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The Frequency of Fruit and Vegetables Consumption and the Frequency of Vitamin and Mineral Supplements Consumption among Students

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ABSTRACT

Eating habits of Slovenes are bad. The research Eating habits of adult Slovenes [1] showed that Slovenians eat too much unhealthy food and too little fibre, fruit and vegetables. On average a Slovenian adult eats only one piece of fruit per day, whereas 12 % of Slovenians never eat vegetables [1]. In their research from the year 2004, Poljšak et al. similarly come to the conclusion, that half of the participants eat fruit and/or vegetables merely once per day or even less than once. Numerous institutions in cooperation with the government commissions therefore started promoting a diet with more fruit and vegetables. This kind of promotions (PRO GREENS, School fruit scheme) is focusing on the younger population.

Due to the fact that this is a current topic, it was decided to carry out a research among the students of the University of Ljubljana, which would help to find out how often the students eat fruit and vegetables, and how often they consume vitamin and mineral supplements. Regarding available data the observed population does not eat enough fruit and vegetables, and moreover too often takes vitamin and mineral supplements. The results of the research carried out among 100 students show that merely 7 % of the participants eat fruit or vegetables five or more times per day. As many as 40 % of the participants eat fruit and vegetables only once per day. The frequency of taking vitamin and mineral supplements varies. Out of 71 % of students who take vitamin and mineral supplements, 8 % consume supplements regularly on a daily basis.

KEY WORDS:

Nutrition, Research, Fruit and vegetables, Vitamin and mineral Supplement, Student

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INTRODUCTION

Food consumed by an individual has a great impact on health. A healthy diet protects one's health, at the same time improves it and lowers the risk of numerous "contemporary lifestyle diseases" (high blood pressure or hypertension, high cholesterol, cancer, diabetes, etc.). Among nutrients, particularly vitamins and minerals are essential. Human body is incapable of producing them on its own (except for small doses of vitamin D and K, and biotin), therefore they have to be consumed with our food on a daily basis. Most vitamins and minerals are found in fruit and vegetables, and unshelled cereals. According to World Health Organisation (WHO) reccomendations every individual should eat fruit and vegetables every day, in at least five meals.

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And why is eating fruit and vegetables that important? Both fruit and vegetables contain antioxidants, substances that lower the production of free radicals in the organism [2] and in this way protect body cells from injuries [3].

Contemporary lifestyle and shortage of time are the two major reasons why people increasingly often take vitamin and mineral supplements. According to the data available in literature, approximately 20 % of Americans were taking vitamin supplements in the early 70's of the 20th century, whereas twenty years later the percentage amounted to 40 % [4]. Poljšak et al. [2] carried out a similar research among the Slovenian population, which shows that as many as 12 % of the participants are regularly taking vitamin and mineral supplements. Merely 28,3 % of the participants do not take vitamin and mineral supplements.

Due to the increasing availabity of vitamin and mineral supplements, numerous institutions around the world are carrying out a range of research to find out the impact of vitamins on the one hand, and the additional intake of antioxidants on the other. Research findings vary. Up to now, there have been no reliable proofs for the beneficial effect of vitamin supplements. However, the pro-oxidant effect of vitamins C and E with the simultaneous intake of iron has been prooved [5,6,7].

Regarding the popularity of the discussed topic, extensive research on the impact of supplements on our health, and the already conducted research, with which Poljšak et al. [2] wanted to research the consumption of food supplements among Slovenian adults, we prepared a model of a pilot study to find out about the suplement consumption among the students of the University of Ljubljana. The selection of the population was not coincidental, since the students belong to the group of young adults. It is said that the world depends on youngsters, therefore the concern for their healthy lifestyle is of utmost importance. It was presumed that the students' daily vitamins and minerals consumption is insufficient and that they too often take additional antioxidants.

Students lead a stressful life due to the fact that this is the time of acquiring education, material wealth, starting a family and a demanding lifestyle. In this period, young people tend to indulge in various pleas-

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ures (drinking, smoking), eat unhealthy food, do not practice any sports – all of the mentioned factors result in oxidative stress and illnesses deriving from it [2]. Therefore the observed population should be conscientously eating the recommended daily doses of vitamins and minerals, whereas during the examination periods the doses should be increased. The objective of our research was to determine the rates of vitamin-mineral supplement consumption among the above mentioned population, the kind of supplements they most often use, to find out how often they eat fruit and vegetables and what is their opinion regarding the impact of fruit and vegetables consumption on their health.

