



World Scientific News

An International Scientific Journal

WSN 106 (2018) 163-174

EISSN 2392-2192

Evaluation of the Dietary Supplements Intake Among University Students

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ABSTRACT

The aim of this study was to determine the prevalence and reasons of intake of dietary supplements among students aged 19-29 years. The survey was performed using the questionnaire method Computer-Assisted Web Interview among group of 350 students aged 19-29 years in March 2018. Dietary supplements have been used by 66,85% respondents. More than a half of respondents took them every day. Almost 70% of students took dietary supplements as a result of their own decisions. Single-component supplements were the most commonly used ones, including preparations of vitamin D and magnesium. The most common reasons of supplementation among students were preventions and improvement of health. The current study shows that the intake of dietary supplements is common among students, especially among women and students of nutritional associated courses. In most of the cases it was a result of individual decisions, rarely due to the recommendations of specialists.

Keywords: dietary supplements, supplementation, university students, vitamins, minerals

1. INTRODUCTION

The European Food Safety Authority (EFSA) defines food supplements as “concentrated sources of nutrients (i.e. mineral and vitamins) or other substances with a

nutritional or physiological effect that are marketed in “dose” form (e.g. pills, tablets, capsules, liquids in measured doses)”. There are a lot of substances that can be present in food supplements, for example vitamins, minerals, amino acids, essential fatty acids, fibre and various plants and herbal extracts. The aim of using food supplements is to supplement a normal diet [1].

Pursuant to the Pharmaceutical Law Act of 6 September 2001 (Journal of Laws of 2016, item 2142, as amended), a food supplement must not have the properties of a medication. The labelling, presentation and advertising of dietary supplements must not contain information stating or suggesting that a balanced and varied diet cannot provide the body with sufficient amounts of nutrients. Dietary supplements, unlike medicines, are not supervised by the Pharmaceutical Inspectorate, which means that their composition is not controlled, and there are no studies confirming their quality, effectiveness and safety. To place the product on the market it is needed just to notify the Chief Sanitary Inspectorate and provide the packaging template. In the case of a food supplement, there is no statutory requirement for continuous monitoring of the safety of use.^{1,2}

The findings of the Supreme Audit Office’s inspection showed that in Poland there is no adequate level of safety of dietary supplements. By assumption, a product that goes to the market should be previously researched, but in practice the number of products on the market exceeds the control capacity of the Sanitary Inspectorate. The inspections carried out by the Inspectorate concern only a part of the market thus in many cases sold supplements are not controlled.

The study held in 2014 by TNS Polska showed that 50% of respondents believed that supplements are as controlled as medicines whereas the Supreme Audit Office’s analysis demonstrated that the advertisements of some of the products include content that attributes supplements to medicinal properties and may suggest that they are an indispensable part of a daily diet.³

Despite the increasing use of dietary supplements, consumers are convinced of the beneficial effects of these products on the body. The constantly growing increase in dietary supplement consumption may indicate that consumers are convinced of their beneficial effects. In the mentioned report of TNS Polska it was also showed that 41% of respondents was convinced about medicinal properties of dietary supplements which they do not have. Many studies directly indicate the lack of effect of dietary supplements on general mortality, cause-specific death, cardiovascular diseases and cancer, and they do not show any preventive effect on chronic diseases [2]. Moreover, excessive consumption of vitamins and minerals may cause side effects when their use is not justified from a nutritional point of view. Harmful effects could be associated with a risk of adverse reactions, such as hepatotoxicity, gastrointestinal and neurological complications, and interactions with drugs [3, 4].

Observation by Chiba et al. shows that the most common side effects associated with the consumption of dietary supplements are gastrointestinal complaints. People who had experienced side effects did not report them to the appropriate authorities, and what is more,

¹ Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 7 grudnia 2016 r. w sprawie ogłoszenia jednolitego tekstu ustawy - Prawo farmaceutyczne (Dz.U. z 2016 r. poz. 2142, ze zm.)

² Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 3 stycznia 2017 r. w sprawie ogłoszenia jednolitego tekstu ustawy o bezpieczeństwie żywności i żywienia (Dz.U. 2017 poz. 149)

³ Dopuszczanie do obrotu suplementów diety, nr ewid.195/2016/P/16/078/LLO, Delegatura NIK w Łodzi, marzec 2017 r.

