# THE FREQUENCY OF ILLNESSES IN THE POPULATION OF HIGH SCHOOL ATHLETES AND NON-ATHLETES

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***Abstract***
*In study which included the sample of 240 subjects of high school population, both sexes, the frequency of illnesses was examined. The sample was divided in two sub-samples of 120 high school students actively engaged in sport activities, and 120 non-athletes, respectively. The frequency of illnesses among the participants was determined using a questionnaire. High school students' anamnesis was taken from the School Ambulance and was descriptively mistreated and presented. It is determined that high school students which are actively engaged in sport activities are less accessible to disease in relation to their compeers non-athletes, which is expected, considering positive influence of sport activity on different systems of human organism. In the case of most athletes, the overview determined the occurrence of respiratory tract infections (acute inflammation of the pharynx - J02, acute inflammation of the larynx - J04, the flue, unidentified virus - J10), while visits to the doctor due to other illnesses were determined to a smaller extent. In the case of non-athletes, the following illnesses were noted: mostly respiratory tract infections, primarily acute inflammation of the pharynx (J02); to a smaller extent we have other indicators of illnesses, that is, symptoms, signs and pathological and laboratory findings; internal gland disorders; human tissue diseases; circulatory disorders. The results of the current research indicate that insufficient physical activity, which is characteristic of non-athletes, has a negative influence on the immune system and leads to susceptibility of the respiratory tract to infections. On the other hand, exhausting physical activity, which is characteristic of athletes, also, even though to a far smaller percentage than among non-athletes, has a negative effect on the immune system and the occurrence of respiratory tract infections. It would seem that a solution should be sought for in moderate physical activity, which in the case of professional athletes is, unfortunately, very difficult to achieve, due to the tasks and goals set before them.*

***Keywords****: high school student population, athletes, non-athletes, frequency of illnesses*

## Introduction

Human knowledge regarding physical exercise in the function of education has ranged from the empirical to the abstract or philosophical, all the way to the scientific. For the current study, what is especially important is that all the more famous ancient philosophers argued for what was basically a humanistic idea of the need for the harmonious development of one's personality, for the symbiosis of the body and spirit. From ancient China and India, Assyria and Persia, the Sumerian and Crete-Miocene cultures to Athens and Rome, in addition to forming certain human virtues, moral virtues contained in the pursuit of truth, justice, courage, proper behavior, physical education also represents a constituent part of a person's upbringing. The thoughts of Confucius, Homer, Socrates, Plato and Aristotle could be summed up in the idea that health and the development of man are necessarily intertwined with muscle activity. The numerous works of philosophers and pedagogists alike, especially Jean Jacques Rousseau, point out the need for the harmonious development of personality and the significance of the exercise process for the optimal and balanced development of a man, arguing that 'it is important to exercise the body' and thus by exercise realize educational components, as well as aesthetic ones, emotional and moral values (Dedaj, 2011). The early acquired knowledge regarding the significance of physical exercise, as well as the development of the habit of regular physical exercise make a significant contribution to the quality of health during childhood and represent the basis for the formation of proper body posture. Gaining the habit of regular physical exercise among students is the primary aim of the educational section of physical education (Dedaj, 2010). During the last few decades of the XX century and the beginning of the XXI century, numerous scientific studies have investigated the connection between physical activity and health, as well as the influence of physical exercise on certain systems of organs. The World Health Organization (WHO), in the proposed Global Strategy for dietary regimens, physical activity and health, argues that educational measures and programs should support the development of a healthy dietary and physical