The purpose of this paper is to introduce the pilot study results. The obtained results may later be used in a more extensive research on the vitamin and mineral supplement consumption among Slovenian students. The obtained results may also be used as an argument for more frequent and extensive campaigns of the importance of fruit and vegetables consumption among students. The aim is also the argumentation of the removal of unhealthy food from automatic vending machines at faculties and replacing it with a wide choice of seasonal fruit.

The obtained results may later be used in a more extensive research on the vitamin and mineral supplement consumption among Slovenian students.

METHODS

The study is based on the cross-sectional descriptive method. Interviews were carried out at the site. The study scheme does not allow for the analiyis of reasons that triggered the illness or condition. It also does not allow for the analysis of measures taken to contain the illness. Due to the mentioned reasons the study may be labelled as the one of descriptive apidemiologic nature [8]. The primary purpose of the study was not the verification of the presurmise or search for the correlations but the description of the situation. For this reason there was no need to establish the hypothesis. The advantage of such studies is the formation of presumptions that may be tested as part of analitical epidemiologic studies. The study offers data about the condition in a given moment. The population that is exposed to the risk involves all the individuals included in the research [8].

The data were collected with questionnaires designed according to the questionnaires administered by the authors [2] in the research Consumption of vitamin supplements in diet. The questionnaire consisted of 13 questions.

The questionnaire started with the questions that defined the sample characteristics. They were followed by the questions dealing with the individual's attitude to the consumption of vitamin and mineral supplements. The questionnaire concludes with the question dealing witht the importance of fruit and vegetables consumption and concern for health.

The questionnaire required marking the chosen statements. Due to the reason that the same questions had been previously used [2], the pilot study that would test the comprehension and optimality of the questionnaire was not carried out.

The inerviews took place either in front of or inside the faculties, members of the University of Ljubljana, chosen at random, also on streets, and in students' homes. The participation was voluntary, the questionnaires were filled in by the participants in the presence of the interviewer who was able to clarify any questions. Prior to the interview all the participants were reminded that they may decline the participation, and those who did so, refrained from filling in the questionnaire. 115 individuals were approached, 100 of them agreed and filled in the questionnaires. The most common reasons for the rejection were the lack of time and lack of knowledge about the topic involved. The interviews took place in the period from 22 March 2010 to 16 April 2010.

The questionnaires were processed with the Microsoft Office Excel programme. At the very beginning 5 questionnaires were excluded from the further analysis for they were not filled in according to the instructions.

RESULTS AND DISCUSSION

Results

The results chosen for the graphic illustration refer to age (Figure 1) and gender (Figure 2) structure of the participants, the frequency of fruit and vegetables consumption (Figure 3), vitamin and mineral supplements consumption (Figure 4), and their types (Figure 5), the reasons for consumption (Figure 6) and the oppinion of the participants regarding the requirement of the supplement consumption although sufficient fruit (Figure 7) and vegetable intake as well as the requirement of fruit and vegetable consumption although regular intake of the supplements (Figure 8). The remaining findings are included in the discussion. Questions meant to be answered just by the participants who consume vitamin and mineral supplements were not filled in by the participants who do not take them. In case the participants did not respect the instructions, the questionnaire was excluded from the further analysis, as mentioned previously.

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Discussion

The results of the research show that 80 % (Figure 3) of the participants eat fruit and/or vegetables every day. 40 % of them eat fruit and/or vegetables two to four times per day, 40 % once per day. Only 7 % of the participants eat fruit and/or vegetables five times per day. Similar results were obtained from the authors of the research [6], in which they wanted to find out how many times per day Slovenians eat fruit and/or vegetables. They found out that only 5 % of the participants eat fruit and/or vegetables five or more times per day. According to World Health Organisation (later on referred to as WHO), one should eat at least five meals per day containing fruit and/or vegetables. Since the recommended norms about the daily amounts of fruit and vegetables are not met, WHO, being aware of the situation, formulated The Global Strategy on Diet, Physical Activity and Health, a very important part of Strategies for Health in the 21st century. It also includes information on