1/3 of those subjects did not stop supplementation [5]. Doctors also demonstrate low level of knowledge about dietary supplements. In another study as many as 37% of physicians did not know that dietary supplements do not have to be accepted by the Food and Drug Administration before entering the market [6].

The high data indicate a low level of awareness among both consumers and professionals, and the need for their education in the field of supplementation. In addition, changes in the system of supervision over the market of dietary supplements are needed.

The aim of this study was to investigate the frequency and the cause of the use of dietary supplements among students aged 19-29.

2. MATERIAL AND METHODS

The study was conducted using CAWI (Computer-Assisted Web Interview) among 350 students at various faculties of universities in Poland in March 2018. The respondents filled out the questionnaire placed on the web server, to which the link was received directly from the interviewer or was placed on various social networks. The majority of respondents were women (261 women and 89 men).

The original questionnaire consisted of two parts. The first one contained metric data (age, sex, body mass, height) and general information about place of residence, field of study and employment. The second part contained questions about supplementation (amount and type of supplement, regularity of supplementation and financial resources allocated to it).

Table 1. Characteristics of study participants.

Field of study	Respondents (n = 350)					
	women		men		total	
	Number of people	n_1 [%]	Number of people	n_2 [%]	Number of people	n_3 [%]
Nutrition Sciences	78	29,9	11	12,4	89	25,4
Medical Sciences	47	18,0	11	12,4	58	16,6
Agricultural Sciences	45	17,2	15	16,9	60	17,1
Humanistic Sciences	36	13,8	23	25,8	59	16,9
Economic Sciences	35	13,4	6	6,7	41	11,7
Technical Sciences	20	7,7	23	25,8	43	12,3

Source: Own research 2018

The results were evaluated using Microsoft Excel 2007 and Statistica version 13.1. Using the Statistica program, the relationship between the intake and choice of dietary supplements and the field of study, as well as the field of study and gender and expenditure on dietary supplements was investigated.

3. RESULTS

350 university students took part in the study, of which 75.0% were women (n = 261), and 25.0% were men (n = 89). Most of the respondents (25.4%) were students of nutrition sciences. The smallest group consisted of students of technical faculties. Most women studied in the nutritional (29.9%) and medical (18.0%) fields. In the group of men, the majority were representatives of technical and human sciences.

Table 2. Frequency of dietary supplements consumption depending on the field of study.

Field of study	Total [%]	Supplementing the diet (n = 350)		
		Regularly [%]	Occasionally [%]	No supplementation [%]
Nutrition Sciences	100	51,68	30,33	17,98
Medical Sciences	100	43,10	25,86	31,03
Agricultural Sciences	100	26,67	41,67	31,67
Humanistic Sciences	100	22,03	30,51	47,46
Economic Sciences	100	29,27	34,15	36,58
Technical Sciences	100	18,60	34,88	46,51

Source: Own research 2018

The use of supplements was declared by 69.0% of respondents, of whom 36.0% consumed them regularly and 31.0% sporadically. The largest group of people taking supplements regularly were students of nutrition sciences (51.7% of students) and medical sciences (43.1%). Regular supplementation was not popular among students of technical and human sciences, as only about 20.0% of these students chose it. In the present study, it was found that women tend to use dietary supplements more often.

A similar frequency of taking supplements among students in other countries, i.e. in the United States of America and Qatar, was described by Lieberman et al. and Mamtani et al. Among American students, it was defined at 66.0% and Qatari at about 50.0% [7, 8]. The results of Teleman et al. characterizing the use of dietary supplements by Italian students

contrast with the previous studies. It shows that 89.3% of respondents did not consume dietary supplements [9]. According to Kobayashi et al. Japanese students declared similarly rare supplementation. Only 16.8% of students of the Tokyo university stated regular consumption, and 68.0% never consumed supplements. Interestingly, this frequency was related to the level of their nutritional education. Both the education about food and nutrition and about diet supplements were associated with more frequent intake of dietary supplements (19.9% and 15.7% compared to 21.9% and 15.9% of people who did not study topics mentioned above) [10]. Low prevalence of vitamin-mineral supplement use was also observed by Suleiman et al. Only 27.4% of students reported that they have used dietary supplements during the year before the study. [11]

This study showed that in most cases (63.0%) of supplementing students decided to take supplements themselves. Rarely was it the result of recommendations from professionals - doctors, dieticians or pharmacists. Respectively 21.0%, 8.0% and 3.0% of students started supplementation because of their advice.