activity regimen. Schools should influence the lives of the greatest number of children in all countries, and thus in ours as well (WHO, 2006; American college of Sports Medicine-ASCM, 2000). Taking part in regular organized forms of physical activity (recreational activities, physical education classes and sport) leads to the improvement in the general sate of health, the increase in conditional and functional abilities, to a sense of pleasure and has a positive influence on the remaining spheres of human life. It is a fact that children who actively participated in sports, as far as health is concerned, are in a better position than children who do not take part in sports (Stone et al., 2004). The health benefits of physical activities include: improved functions of the cardiovascular and respiratory system, positive changes in the level of blood lipids, a decrease in coronary risks, a decrease in the frequency of insulin-independent diabetes and the decrease in the number of obese individuals, an increase in lung capacity and volume, an increase in aerobic and anaerobic abilities, an increase in defensive abilities of the human body, an increase in motor skills and finally, an increase in mental and social wellbeing. Due to the positive influence on mental health, physically active individuals, especially athletes, are less susceptible to addiction, that is, drug abuse, alcoholism, smoking, as well as other risky mental states, such as depression, suicidal thoughts (Heimer et al., 2006; Macera et al., 2003; Videmšek et al., 2002; Baranowski et al., 1992). The aim of the current research was to determine the number of ill high school students who regularly take part in organized physical activities (athletes) and those who are not actively involved in the training process (non-athletes), as well as which type of illness occurs most often in the studied population.

## Methods

The study was carried out in a prep school for future students of economy in Niš, in September 2011, and in accordance with the propositions of the Helsinki Declaration. A total of 240 students, sophomores, juniors and seniors of both sexes (154 female and 86 male students) participated in this study, which is a part of project no 179024, supported by the Ministry of Science and Technological Development of the Republic of Serbia (RS). The sample of participants was divided into two sub-samples numbering 120 athletes and 120 non-athletes, respectively. The frequency of illnesses among the participants was determined using a questionnaire. Prior to filling in the questionnaire, the participants were told about the purpose of the research and the commitment of the researcher to presenting all the results in percentages, without stating the names of the participants. The questionnaire asked for the following data: first and last name, day, month and year of birth; grade; whether or not the participant actively participates in sports activities; if YES, then which sport; how many times a week; whether the participant has been ill during the second term of the school year.

Therefore, the studied period of time referred only to the second semester of the 2010/2011 school year, or in other words, the period from the end of January till the middle of June of 2011. The proper identification of pathological states was determined on the basis of the medical charts obtained from the school infirmary where the illnesses were presented in code. When deciphering the type of illness, a code of illnesses was used, one which doctors relies on in health institutions of the Republic of Serbia. For the statistical analysis and interpretation of the results, the package Statistics 13.0 was in use. All of the data were processed using a descriptive method, and the results are shown in the form of tables, that is, numerically and in the form of percentages (Pallant, 2007).

## Results and discussion

Table 1. The number and percentage of high school girls who are non-athletes (N=98) and those who are athletes (N=56), who were and were not ill (overall number of high school girls N=154).

| | High school girls (N=154) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | non-athletes | | | | athletes | | | |
| grade | ill | | health | | ill | | healthy | |
| | no. | % | no. | % | no. | % | no. | % |
| II | 9 | 9.18 | 42 | 42.9 | 1 | 1.8 | 33 | 58.9 |
| III | 3 | 3.06 | 7 | 7.14 | 1 | 1.8 | 3 | 5.36 |
| IV | 15 | 15.3 | 22 | 22.5 | 2 | 3.6 | 16 | 28.6 |
| overall | 27 | 27.6 | 71 | 72.5 | 4 | 7.2 | 52 | 92.9 |

The results shown in table 1 indicate that from the overall number of high school girls, sophomores, juniors and seniors (N=154), a total of 98 or 63.64% were non-athletes, or in other words 56 or 36.36% were athletes. Of the cited number of female non-athletes, a total of 27 or 27.55% were ill, while 71 of the girls or 72.45 % were not. In the case of female athletes, we determined that 4 of the high school girls or 7.15% of them were ill, while 52 or 92.85 % were not ill. These results indicate that the high school girls who regularly take part in physical activities in the form of sports training or competitions have a lower rate of illness by 20.4% than those who only take part in physical education classes and do not take part in sport. The current results which indicate a greater frequency of the occurrence of illness among non-athletes than among athletes (27.55% (N=27) vs. 7.15% (N=4)) agree with the results of the research carried out by Stojiljković et al. (2011) who, also analyzing the abovementioned relationship on a somewhat smaller sample of female high school seniors (N=97), determined a greater frequency in the occurrence of illness among non-athletes than athletes (51% (N=41) vs. 25% (N=4)). Table 2 shows the results for the high school sophomores, juniors and seniors (N=86), 22 or 25.58% of whom are non-athletes, or in other words, 64 or 74.42% of whom are athletes. We can determine that a great percentage of high school students take part in sport (74,42%), which can be considered a very positive trend.

