PILOT STUDIES: VITAMIN SUPPLEMENTS – WHAT DRIVES CONSUMERS FROM THE PODKARPACKIE REGION AND DO THEY NEED EDUCATION?

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Abstract

Introduction: Supplements have long been used by consumers, but few of them are aware of the possible consequences of inappropriate use resulting from hypervitaminosis or drug interactions. The higher the sales of supplements, the more necessary consumer education appears to be. The aim of the study was to assess the knowledge and educational needs of consumers from the Podkarpacie region.
Material and methods: 218 people aged 18-65 completed the anonymous survey consisting of 38 questions about vitamin supplementation, dietary habits, and knowledge about supplementation.
Results: Most respondents decide to take supplements without laboratory tests or medical consultation. Only 54% of the respondents read the inserts. Most of them pay attention to the composition and label of supplements before buying them and consume supplements with meals and do not combine them with alcohol. Only 4.10% of the respondents noticed side effects related to supplementation. Being in the medical profession has a positive impact on the knowledge about supplementation, confirming that education is important for understanding and awareness in the field of supplements.
Conclusion: The average level of knowledge is low. Medical professionals usually have a greater awareness of vitamin supplementation, which confirms the hypothesis that appropriate education is necessary for people taking supplements.

Key words: hypervitaminosis, drug interactions, supplements

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Introduction

Conscious food choices and maintaining a balanced, varied diet provide the necessary energy and nutrients for the body's balance. Modern lifestyles, full of stress, rush, limited physical activity and unhealthy habits expose people to a number of harmful factors that increase the demand for nutrients [1]. Dietary supplements are intended to compensate for poor dietary choices and are an integral part of a modern, healthy lifestyle. The most popular forms of supplements are vitamin and mineral mixtures, but other products are also available, e.g. those containing fish oil or prebiotics and probiotics, as well as various substances of plant origin [2]. According to the Act of 25 August 2006 on food and nutrition safety, a dietary supplement is defined as a food product whose purpose is to supplement a normal diet. It is a concentrated source of vitamins, minerals or other substances with a nutritional or other physiological effect, sold in a dosed form, e.g. in the form of capsules, lozenges, tablets, powder in sachets, or liquid in bottles. Dietary supplements do not require clinical trials [3,4]. Manufacturers declare that dietary supplements have a positive effect on the systems and organs of the human body [5]. According to a Report of the Polish Economic Institute from 2019, 71% of Poles admitted that they consume supplements and 48% do it regularly. However, only 27% can correctly define a supplement, distinguishing it from a medicine or special-purpose food. 50% of respondents stated that supplements are tested as rigorously as medicines. According to the Chief Sanitary Inspector, the number of newly registered dietary supplements in 2008 was one thousand, while in 2018 it was ten times that number [6]. Easy access to dietary supplements, as well as limited data on the composition of the product, and the lack of the needed testing before introducing them to the market pose a risk to the health of consumers [4,7]. They are not aware that the dietary supplements they take may have adverse effects or interact with drugs, which may consequently contribute to the deterioration of health and require hospitalization [7,8]. Introducing a supplement to the market does not mean that it does not contain potentially dangerous substances and is characterized by a higher content of active ingredients than conventional food; however, dietary supplements of appropriate quality and after consultation with a specialist can be a valuable complement to a balanced diet [4]. The problem of overusing dietary supplements exists in many countries [9]. The choice to use supplements should be undertaken with a doctor's consultation and is sometimes recommended in some clinical cases such as supplementation during pregnancy, to combat confirmed nutritional deficiencies, secondary preven-

tion of osteoporosis, supplementation in cardiovascular diseases or probiotic therapy to prevent diarrhea [10]. Possible undesirable side effects of vitamin supplements include overdose or interactions with drugs. The literature recommends special caution in combining medications with vitamin C, B3, B6, B9 and E supplements [11]. However, there are many reports related to overdosing of fat-soluble vitamins because they can accumulate in the body and have toxic effects. Excessive vitamin A supplementation can have teratogenic effects [12].

The aim of the study was to answer the question whether education on the use of vitamin supplements is necessary among consumers of vitamin supplements in the Podkarpackie region. In order to draw appropriate conclusions, the state of knowledge on vitamin supplements and the frequency of their consumption was examined. Education on supplementation is important due to the possible phenomenon of hypervitaminosis and interactions of supplements with drugs and food.

Material and methods

Research survey

The study was conducted using an original survey using Google Forms. The questionnaire contained 38 questions formulated in a comprehensible manner and required a short answer. The questions were dominated by closed questions with only 5 open questions. The survey questions focused on the frequency of taking vitamin supplements, the form of their administration, as well as knowledge of the side effects resulting from the improper use of supplements. In questions regarding knowledge about supplements, respondents could receive a maximum of 8 points. In addition, the factors that guide consumers when choosing specific supplements were examined. The survey was completed anonymously, and respondents had no time limit for completing the survey and could withdraw from the study at any time.