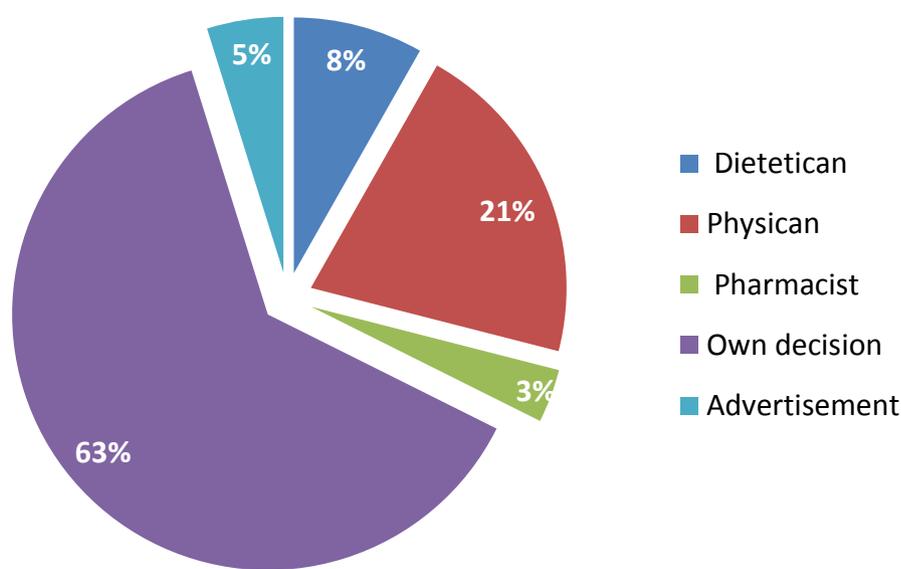


Figure 1. Sources of supplementation recommendations.
Source: Own research 2018

Unfortunately, a similar tendency is shown by the studies from other countries around the world. An equally large impact of the Internet on the selection of the supplement was shown among Japanese students. Over 38% of respondents admitted that information about supplements is derived from online websites. Clinics' opinions were taken into account by only 2.8% of respondents [10]. The Internet was also a popular source of information for American students, especially male sex students. However, it should be emphasized (especially in comparison to previously presented research results) that the recommendations of healthcare professionals have been crucial for them. It has been considered by 30.8% of surveyed women and 17.5% of men [7]. Another study shows that nearly half of the respondents who has been taking dietary supplements admitted that they followed a medical doctor's recommendation [12]. Contradictive to this are observations made by Naqvi et al.

where most students from Pakistan declared physician's recommendation as the reason for using dietary supplements [13]. Moreover, it is worth mentioning Mamtani's et al. study, in which students as one of two main reasons for the use of supplements stated their safety. Considering the lack of professional advice among young people it may indicate a dangerous trend [8]. The most frequently chosen (by 48% of people) were one-component preparations. Also, very popular were vitamin-mineral preparations. The least frequently used were multivitamins.