Table 2. The number and percentage of the non-athletes (N=22) and the athletes (N=64), who were and were not ill (overall number of students N=86).

| | Male students (N=86) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | non-athletes | | | | athletes | | | |
| grade | ill | | healthy | | ill | | healthy | |
| | no. | % | no. | % | no. | % | no. | % |
| II | 0 | 0 | 8 | 36.4 | 0 | 0 | 26 | 40.6 |
| III | 1 | 4.55 | 3 | 13.6 | 1 | 1.6 | 5 | 7.81 |
| IV | 1 | 4.55 | 9 | 40.9 | 1 | 1.6 | 31 | 48.4 |
| overall | 2 | 9.1 | 20 | 90.9 | 2 | 3.1 | 62 | 96.9 |

The number and percentage of non-athlete students which were not ill was 20 or 90.9%, and the number of those who were ill was 2 or 9.1%. In the case of the athletes, 62 or 96.88% of them were not ill, while 2 or 3.12% of them were ill. These results indicate that the students who regularly take part in physical activities in the form of sport training or competitions have a lower rate of illness by about 5.98% in comparison to the students who only take part in physical education classes, or do not take part in sport. The current results which indicate the greater percentage of frequency of the occurrence of illness among the non-athletes when compared to athletes (9.1% vs. 3.12%) agree with the results of the research carried out by Stojiljković et al. (2011) who, also analyzing this particular relationship on a somewhat smaller sample of high school seniors (N=53), determined a greater percentage of the occurrence of illness among non-athletes when compared to athletes (46% (N=13) vs. 16% (N=4). A somewhat greater percentage of the occurrence of illness in a population of males and females in the research carried out by authors Stojiljković et al. (2011), when compared to the results in the current research, can be explained by the fact that the data obtained by the cited authors refer to the winter semester, when the frequency of the occurrence of illness was greater partially due to cold weather. In the case of most athletes, the overview determined the occurrence of respiratory tract infections (acute inflammation of the pharynx - J02, acute inflammation of the larynx - J04, the flue, unidentified virus - J10), while visits to the doctor due to other illnesses were determined to a smaller extent. In the case of non-athletes, the following illnesses were noted: mostly respiratory tract infections, primarily acute inflammation of the pharynx (J02); to a smaller extent we have other indicators of illnesses, that is, symptoms, signs and pathological and laboratory findings; internal gland disorders; human tissue diseases; circulatory disorders. In comparison to the most frequent illnesses in the current research, that is, respiratory tract infections, research carried out to date has shown that individuals who take part in moderate physical activities have a smaller risk of upper respiratory tract infections in comparison to physically inactive individuals (Matthews et al., 2002; Neiman, 1998) or when compared to athletes who are involved in an intense training program (Spence et al., 2007; Gleeson & Pyne, 2000). The results of the current research, regarding respiratory tract infections as the most frequent illness among athletes, agree with the results of the research carried out by Dvorak et al. (2011); Alonso et al. (2010); Engebretsen et al. (2010). Some authors believe that regular physical exercise has a greater impact on health than any hereditary factor (Stojiljković et al., 2011; Hein et al., 1992). Acute respiratory disease, or acute respiratory tract infection, is the most common type, as well as the most common illness that affects man in general. Those suffering from acute respiratory infections, especially of the upper respiratory tracts, most often visit pediatric and other doctor's offices for primary medical care. Small children are most susceptible to these illnesses. The reasons for this great frequency of acute respiratory infections can be found in the structure and position of the respiratory tract (Kuzman, 2005). Even though active athletes mostly do not have clinically determined immune system deficiency, there is evidence that a decrease occurs in some of the parameters of the immune system over an extended period of intense training. This includes a decrease in neutrophil functions, serum, concentrations of saliva immunoglobulin, natural killer cells, and maybe even the cytostatic activity in the peripheral circulation. In addition, there is an increase in the frequency of the symptoms of upper respiratory tract infections during endurance training. All of these changes are the result of an increase in the training intensity (MacKinnon, 2000; Shephard et al., 1994). The relationship between exercise and upper respiratory tract infections (URTI) can be modelled in the shape of a 'J' curve. It would seem that the risk of the URTI is especially high during a single or two-week period following a marathon race or similar events (Nieman et al., 1989).

