capacities with expensive equipment and concentration of personnel,which did not provide adequate coverage and accessibility of rehabilitation services to multiple users (2).

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Rehabilitation resources had been altered during the war in BiH. During wartime events from April 1992 health care institutions have been significantly damaged, as well as equipment in them, and there was a significant reduction of health care personnel. In such a situation, depending on the circumstances and conditions, there was attempt to provide rehabilitation services, sometimes in improvised conditions considerind the large number of injured people (3). After the establishment of peace in the area of BiH followed by the activity on the establishment of a new concept of rehabilitation with the dispersion of services across the BiH. So in all regions of the Federation and later in the Serbian Republic, through international projects there was construction and equipping of spaces for about 60 centers for physical therapy (CBR centers), and then a program for education of professionals was conducted ,who are employed or have been hired to work in these centers.On this work as educators jointly attended national and international experts from Queens University in Canada (4). Also, by this concept sustainable development through the aforementioned project is provided because by the Law on Health care of the Federation the same included in the primary health care thus to secure a continuous and predictable funding.Total in the Federation 38 CBR clinics for physical therapy are opened and 23 in the Serbian Republic, which fundamentally altered the organization model of rehabilitation from institutional to outpatient model. According to the data from 2006 year 1,700.000 services were provided for approximately 30 000 patients (through outpatient services 29,000 and stationary services for approximately 900 patients), which means that by the new organization with rehabilitation services 7.15% of the population of Sarajevo Canton is covered, compared to 2% that is how many was covered untill 1992 year (5). Tasks and responsibilities of this program are practically the principles of rehabilitation. Primary role of the Center for Physical Therapy is reflected in the application of measures for medical rehabilitation, particularly physical therapy, to prevent or minimize disability following injury through the application of all methods of physical therapy, through the ambulatory and patronage work, in the area for which it was founded. The aim of the program in the community (CBR) is to enable individuals with disabilities to manage lives in which they have equal opportunities, equal access to social, cultural and economic privileges. In many societies are increasingly accepting the fact that persons with disabilities are talented, possess skills and abilities to be active and productive in the community, capable and competent as a workforce (6). CBR centers integrated into primary health care centers (Health centers), through the use of existing infrastructure of primary health care system in the F BiH, have become accessible to persons with disabilities, who had no access to services of physical therapy and rehabilitation in the community where they live or work until then. People with disabilities, before the establishment of the CBR system in the F BiH, services of physical therapy and rehabilitation could only get in the clinical centers or regional hospitals within departments for physical therapy and rehabilitation (7). The aims of the study were to show the age and gender structure of respondents in the process of rehabilitation in the home conditions, then to show the representation of diseases in those patients, to show the ratio between home visits of doctors and physiotherapists in the process of rehabilitation and to show the representation of existing medical staff in CBR clinics.

Methods

Subjects

The study was conducted on the patients who have had a referral for a home visit from CBR Center Novi Grad Sarajevo (CBR-Kumrovec and CBR-Saraj Polje) in the department of physical medicine and rehabilitation at the Sarajevo Canton. The study included and statistically treated 97 patients (total number of them who has achieved a home visit) during the period from 01.01.2008 to 31.12.2008 year. Criteria for inclusion were subjects of either sex, any age with disease or condition rendering them unable to attend the treatment of physical therapy and rehabilitation in CBR. Criteria for exclusion were respondents who were referred to the stationary form of treatment or died during the study period.

Procedures

From the procedures used in the home conditions, electro therapy is used the most (TENS, ultrasound, DDS, IFS, IR lamp, hot-pac, cryotherapy, manual massage). After electrotherapy various kinesyotherapeutic procedures (active, active-assisted and passive exercise).

Statistical Analysis

Data of treated patients are computer processed by entering all the relevant parameters and statistically analyzed through specialized unified software program.

TABLE 1. Gender structure of respondents from 01.01.2008 to 31.12. 2008 year

GENDER	NUMBER OF RESPONDENTS	%
MALE	34	35%
FEMALE	63	65%
TOTAL	97	100%

Results

The results are shown in Tables.

Discussion

The study included and statistically treated 97 patients (total number of them who has achieved a home visit), of which 35% were men and 65% women. The largest number of respondents were from the age group of 71-80 years (40%), followed by a group of 61-70 years (21%), a group of 51-60 years (20%), a group of 81-90 years (10%), group 31-40 years (4%), a group of 41-50 years (2%), and groups of up to 20 years, 21-30 years and 91-100 years of age amount (1%). The largest percentage of the leading diseases have respondents diagnosed with ICV (43%), fracture (16%) and endoprotesis (6%), while the smallest number of visits had respondents with a diagnosis of CP, Spondilosis Deformans and Tromboembolia (1%). Mallick M and associates(9) in their research which they conducted

TABLE 2. Age groups of respondents from 01.01.2008 to 31.12. 2008 year

AGE GROUP	Up to 20 years	21-30 years	31-40 years	41-50 years	51-60 years	61-70 years	71-80 years	81-90 years	91-100 years	total
NUMBER OF RESPONDENTS	1	1	4	2	19	20	39	10	1	97
%	1%	1%	4%	2%	20%	21%	40%	10%	1%	100%