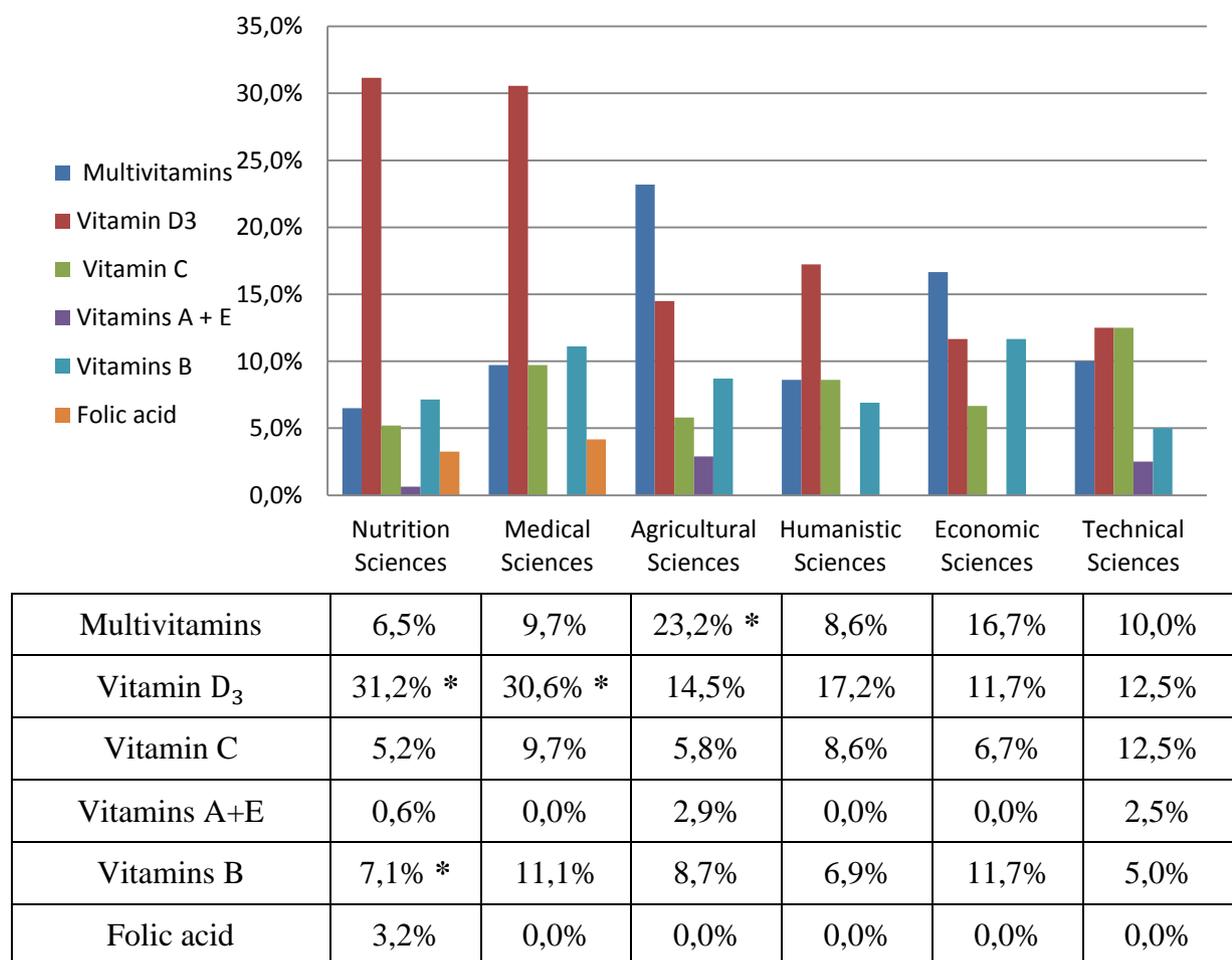


Figure 2. Statistical analyses were carried out between the field of study and the consumption of the vitamin supplement. The p values were calculated using the χ^2 test.

*p<0,05 is considered statistically significant.

Source: Own research 2018

Among the group of people supplementing the diet with vitamin and / or multivitamins preparations, the largest percentage were students who took vitamin D preparations (22.5% of respondents). Taking into consideration respondents' field of study, the vitamin D has been most frequently consumed by students of nutritional and medical courses (31.2% and 30.6% of respondents, p <0.05), least often - students of technical (12.5%) and economic (11.7%)

majors. Multivitamins were very popular (used by 11.5% of supplements). The most often chosen by medical sciences students (23.2% of students of these majors, $p < 0.05$) and students of economy (16.7%). Students of nutritional sciences (up to 6.5% of students) were reluctant to use multivitamins.

B vitamins were supplemented by 8.4% of respondents. They were mainly consumed by students of medical (11.1% of surveyed) and nutritional fields of studies (7.1% of students, $p < 0.05$). The least frequently used vitamin supplements in the population were vitamins A and E, they were used by only less than 1% of the surveyed students. Although a large part of the respondents were young women, folic acid was not a popularly used supplement. Only 2,2% of all surveyed women use folic acid supplements, what is more, they were only the students of nutritional and medical fields.