Clinical data support the concept that heavy load increases the risk of URTI among athletes due to the negative changes in the functioning of the immune system and an increase in the concentration of the stress hormones, adrenalin and cortisol (Gleeson, 2007). On the other hand, there is evidence that all of the amounts of moderate physical activity can decrease the risk of URTI through favourable changes in the functioning of the immune system, without any negative effects on the increase in stress hormones (Nieman, 1994).

**Conclusion**

The results of the current research indicate that insufficient physical activity, which is characteristic of non-athletes, has a negative influence on the immune system and leads to susceptibility of the respiratory tract to infections. On the other hand, exhausting physical activity, which is characteristic of athletes, also, even though to a far smaller percentage than among non-athletes, has a negative effect on the immune system and the occurrence of respiratory tract infections.

It would seem that a solution should be sought for in moderate physical activity, which in the case of professional athletes is, unfortunately, very difficult to achieve, due to the tasks and goals set before them. For that reason it is necessary for professional athletes to maintain a healthy diet (the intake of sufficient amounts of vitamins C and E, antioxidants, carbohydrates, and the like), to rest and recover between training sessions and competitions, as well as to eliminate all the remaining risk factors which might lead to the onset of an illness.

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## UČESTALOST BOLESTI U POPULACIJI VISOKOŠKOLSKIH STUDENATA SPORTAŠA I NESPORTAŠA


### Sažetak

*U istraživanju koje je uključivalo uzorak od 240 ispitanika studentske populacije, oba spola, istraživana je frekvencija oboljenja. Uzorka je podijeljen u dvije subgrupe po 120 studenata aktivno uključenih u sportske aktivnosti, kao i 120 nesportaša, respektivno. Učestalost oboljenja među sudionicima je utvrđivana upitnikom. Anamneza studenata uzimana je iz podataka Školske ambulante i bila je opisno tretirana i predstavljena. Utvrđeno je da su student koji su aktivno uključeni u sportske aktivnosti manje izloženi bolestima u odnosu na njihove kolege nesportaše, što je za očekivati, uvažavajući pozitivni utjecaj sportskih aktivnosti na različite ljudske organske sustave. U slučaju većine sportaša, pregled je pokazao pojavu infekcija respiratornog trakta (akutnu upalu pharynxa – J02, akutnu upalu larynxa – J04, gripu, nedefinirani virus – J10), dok su posjete liječniku zbog drugih oboljenja primjećene u manjem obujmu. U slučaju nesportaša, primjećene su slijedeće bolesti: većinom bolesti respiratornog trakta, prvenstveno akutna upala pharynxa (J02); u manjem broju ostali indikatori bolesti, odnosno simptomi, znakovi i patološke ili laboratorijske nalaze; poremećaji unutrašnjih žlijezda, bolesti tkiva, cirkulatorne bolesti. Rezultati tekućeg istraživanja pokazuju da nedovoljna tjelesna aktivnost, koja je svojstvena nesportašima, ima negativan utjecaj na imunološki sustav i vodi prema osjetljivosti respiratornog trakta za infekcije. S druge strane, iscrpljujuća tjelesna aktivnost, svojstvena sportašima, također, čak možda i nešto više nego kod nesportaša, ima negativan učinak na imunološki sustav i pojavu infekcija respiratornog trakta. Može se primjetiti da rješenje treba potražiti u umjerenoj tjelesnoj aktivnosti, što je kod profesionalnih sportaša jako teško osigurati zbog zadaća i ciljeva koji sui m postavljeni.*


***Ključne riječi**: studentska populacija, sportaši, ne-sportaši, učestalost bolesti*

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