Ethics

Polish regulations do not require the consent of the Bioethics Committee for survey research. Patients were anonymous, participation in the survey was voluntary and each respondent was informed about the possibility of ending the study at any time.

Characteristics of the study group

The study involved 218 people, 169 women (77.52%) and 49 men (22.48%) who were divided into age groups (18-29, 30-39, 40-49, 50-65). The largest group consisted of women aged 18-29 – 59.17%, and the smallest were men aged 50-65 – 0.92%. Of all respondents, 34% were rural residents, 24% were residents of cities with more than 50,000 inhabitants, while the largest group were respondents from cities with more than 50,000 inhabitants, representing 42%. The majority of respondents - 60.55% (132 people) were people with higher education, 35.32% (77 people) had secondary education, 4.13% (9 people) - vocational education. The majority of respondents did not work in medical professions - 71.60%. More than half of respondents - 54.10% assessed their health condition as 4 out of 5 points, only 0.90% of respondents gave a score of 1 point, 22% assessed their health as the maximum number of 5 points (Fig. 1). Of these, the vast majority - 67.00% of respondents do not have a chronic disease.

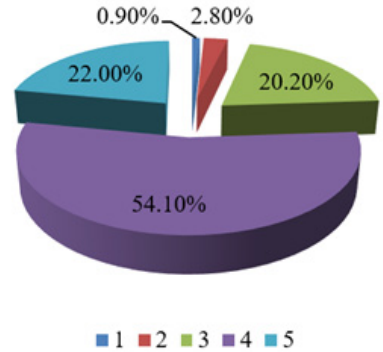

Fig. 1. Subjective assessment of health condition based on declared points on a scale of 1-5 (1-bad, 5-very good).

The percentage of respondents who do not apply any dietary restrictions was 84.40%. Exactly half of the respondents - 50% eat their meals regularly, while only 16.10% of people eat them at irregular intervals, the rest are not sure about the answer. More than half of the respondents - 59.20% eat about 30% of vegetables in each of their meals, for 14.20% half of their meal is vegetables, while 26.60% of the respondents eat about 10% of vegetables with each of their meals. The largest group among the respondents are people who do physical activity for at least an hour about 1-2 days a week, which is 33.00%. The two smallest groups are people who exercise every day - 6.90% and 5 days a week - 7.80%.

Results

The most frequently indicated purposes of using supplements are to strengthen immunity – 39.44% and to prevent deficiencies – 38.54%, only 22.02% take supplements after deficiencies were shown in laboratory tests. The vast majority – 67.47% of respondents independently decided to start using supplements, 19.72% did so at the suggestion of a doctor, and only 3.20% due to the recommendations of a dietician or pharmacist. More than half of the respondents – 62.85% buy supplements in a pharmacy, 33.05% do it online, the fewest people – 1.80% buy supplements in a supermarket. Slightly more than half (56.40%) of respondents always read the information about the composition of the supplements they buy, 27.50% do it rarely, while 16.10% do not do it at all. The vast majority of respondents consume supplements in the dose recommended by the manufacturer or doctor, 21.58% choose the dose of the supplement they use themselves. Almost half of the respondents - 48.55% take supplements after a meal, only less than ¼ of them - 24.78% take them according to the recommendations on the packaging, the rest take them at other times convenient for them, e.g. before a meal, on an empty stomach, in the morning or together with medications. More than half of the respondents - 61.00% do not drink alcohol while using supplements, 27.50% take a break between taking supplements and drinking alcohol, while

as many as 11.50% consume alcohol regardless of the supplements used. The vast majority of respondents - 61.96% consume supplements with the same intensity as before the COVID-19 pandemic. 30.73% take them more often, while 7.31% have reduced their use compared to the level before the pandemic. The type of profession (non-medical / paramedical) affects the level of knowledge of respondents about supplementation. The Spearman rank correlation statistical test performed turned out to be statistically significant, $p<0.001$, moderate correlation strength, rho=0.421. On the other hand, respondents taking supplements were characterized by a lack of sufficient knowledge about the safe use of supplements. The average level of knowledge was 4.59 points, which is approx. 57% of possible points, the lowest possible score was 3, while the highest was 8. The result of the Shapiro-Wilk test and the p value <0.001 for this test indicate a non-normal distribution of data - Table 1.