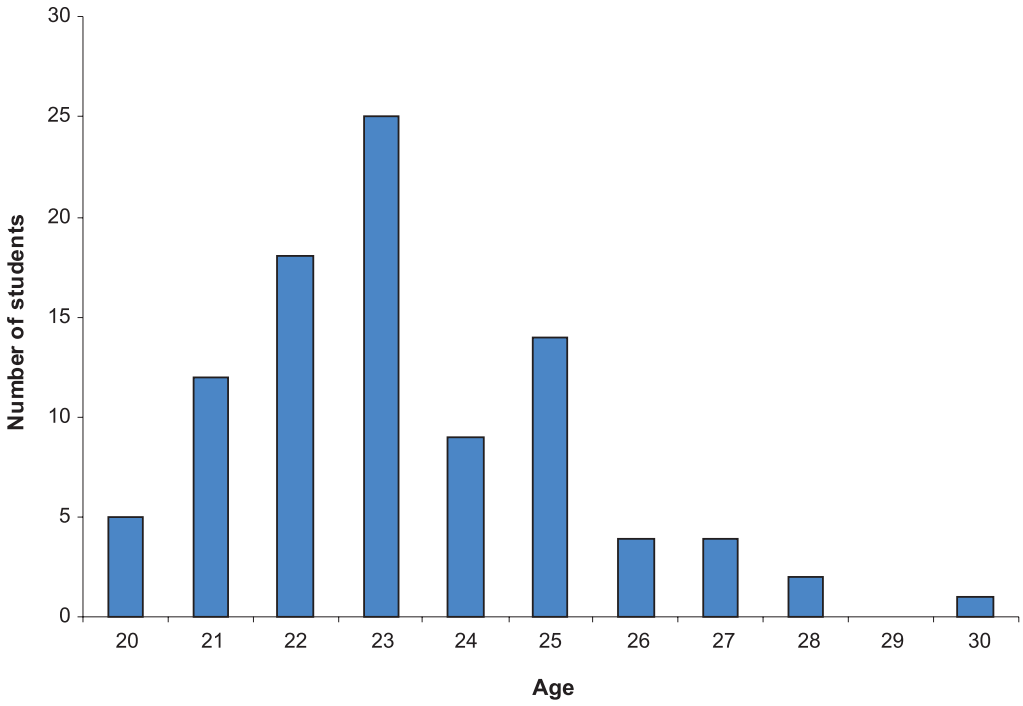

Figure 1: Age.

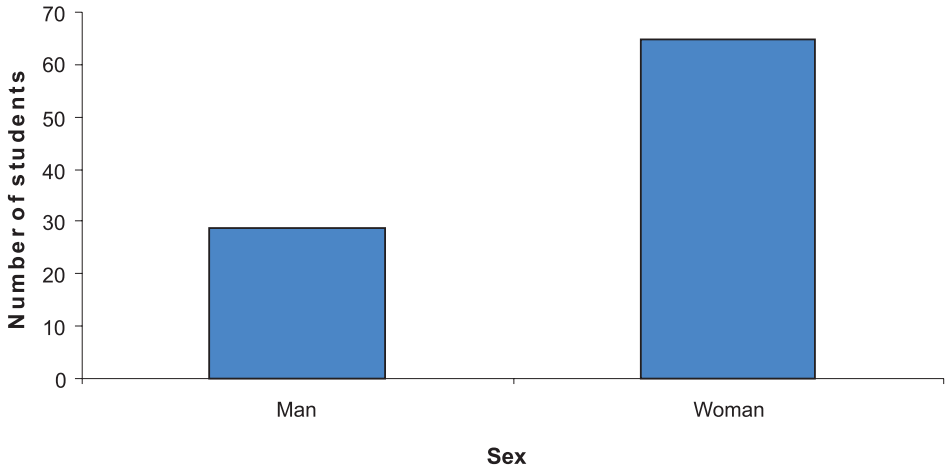

Figure 2: Gender.

healthy diet and it could be included in the group of strategies for essential changes.