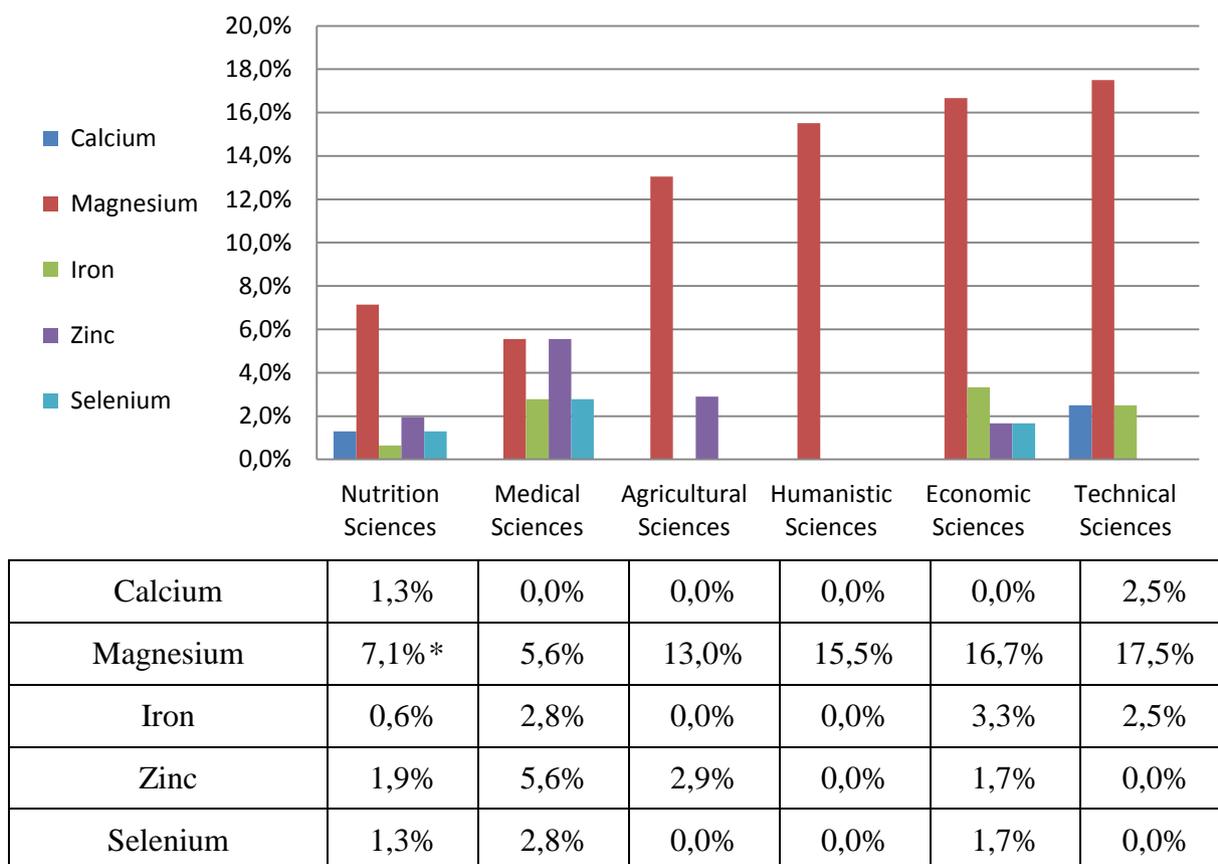


Figure 3. Statistical analyses were carried out between the field of study and the consumption of the mineral supplement. The p values were calculated using the χ^2 test.

* $p < 0,05$ is considered statistically significant.