Tabele 1. The results of the level of knowledge of the respondents about the use of supplements

Level of knowledge of respondents	
N	218
Mean	4.59
Median	4.00
Standard deviation	1.43
Minimum	3
Maximum	8
Skewness	0.441
Kurtosis	-0.882
Shapiro-Wilk W	0.882
Shapiro-Wilk test p-value	<0.001
N- number	

There are no statistically significant differences between people who follow a diet and those who do not follow any diet regarding the decision to use supplements. The Kruskal-Wallis statistical test turned out to be statistically insignificant ($\chi^2=3.15$, $p=0.076$). It is worth noting that the statistical analysis showed that only 4.10% of respondents experienced side effects (diarrhea, vomiting, nausea, or rash) as a result of using vitamin supplements; however, these effects were not life-threatening. The vast majority of respondents use websites as a source of knowledge about supplements, almost half - 47.20% use social media for this purpose. Only 15.10% obtain information from doctors, 17.00% from a dietician, 33.50% use scientific papers and studies for this purpose (Fig. 2).-

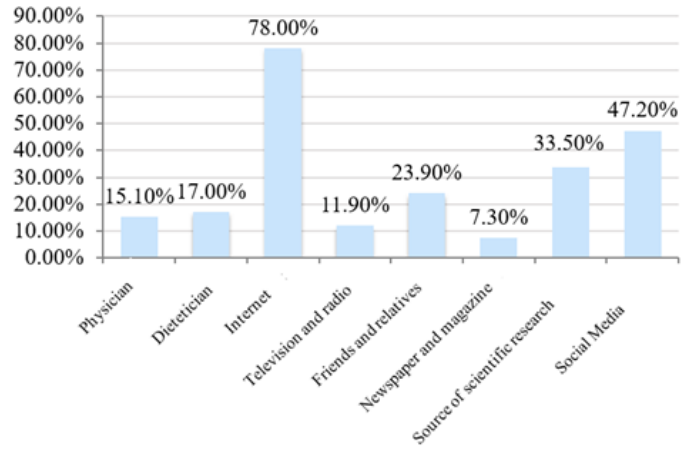

Fig. 2. Sources of information on vitamin supplements.

More than half of the respondents - 56.40% always pay attention to the composition and leaflet of the purchased supplements, 27.50% of them rarely pay attention to it, while only 16.10% do not pay attention to it at all, and the choice of a specific supplement is mostly dictated by the price. The data shows that the most important thing for the respondents was the composition of the supplement - 63.30%, for almost half of the respondents - 49.10% the price, for 37.60% of the respondents the recommendation of a given product by a doctor or dietician was important (Fig. 3).

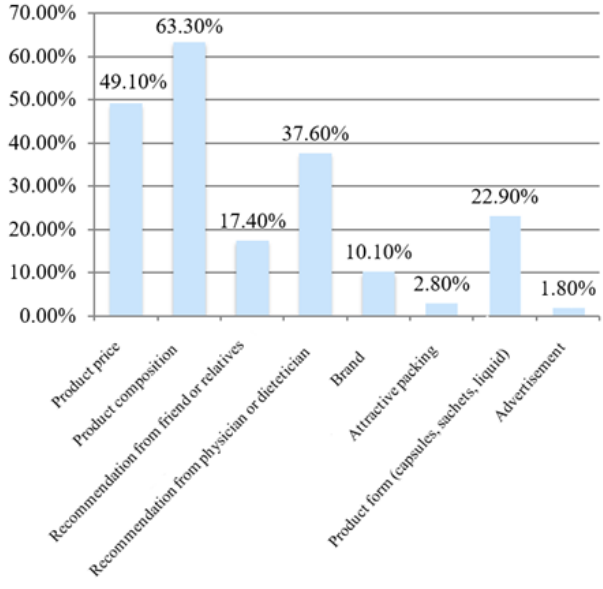

Fig. 3. Factors determining the purchase of a supplement

Discussion

With each passing year, there is a growing interest in dietary supplements among the public, especially taken to improve health. At the same time, both the diversity of information sources and available products can affect the level of knowledge of consumers and their decisions related to the selection of supplements, which may be caused by the price of the product. Working

in the medical profession can also have a significant impact on the level of knowledge [13].