Different government institutions functioning on the field of human health and disease prevention are aware of the problem of insufficient fruit and vegetable intake of the slovenian population. With the aim of increasing the frequency of fruit and vegetable intake many measures were taken. Two of them are the programs "PROGREENS" and "Shema šolskega sadja". Both programms are dedicated to elementary school

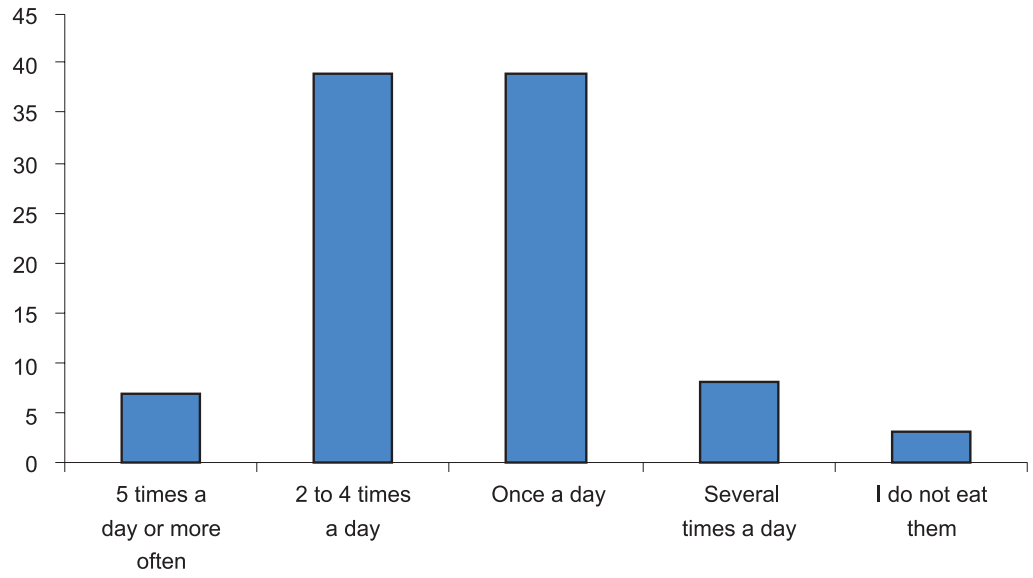

Figure 3:
The frequency of fruit and vegetables consumption (*N*=95).

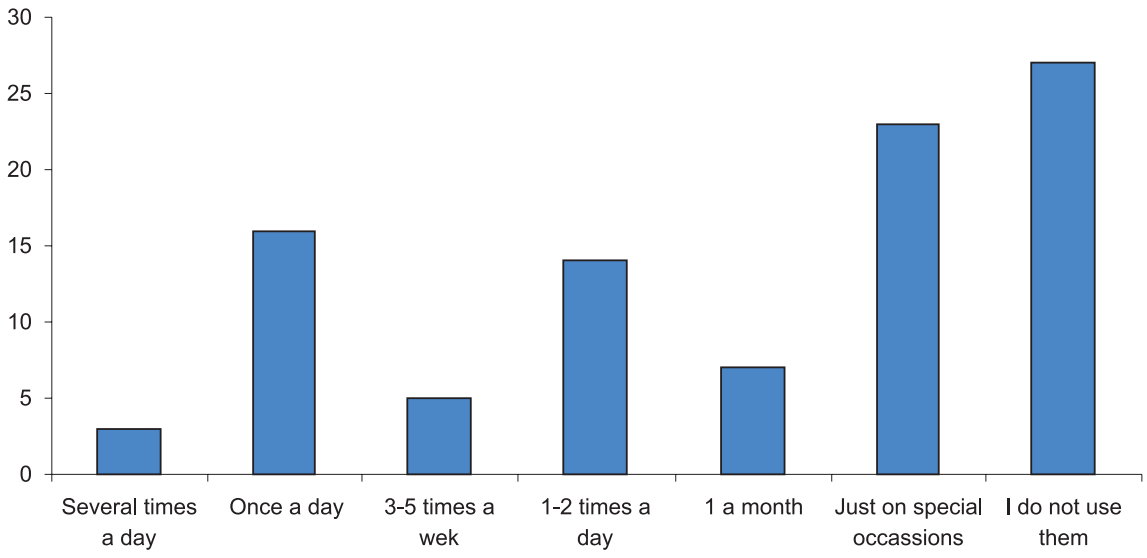

Figure 4:
The frequency of vitamin and mineral supplement consumption (*N*=95).

pupils. Their common goal is to increase fruit and vegetable consumption and thus fortifying the health of target population.