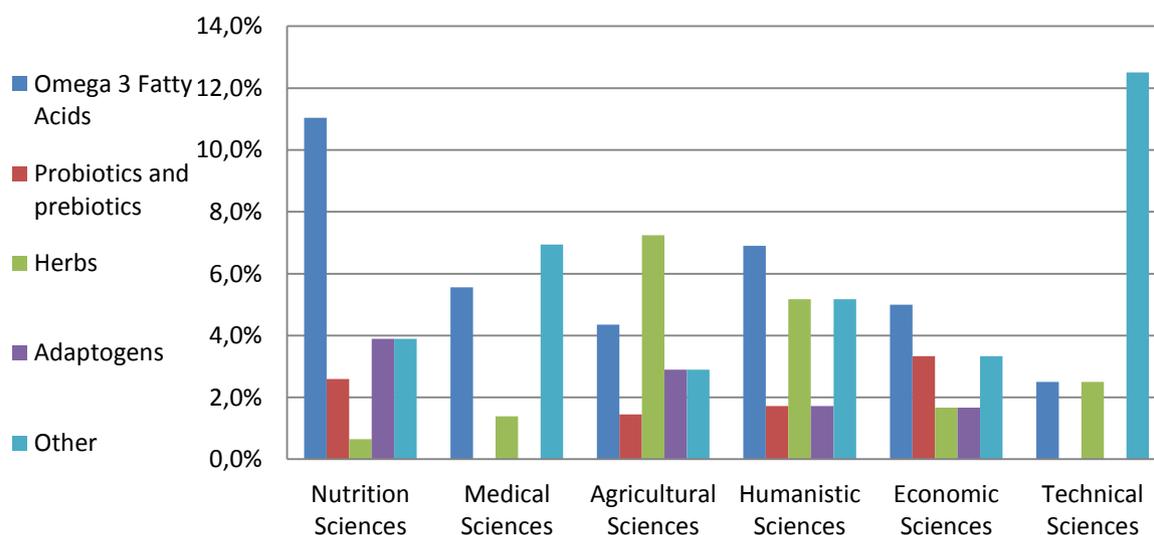
Source: Own research 2018

From the mineral components, the magnesium preparations were the most popular among students of all fields of study. From the mineral components, the magnesium preparations were the most popular among students of all fields of study, 11,0% of students declaring supplementation used it, but statistical significance was recorded only of students in

the field of nutrition. On the other hand, for students of the humanities, magnesium was the only supplemented mineral component.

Zinc supplementation is also relatively common, observed among 2,2% of supplementary respondents, in comparison with other fields of study medical (5,6%) and agricultural (2,9%) students stood out the most. The mineral components that were used the least were selenium and calcium, they were used by respectively 1,1% and 0,7%, of the surveyed students who consumed dietary supplements.

Similar results regarding the type of dietary supplements has been reported by Lieberman et al. and Kobayashi et al., where in both studies referred to above students usually used single-component preparations [7, 10]. Among Japanese students the most often supplemented were B vitamins, vitamin C and vitamin E. Among the minerals were usually calcium, zinc and iron [10].



Omega 3 Fatty Acids	11,0% *	5,6%	4,3%	6,9%	5,0%	2,5%
Probiotics and prebiotics	2,6%	0,0%	1,4%	1,7%	3,3%	0,0%
Herbs	0,6%	1,4%	7,2%	5,2%	1,7%	2,5%
Adaptogens	3,9%	0,0%	2,9%	1,7%	1,7%	0,0%
Other	3,9%	6,9%	2,9%	5,2%	3,3%	12,5%

Figure 4. Statistical analyses were carried out between the field of study and the consumption of the other supplement. The p values were calculated using the χ^2 test.

*p<0,05 is considered statistically significant.