TABLE 3. Presentation of the leading diseases from od 01.01.2008 to 31.12. 2008 year

r/b	DIAGNOSIS	No. of respondents	%
1	ICV	41	43%
2	SCLEROSIS MULTIPLEX	7	7%
3	FRACTURA	15	16%
4	CRANIOTOMIA	6	6%
5	ENDOPROTESIS	6	6%
6	PARAPLEGIA	3	3%
7	CP	1	1%
8	QADRIPLEGIA	1	1%
9	AMPUTATIO	2	2%
10	QADRIPARESIS	4	4%
11	HERNIA DISCI	4	4%
12	GONARTROSIS	3	3%
13	OSTEOPOROSIS	2	2%
14	TROMBOEMBOLIA	1	1%
15	SPONDILOSIS DEFORMANS	1	1%
	TOTAL	97	100%

TABLE 4. Home visits of doctors from 01.01.2008 to 31.12. 2008 year

HOME VISITS OF DOCTORS	NO. OF HOME VISITS	%
CBR – "KUMROVEC"	62	41%
CBR – "SARAJ POLJE"	91	59%
TOTAL	153	100%

TABLE 5. Home visits of physiotherapists from 01.01.2008 to 31.12. 2008 year

HOME VISITS OF PHYSIOTHERAPISTS	NO. OF HOME VISITS	%
CBR – "KUMROVEC"	456	33%
CBR – "SARAJ POLJE"	942	67%
TOTAL	1398	100%

TABLE 6. Existing medical staff in CBR Novi Grad from 01.01.2008 to 31.12. 2008 year

CBR NOVI GRAD	NO.	%
DOCTORS	4	8%
HIGHER EDUCATION PHYSIOTHERAPISTS	6	12%
MIDDLE EDUCATION PHYSIOTHERAPISTS	37	74%
NURSES	3	6%
TOTAL	50	100%

in 2005, cited the importance of rehabilitation in community (CBR) in Pakistan after a major earthquake. The program involved 741 people with spinal injury and 713 with amputation. The total number of home visits of doctors in CBR centers Kumrovec and Saraj Polje is 153 of which the doctors from CBR Kumrovec made 62 home visits (41%) and doctors from CBR Saraj Polje made 91 home visits (59%). The number of home visits of physiotherapists in CBR centers Kumrovec and Saraj Polje was 1398 home visits, of which the physiotherapists from CBR Kumrovec made 456 home visits (33%) and physiotherapists from the CBR-Saraj Polje made 942 home visits (67%). Matsuda A and Kunori M (10) in their work come to the conclusion that home visits from physiotherapists have a great effect in the elderly in improvement of their condition. Medical personnel from CBR Novi Grad, which has two centers (CBR-Kumrovec and CBR -Saraj Polje), in the period from 01.01.2008 until 31.12.2008 had 4 doctors physiatrist specialists (8%), 6 higher education physiotherapists (12%), 37 middle education physiotherapists (74%) and 3 nurses (6%). The average of home visits that are shown in tables and graphs is refering to the professional personnel who performed home visits in this period. The total number of personnel is 26 professionals, of which 4 are doctors physiatrist specialists and 22 physiotherapists.

Conclusions

The study included respondents of all ages and professions, who require rehabilitation in the home conditions. All respondents involved in research are from the Sarajevo Canton. Age structure of respondents who are treated in the home conditions are respondents were between 71 and 80 years of age and occupy 40% of all treated patients in a home conditions. Of the total number of respondents women are 65%. Most often the visits in the home physical treatment is applied after the ICV and in the condition after the fractures which, with sclerosis multiplex and arthroplasty, represents about 80% of all services on a home visit. CBR "Saraj Polje" performed 59% and CBR "Kumrovec" 41% of visits in the municipality of Novi Grad. In the home visits middle education physiotherapists attended the most 74%, and nurses at least 6% of the total medical staff.

Competing interests

There is no competing interests or an ethical violation in the preparation of this project.

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Tabele
Tabele se moraju staviti iza referenci. Svaka tabela mora biti na posebnoj stranici. Tabele NE TREBA grafički uređivati.
Broj tabele i njen naziv piše se IZNAD tabele. Tabela dobija broj prema redoslijedu pojavljivanja u tekstu, a naziv treba biti jasan i dovoljno opisan da je jasno šta tabela prikazuje. npr „Table 3. Tekst naziva tabele....". U radu prilikom pozivanja na tabelu treba napisati broj tabele u zagradi, npr. (Table 3). Za skraćenice u tabeli potrebno je dati puni naziv ispod tabele. Poželjno je ispod tabele dati objašnjenja i komentar, koji su neophodni da se rezultati u tabeli mogu razumjeti. Prikazati statističke mjere varijacije, kao što je standardna devijacija i standardna greška sredine, gdje je primjenjivo.

Slike
Slike staviti iza referenci i tabela (ako postoje). Svaka slika mora biti na posebnoj stranici. Slika dobija broj prema redoslijedu pojavljivanja u tekstu. Naziv i broj se pišu ISPOD slike, npr. „Slika 3. Tekst naziva slike..." U radu, prilikom pozivanja na sliku treba napisati broj slike u zagradi, npr (Slika 3). Neophodno je da slika ima jasan i indikativan naziv, a u tekstu ipod slike objasniti sliku i rezultat koji ona prikazuje, sa dovoljno detalja da ona može biti jasna bez pretrage teksta koji je objašnjava u radu. Slika mora biti kvaliteta najmanje 250-300 dpi, formata JPG, TIFF ili BMP.

Jedinice mjere
Mjere dužine, težine i volumena trebaju se pisati u metričkim jedinicama (meter, kilogram, liter). Hematološki i biohemijski parametri se trebaju izražavati u metričkim jedinicama prema International System of Units (SI).

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