71 % (Figure 4) of the participants take vitamin and mineral supplements. 8 % of participants take supplements on a daily basis, hardly a third of the participants take them a few times per week or per month,

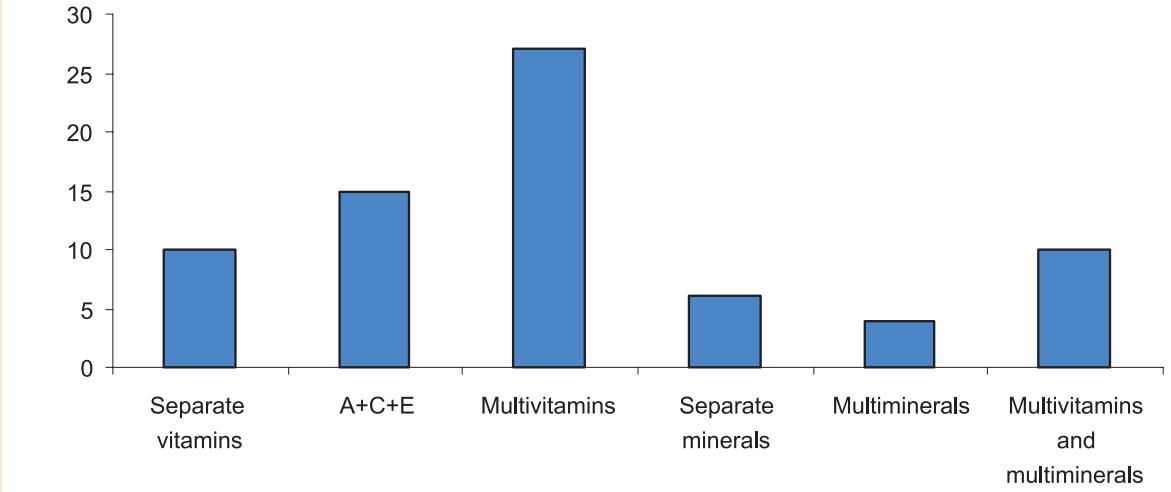

Figure 5:
The most commonly used vitamin and mineral supplements (*N*=95).

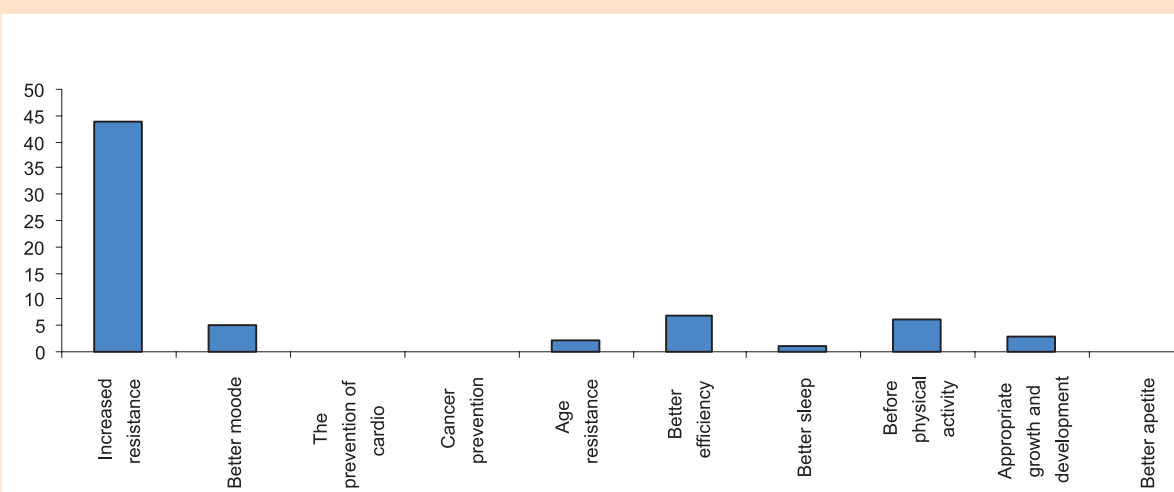

Figure 6:
Reasons for vitamin and mineral supplement consumtion (*N*=95).