Source: Own research 2018

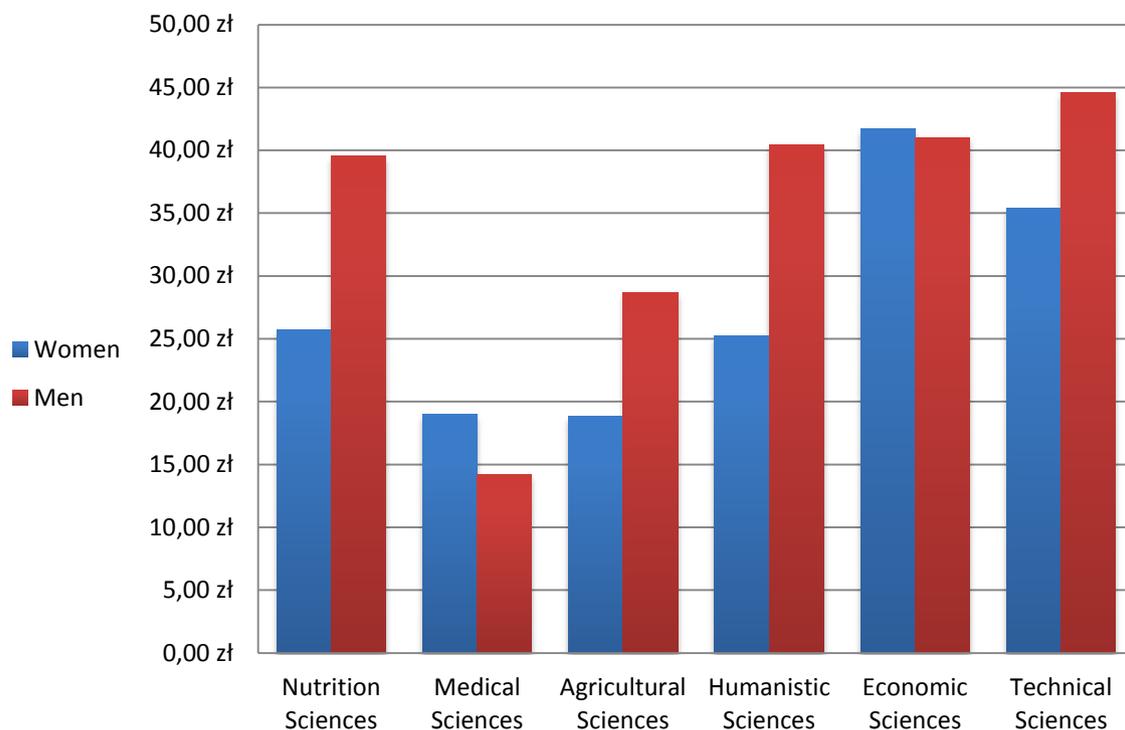
In the group of dietary supplements, which are not vitamins or mineral components, preparations containing ω -3 polyunsaturated fatty acids were used primarily, the most often chosen by nutritional students (11,0% supplementing students, p <0,05). Less popular were

herbs, which were chosen by 2,6% of supplementing students, of which mainly they were agricultural sciences students. The least used dietary supplements among all students were adaptogens as well as probiotics and prebiotics.

Another group of supplements included in the study were sport supplements, of which protein and amino acid preparations were most often chosen, and consumption was declared by 5,7% of students, men used it significantly more often than women ($p < 0.05$). The field of study was not relevant to the choice of these preparations by surveyed students.

Similar results were obtained by Mamtani et al. In their study almost 60% of students declared that they are currently supplementing or were supplementing in the past with supplements that are not vitamins, mineral components or herbs. Among those preparations, the most common were those containing protein and supplements with fish oil or omega-3 acids [8].

Protein and amino acids were also often supplemented by American students (17% of respondents). As it has been reported by Lieberman et al. supplements consumption (at least once a week) was higher among men, people with BMI ≥ 25 , trying to gain weight, consuming high-protein diet and trained, exercising more than 300 min per week to increase muscle mass and increase strength. Interestingly, it was also noticed that people on a high-protein and low-fat diet are more likely to eat dietary supplements. The high-protein diet itself was associated with the use of ≥ 5 dietary supplements per week, taking multivitamins / multiminerals, as well as preparations containing protein and amino acids. The students from this group also spent more money on supplements - over \$ 30 a month, while the average expenses in general of the surveyed students were \$ 17 / month [7].



Women	PLN	25,71 zł	18,97 zł	18,83 zł	25,25 zł	41,67 zł	35,42 zł
	EUR	5,94 €	4,38 €	4,35 €	5,84 €	9,63 €	8,19 €
	USD	6,94 \$	5,12 \$	5,08 \$	6,81 \$	11,25 \$	9,56 \$
Men	PLN	39,50 zł	14,17 zł	28,64 zł	40,45 zł	41,00 zł	44,55 zł
	EUR	9,13 €	3,28 €	6,62 €	9,35 €	9,48 €	10,30 €
	USD	10,66 \$	3,82 \$	7,73 \$	10,92 \$	11,06 \$	12,02 \$

Figure 5. Estimated average monthly expenditure on dietary supplements depending on the field of study, including gender. The p values were calculated using the χ^2 test $p < 0.05$ is considered statistically significant.

