# DIETARY SUPPLEMENT USE, ATTITUDES, AND KNOWLEDGE AMONG THE GENERAL PUBLIC IN SLOVAKIA

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**Objective of study:** The purpose of the study was to evaluate the use of dietary supplements by the general public in Slovakia and to identify their attitudes to and knowledge of these products.
**Methods:** A questionnaire survey of 256 respondents was conducted during the period from October to December 2014 by on-line collection. Dietary supplement use and knowledge of the respondents were evaluated based on whether they agreed with general, safety, and efficacy statements regarding dietary supplements. The results were processed descriptively using Microsoft Excel.
**Results:** As many as 64.5 % of the respondents use dietary supplements, with 49.8 % using them at least sometimes. Pharmacy is the most frequent place for their purchase (55.8 %). The main reason for their use is prevention of disease (30.0 %) and this particularly concerns the supplements containing vitamins. Fifty-seven percent of the respondents reported having enough information about dietary supplements, with the main information sources being identified as follows: the internet (23.8 %), pharmacists (18.6 %), and physicians (14.6 %). Only 21.5 % of the respondents use dietary supplements based on the advice of a physician and 11.5 % based on that of a pharmacist. A higher level of knowledge of the respondents was associated with the perception of difference between a dietary supplement and a medication (78.1 %), the knowledge that a dietary supplement is available without prescription (72.0 %), and the fact that it is appropriate to consult its use with an expert (71.3 %). Moreover, 58.5 % of the respondents knew that a dietary supplement was not a medication, but only 25.3 % of them knew that dietary supplements belong to foods for special nutritional purposes. Thirty-four percent of the respondents considered dietary supplements as completely safe, and 19.6 % thought that they were as effective as medications.
**Conclusion:** The study found that the use of dietary supplements by the general public in Slovakia was comparable with that in other countries. The evaluation of knowledge showed perceptions and attitudes of the general public towards the efficacy, safety, and general characteristics of dietary supplements. Responsible and safe use of dietary supplements, however, requires greater involvement of health care professionals.

**Key words:** dietary supplements, knowledge study, attitudes and awareness among general public, pharmacists.

## Introduction

The use of dietary supplements, including vitamins, minerals, and herbal products, has increased dramatically in the recent decades, not only in the United States (1, 2), but also in other developed countries (3). The main reason for this is the use of these products as part of self-treatment and/or health promotion (4–6). However, numerous studies have shown that dietary supplements are also frequently used by patients with serious conditions, such as cancer (7, 8). Easy availability, inadequate legislation, pressure from the industry as well as poor awareness among the users are aspects that are often the subject of not only scientific interest, but also criticism (9).

Dietary supplements are regulated differently than medications (including OTCs) in terms of their quality, market entry, labelling, safety, etc. In Slovakia, the legislative standards for dietary supplements are in accordance with the European Union legislation. Accordingly, dietary supplements are defined as *"foodstuffs the purpose of which is to supplement the nor-*

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**Tab. 1.** *Sociodemographic characteristics and specific data on dietary style, presence of chronic diseases, and long-term medication use in the respondents (n = 265)*

| Respondent characteristics | | Total (%) |
|---|---|---|
| **Sex** | Women | **52.8 %** (140) |
| | Men | **47.2 %** (125) |
| **Age** | < 20 | **8.7 %** (23) |
| | 20–34 | **44.1 %** (117) |
| | 35–49 | **18.9 %** (50) |
| | ≥ 50 | **28.3 %** (75) |
| **Education** | Primary | **4.9 %** (13) |
| | Secondary | **48.3 %** (128) |
| | Tertiary | **46.8 %** (124) |
| **Income** | < €500 | **42.6 %** (113) |
| | €500–1000 | **43.0 %** (114) |
| | > €1000 | **14.4 %** (38) |
| **Dietary style** | Regular, no restrictions | **74.4 %** (197) |
| | Special | **12.8 %** (34) |
| | On a diet due to disease | **7.9 %** (21) |
| | Other | **4.9 %** (13) |
| **Presence of disease*** | Heart and vessels | **18.1 %** (48) |
| | Joints and locomotor system | **10.9 %** (29) |
| | Mental illness | **13.8 %** (10) |
| | Diabetes | **6.8 %** (18) |
| | Cancer | **4.9 %** (13) |
| | None | **58.5 %** (155) |
| | Other | **5.3 %** (14) |
| **Regular medication use** | Yes | **32.5 %** (86) |
| | No | **67.5 %** (179) |