whereas the majority of the participants take them under special circumstances only. The findings of the research The consumption of vitamin and mineral supplements as a part of one's diet [6] show that 12 % of the participants take supplements on a daily basis, 38 % of the participants only in rare cases. The findings of the research Slovenian public opinion from 1994 [9] show that 8,4 % of the participants take supplements on a daily basis, 29,9 % take them rarely and 47,4 % never take them. According to the results of the research Slovenian public opinion [9], from 1996, 9,1 % of the participants take supplements every day, 28,9 % take them rarely, and 47,2 % never take supplements. In the research carried out among nurses in the year 2002

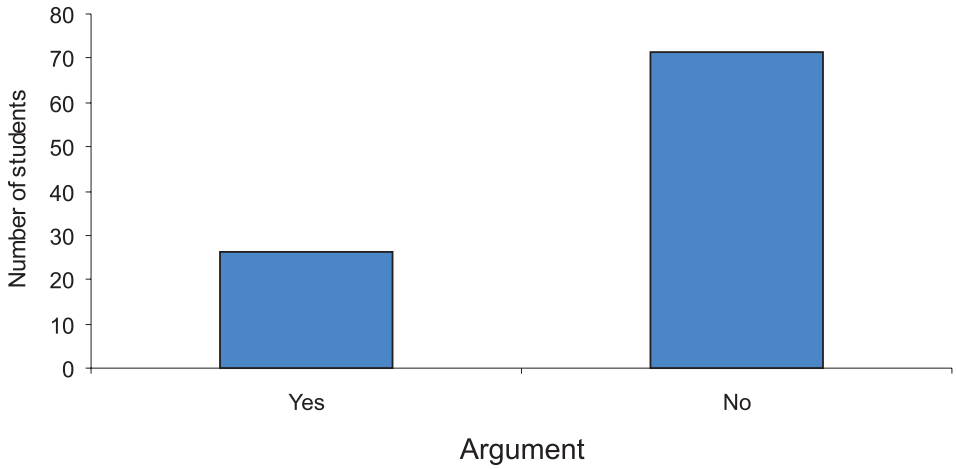

Figure 7:
The requirement of the supplement consumption although sufficient fruit and vegetable intake is obtained (*N*=95).

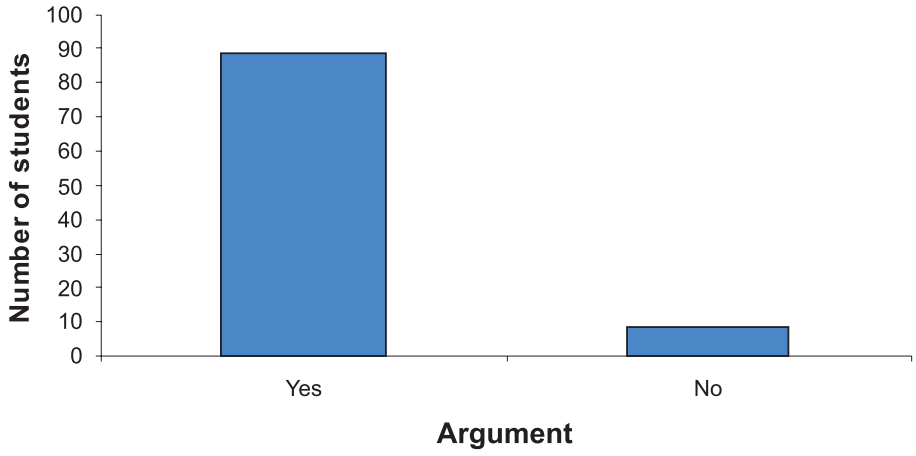

Figure 8:
The requirement of the fruit and vegetable consumption although vitamin supplement is regularly used (*N*=95).

[10] the authors found out that 36,9 % of the participants take supplements once per month or even more seldom, and merely 6,2 % of the participants take them on a daily basis. It can be drawn the conclusion from the listed research that the consumption of vitamin and mineral supplements is the lowest among health services employees, and among our chosen population.