The conducted study confirmed that people performing paramedical professions demonstrate a higher level of knowledge in the field of vitamin supplements. The results of this study suggest that the average level of knowledge of the entire study group about supplements is slightly higher than half the maximum number of points, which shows significant variation in the level of awareness among the study participants. Other researchers obtained similar conclusions from studies in which it was shown that people using dietary supplements usually have higher education and higher average earnings than people who do not use dietary supplements [14-16]. Xin et al. conducted a study in Malaysia examining the knowledge and practices of local pharmacists regarding vitamin and supplement counseling, where an online questionnaire was used. The online questionnaire was completed by 260 people, where 73.5% were classified as having average knowledge of supplements. The results showed a lack of basic knowledge about the indications for use of supplements and the time at which supplementation should be discontinued. It was found that 33.5% of pharmacists only occasionally used the literature and relied on product leaflets. Equally important statistical information is that nearly 29% of pharmacists responded that consultation with a doctor regarding the use of vitamin supplements is not necessary, even in the event of undesirable side effects. An interesting fact is that 44.6% of pharmacists confirmed that, in their opinion, there is a link between the effectiveness of the given vitamin products and the price, which is why they usually recommended more expensive brands, despite their similar composition [17]. It has also been proven that women use more dietary supplements than men, and the frequency of their use increases with age [14,16,18]. Interestingly, this study suggests that adhering to a specific diet does not directly affect decisions regarding supplementation, and the main purpose of their use is to prevent deficiencies or strengthen immunity. Many recent studies have shown opposite conclusions, with the studies by Dickinson et al. proving that people using supplements usually have healthier eating habits, engage in more regular physical activity, and are more likely to maintain a healthy body weight as well as avoid tobacco products. To sum up, people who lead a healthier lifestyle are more likely to reach for dietary supplements, which is a statistically significant finding [15]. In addition, in a study by Huang et al., it was shown that people with unhealthy eating habits most often choose products containing vitamin C and vitamin A from dietary supplements [19]. Such an approach can be disastrous if these vitamins are consumed contrary to the recommendations or with an unknowingly high level of vitamin A in the blood, where its excessive level can have a hepatotoxic effect [20]. When paying attention to the most frequently used sources of knowledge on the subject of supplementation, one cannot ignore the Internet and social media. These are currently the dominant information channels in the category of health and nutrition. The vast majority of respondents pay attention to the composition of products before buying them, which indicates a conscious approach to supplementation. The role model turns out to be young athletes, in the study by Goluch et al., where the results showed that over 2/3 of the respondents had a proper nutritional status, which may indicate a high level of awareness. It was also shown that climbers get their knowledge about supplements mainly from the Internet, scientific publications and sports books. The study also emphasized the importance of conducting diagnostic tests before starting supplementation. When tests indicate nutrient deficiencies, supplementation becomes justified, which can be called a key approach, due to the possibility of avoiding unnecessary or excessive use of supplements, which could lead to undesirable side effects due to excess of certain nutrients in the blood [21].

A survey was also conducted by Matysek-Nawrocka et al., on a group of 100 people, to explore opinions on the use of supplements. Each respondent was a client of pharmacies in Samborzec and Lublin, where 94% were women and only 6% were men. The first most common source from which respondents drew information on the topic of taking supplements was a pharmacist, followed by advertising and information from friends. This shows that although advertising has a large impact on the choice of supplement, personal and professional recommendations are still very important [22].

An important aspect of vitamin supplementation is the topic of side effects, although they are very rarely life-threatening, they can reduce the quality of life. Kozłowski et al. research draws attention to the inappropriate intake of supplements and the related side effects experienced by respondents. 7.4% of respondents confirmed that they experienced negative side effects, including: gastrointestinal disorders, headaches, rashes or skin discolorations, which disappeared spontaneously and did not require medical intervention. This indicates in particular the need for education on the subject of proper and safe use of supplements in order to avoid potential side effects as effectively as possible [16].

An interesting determinant of dietary supplement consumption is the one adopted by residents of France in the study by Pouchieu et al., where the reason was to overcome fatigue, maintain health and compensate for deficiencies in the diet, which was given by only 5.4% of respondents [23].

The results of our own research and those of other authors show that the vast majority of respondents use supplements, and the reasons for starting supplementation are very diverse. Not every user of supplements is fully aware of the effects of consumption. Many studies emphasize the multifaceted approach to supplementation, paying great attention to the need to expand education and research on this topic. The results strongly suggest the need for further research and public education to increase consumer awareness of the benefits and potential side effects or adverse effects caused by the consumption of dietary supplements.

This study has some limitations. The survey using an online platform is related to limiting respondents to a group of younger people using the Internet. The author's survey is not standardized, but during its creation, an attempt was made to select appropriate questions to achieve the research goal. An additional limitation is the number of surveys.

Conclusion

The results of our research indicate an average level of knowledge with a non-normalized data distribution, which suggests a large variety in the level of knowledge of respondents. Additionally, respondents do not consult a doctor when deciding on supplementation. Only 54% of respondents read leaflets. The Internet and social media are the main sources of knowledge about supplements for respondents, which emphasizes the change in the ways information about health and nutrition are obtained. Being a medical professional has a positive effect on the level of knowledge about supplementation, which confirms that education is important for increasing awareness in this area.

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