Average currency rate: 1 EUR = 4.3262 zł; 1 USD = 3.7055 zł (12.07.2018)

Source: Own research 2018

The amounts allocated to dietary supplements varied depending on the gender and field of study. Statistical analysis showed a relationship between expenditure on dietary supplements and gender and field of study. Men spent on average more money on food supplements than women. Among men, the most financial means for dietary supplements were eager to allocate students of technical faculties, while among women, students of economic faculties.

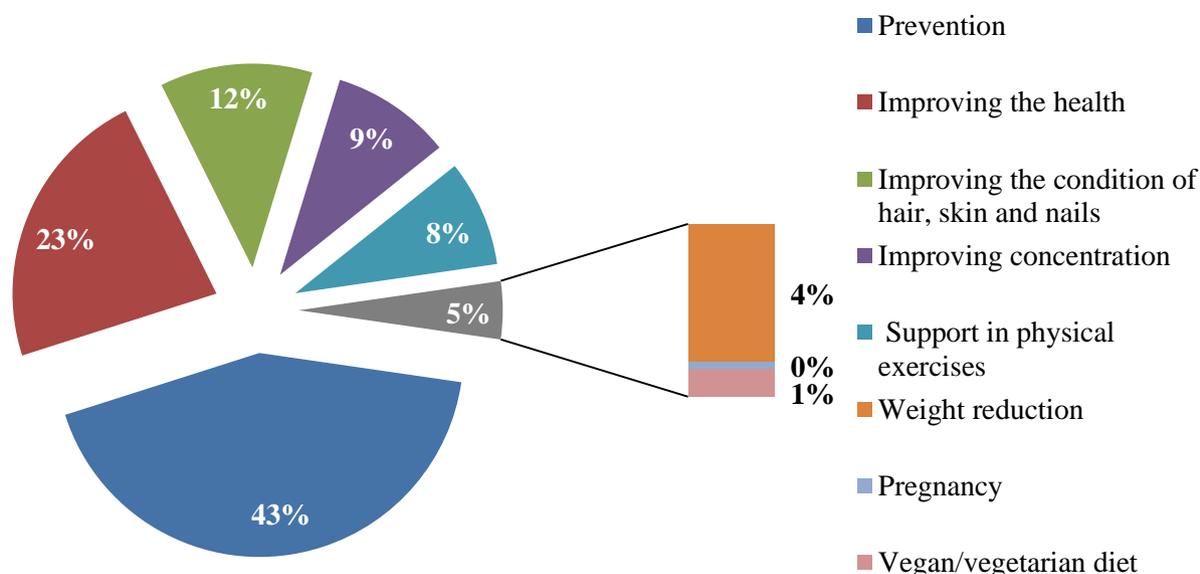


Figure 6. The main aims of supplementation among students.

Source: Own research 2018

The most frequently declared reason for supplementation among the studied population (selected by 43% of respondents) was disease prevention. Almost a quarter of respondents wanted to improve their health through use of dietary supplements. 12% of respondents took supplements for aesthetic reasons - to improve the condition of hair, skin and nails. Almost every tenth student took diet supplements with the intention of improving concentration, and 8% of students with diet supplements intended to support physical condition.

The least common reason for supplementation was the reduction of body weight and the use of a vegetarian or vegan diet. For comparison, in the study on Saudi Arabia students the most common reasons for the use of supplements were to maintain healthy hair and because of injury and illness [14] whilst students of United Arab Emirates reported that that their motivation for supplement use were to maintain good health (58,21%) and ensure adequate nutrition (43,15%) [15]. Similar reasons were reported by Americans in Dickinson's et al. study where dietary supplements were meant to improve overall health or to fill nutrient gaps [16].

4. CONCLUSIONS

- 1) The use of supplements in the studied population was a common phenomenon and dietary supplementation was declared by 69% of respondents, of which 55% was using dietary supplements at least once a day.
- 2) One-component supplements were the most popular.
- 3) Supplementation was most often the result of an independent decision.
- 4) There was a statistically significant correlation in the study population between the estimated average monthly expenditure on dietary supplements and the field of study and gender. The average monthly expenses for dietary supplements were higher among men and students of technical and economic sciences.
- 5) This study shows that the intake of dietary supplements among students is high, which may indicate a high need for education of this group on the safety of these substances. Education of this group could bring beneficial effects in the future.

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