In our research, the participants' opinion on the sensibility vitamin and mineral supplements consumption turned out to be pretty unanimous. The results show that less than 75 % of the participants do not see any point in taking vitamin and mineral supplements, in case one regularly

eats fruit and/or vegetables (Figure 8). As much as 95 % of participants as well believe that in case one regularly eats fruit and/or vegetables there is no need for supplements (Figure 7). Similar results were obtained in the research The use of vitamin and mineral supplements as part of one's diet [11], in which 72,3 % of participants turned out to believe that there is no point in taking supplements if one regularly eats fruit and/or vegetables, 86 % of the participants think that in case of regular consumption of fruit and vegetables supplements are not necessary. Furlan [11] and Pokorn [12,13] come to the conclusion that mineral and vitamin supplements are not necessary in preventive medicine, they can even be harmful. They write that a balanced diet is still the most optimal choice for the prevention of some chronic deseases. Many studies confirmed the fact that vitamin intake is better from the food compared to synthetic compounds. Fruits, grains and vegetables contain multiple components that might exert protective effects against disease. It could be any, or any combination of those factors that is a true protective agent. High plasma ascorbate levels or high ascorbate intake could simply be a marker of a good diet rather than a true protective factor [14]. Fruit and vegetable contains many different antioxidants and specific antioxidant interact in a synergistic way by regeneration of each other [14], e.g. vitamin E can regenerate vitamin C and glutathione can regenerate vitamin C [14,15]. If these compounds are not present (e.g. in a food supplement) such regeneration cannot occur and pro-oxidative reaction can begin [14,15]. Such situation may occur when a single vitamin supplement is taken [15].

Fruit and vegetable contains many different antioxidants and specific antioxidant interact in a synergistic way by regeneration of each other, e.g. vitamin E can regenerate vitamin C and glutathione can regenerate vitamin C.

The research showed that the participants most often take multivitamin supplements (approximately 50 %) (Figure 5). Less than a quarter of them take multivitamin-multimineral supplements or a single-vitamin supplement, less than a sixth of the participants most often take suplements of vitamins A+C+E (Figure 5). Similar conclusions are drawn in the research carried out among the students of the University of Ohio, where the most popular supplements are the multivitamin ones, followed by vitamin C supplements an the ones with calcium [16]. Somewhat different are the results obtained by the authors of the research The consumption of vitamin supplements as a part of one's diet [2]. Their observed population most often take multivitamin supplements (28,7%), and supplements of vitamins A+C+E (28,3%). Similar to these findings are the ones obtained from the American national research, where most often used vitamin and mineral supplements are likewise multivitamin supplements, followed by a very similar percentage of those taking the supplements of vitamin E and calcium [17]. Regarding the reason for the consumption of vitamin and mineral supplements, prevails the opinion that vitamin and mineral supplements increase the resistance of the organism (Figure 6). A small percentage of the participants state as a reason for the consumption of supplements improved productivity and concentration, higher spirits and better physical performance (Figure 6). The participants' idea about the consumption of supplements increasing the resistance of the organism is actually not precise, since it is well known that the natural vitamins'

The consumption of vitamin supplements as a part of one's diet.

Regarding the reason for the consumption of vitamin and mineral supplements, prevails the opinion that vitamin and mineral supplements increase the resistance of the organism.

efficiency by far exceeds that of the synthetic vitamins. Eating a lot of fruit and vegetables is therefore more sensible than taking supplements. For example, the synthetic vitamin C contains only the ascorbic acid, whereas the natural vitamin C found in rose hip contains bioflavonoids and vitamin C complex [19].

The participants obtained information on the beneficial effects of vitamin and mineral supplements mainly from the media. The same are the findings of the authors of the research [2], in which 40 % of the respondents stated the media (TV, radio, newspaper etc.) as the most important source of information on vitamin and mineral supplements. The results of both examples of research indicate the power of the media and the pharmaceutical industry [2].

The legislation in the area of vitamin and mineral supplements may be considered inappropriate. In the USA markets the supplements containing 10 times of the recommended daily doses may be found. As they are still not trated as medicines, they are not regulated by the Food and Drug Administration monitoring bioapsorption and toxicology medicine tests efore they are launched on the market. The European Commission has prepared the regulations in the area of vitamin and mineral supplements that do not fall under the medicine regulations [2]. With the harmonisation of such regulations Slovenia in 2003 first introduced the Regulations on the categorisation of vitamin and mineral supplements taken orally in pharmaceutical form, and included them among medicines [19]. In the year 2008 the regulation was replaced by a new one with one important difference with regard to the criteria of categorisation. According to it the vitamin and mineral supplements taken orally are now considered to be medicines, either when the quantities of vitamins, minerals and oligo elements exceed the quantities quoted in the regulations in Tables 1 and 2, or in case they have medicinal properties and are used also for the prevention of illness [20].

The participants in our research most frequently buy vitamin and mineral supplements in shops. In contrast to this, the participants in the research The consumption of vitamin and mineral supplements as a part of one's diet [2] most often repor buying supplements in pharmacy. 90 % of our participants take vitamin and mineral supplements in doses stated by the producers in the instructions according to the recommended supplement intake.

With regard to the assessment of vitamin and mineral impact on health improvement, the five grade scale (with 1 used for a huge impact, and 5 for no impact), 30,4 % participants assessed the impact on the health as huge or considerable. In contrast to this, Poljšak et al. [2] found out that almost 50 % of participants consider the impact of vitamins and minerals on health as huge or considerable. It is concluded that in general the participants acknowledge the importance to vitamins and minerals in their diet, but not sufficiently.

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THE APPLICABILITY OF THE RESULTS

The researchers awared of the small size of the sample in our research and the fact that the results do not adequately present the total Slovene student population. However, it might beconcluded that the obtained results compare to those of the similar studies [2,9,10,21,22] carried out in our country and including larger numbers of participants. The obtained data may presently be used as an argument for the authorities to improve the much needed campaigns for healthy diet among students and the urgent need to change the offer of snacks in vending machines at faculties belonging to the University of Ljubljana.

The restaurants offering subsidised meals to students take them into account to a certain extent, but the recommendations have to be explained to the students as well.

Although the guidelines for healthy diet of students with menus [23] have been issued, they are not sufficiently used. The restaurants offering subsidised meals to students take them into account to a certain extent, but the recommendations have to be explained to the students as well. The results of the research show the frequency of vitamin and mineral supplements consumption, and the frequency of fruit and/or vegetables consumption. With the help of the guidelines and the obtained data it could be eventually launched the campaign for healthy diet. The guidelines offer advice on fruit and vegetables consumption and the results point at the segments that should be focused on.

It is evident that the obtained data do not lead to clear conclusions, but they nevertheless confirm the fact that it is wise to continue the research.

The research shows that students do not consume enough frequent the fruit and vegetables per day.

CONCLUSION

The research shows that students do not consume enough frequent the fruit and vegetables per day. Merely 7 % of the observed participants eat five or more meals of fruit and/or vegetables. The results show that the consumption of vitamin and mineral supplements among the chosen population is moderate, since merely 8 % of the participants take vitamin and mineral supplements on a daily basis, whereas 71 % of the participants only take them in rare cases (for example in case of an illness). The media play a great role in persuading people to start taking supplements.

Fruit and vegetables contain natural vitamins, which cannot be fully replaced with the consumption of synthetic ones.

It is important to inform youngsters about the fact that a healthy person does not need to take any additional antioxidants in case they regularly eat fruit and vegetables, are physically active and lead a healthy lifestyle. When the balance in the organism is disrupted and one falls ill, it is primarily important to eat fruit and vegetables, and not vitamin and mineral supplements. Fruit and vegetables contain natural vitamins, which cannot be fully replaced with the consumption of synthetic ones.

To take vitamin and mineral supplements or eat fruit and vegetables? Does the consumption of vitamin and mineral supplements make sense or not? There is no correct answer to this question. On the one hand there are fruit and vegetables treated with pesticides, fruit is often collected unripe, even if it is known that fruit starts to produce antioxidants to defent itself from solar radiation [2]. On the other hand there is

no credible evidence about additional intake of antioxidants having any positive impact on the organism, yet the pro-oxidative effect of vitamin C and E taken together with iron has been proved [5,6,7]. *What should be done after?*

A healthy grown up individual leading a healthy lifestyle has no need for an additional intake of antioxidants. It is important that one eats a balanced diet containing as much fruit and vegetables as possible, and as little unhealthy food as possible, and stays physically active. This enables us to protect our health on the one hand and improve it on the other.

A healthy grown up individual leading a healthy lifestyle has no need for an additional intake of antioxidants.

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