**The number of the respondents in this item was 287; they could select one or more answer choices*

*mal diet and which are concentrated sources of nutrients or other substances with a nutritional or physiological effect, alone or in combination"*. Their form is similar to medications (tablets, capsules, pastilles, sachets of powder, or ampoules of liquids) and they are designed to be taken in measured small unit quantities. According to the legislation, the labelling, presentation, and advertising must not *"attribute to food supplements the property of preventing, treating or curing a human disease, or refer to such properties"* (10). Dietary supplements are among the so-called supplementary product ranges of a community pharmacy or dispensary of medical devices, and, under current legislation, are subject to the obligation of procuring, storing, and distributing, but not to that of providing expert information and advice, as is the case with medications, medical devices, and dietetic foodstuffs (11). Dietary supplements are also available outside pharmacy care providers (e.g. pharmacies or dispensaries of medical devices), which increases the risk of their misuse, as has been confirmed in published studies. These studies suggest that up to 77 % of dietary supplement users fail to consult their use with a physician and/or another health care professional (1). The general public considers dietary supplements to be safe products and lacks information on their purpose, appropriateness of use, and possible risks (12).

The present study seeks to evaluate dietary supplement use among the general public in Slovakia as well as to identify their perception and knowledge of these products.

## Methods

### Questionnaire structure and evaluation

The study was conducted in the form of a descriptive questionnaire survey. The structured questionnaire was based on similar surveys published (4, 5) and consisted of four parts: 1) sociodemographic characteristics *(sex, age, education, financial income)*; 2) specific data on the dietary style, presence of chronic diseases, and long-term medication use in the respondents; 3) dietary supplement use *(type, financial expenses, information on dietary supplements, reasons for use, choice of dietary supplements, self-evaluation during dietary supplement use)*; and 4) knowledge of the respondents on dietary supplements. In this section, the respondents were to choose one possible answer *(agree, disagree, don't know)*, with eight general knowledge statements, four statements on the efficacy, and four statements on the safety of dietary supplements. The statements were arranged randomly. The level of knowledge was expressed as percentage of the respondents who answered *"agree"* in response to a given statement.

### Preliminary questionnaire testing

The questionnaire was consulted with experts from the fields of pharmacy, pharmacy practice, and public health. Its comprehensibility and time demands were tested on a sample of ten randomly selected respondents as well as on a sample of ten respondents who were asked to fill in the questionnaire electronically. Suggestions were incorporated in the final version of the questionnaire.

### Data collection

Data collection was conducted electronically through the Google Drive platform during the period from October to December 2014. Data were analysed using basic descriptive methods and processed in the Microsoft Excel programme.

## Results

Only fully completed questionnaires were included in the analysis, with their number being 265. Women were slightly more prevalent (52.8 %) among the respondents, over half of the respondents were younger than 35 years of age (52.8 %), the proportion of respondents with secondary and tertiary education was comparable (48.3 % had secondary and 46.8 % tertiary education), and the monthly net income of the respondents ranged from EUR 500 to EUR 1,000 (43.0 %) or was less than EUR 500 (42.6 %). The vast majority of the respondents (74.4 %) indicated their dietary style as regular, with no restrictions; 12.8 % of the respondents indicated their dietary style as special (e.g. vegetarianism); and 7.9 % reported being on a diet due to disease. As many as 58.5 % respondents claimed that they suffered from no disease, and 67.5 % declared no regular medication use. The results are shown in Table 1.

Table 2 shows the results, characterising the respondents as dietary supplement users. As ma-

ny as 64.5 % of them reported dietary supplement use. However, this figure can even be higher since 11.0 % of the respondents chose the option *"don't know"*, meaning that they were unable to identify whether or not a product they were taking was a dietary supplement. Only 24.5 % of the respondents clearly indicated no dietary supplement use. Regular dietary supplement use was reported by 24.2 % of the respondents, with nearly half of them stating that they used dietary supplements sometimes (49.8 %). The monthly expenses for purchasing dietary supplements were lower than EUR 10 in 37.7 % of the respondents and higher than EUR 10 in 26 % of the respondents. Pharmacy was the most frequent place for the purchase of dietary supplements (55.8 %). Only a small number of the respondents purchased dietary supplements over the internet, in fitness centres, or shopping centres. The results indicate that 42.6 % of the respondents felt better after dietary supplement use, 57 % experienced no change, and only 0.4 % claimed to feel worse. No adverse effects after dietary supplement use were reported by 99.6 % of the respondents and only 0.4 % reported adverse effects in the form of skin problems.

**Tab. 2.** *Dietary supplement use characteristics on a sample of the respondents (n = 265)*

| | | Total (%) |
|---|---|---|
| **Dietary supplement use** | Yes | **64.5 %** (171) |
| | No | **24.5 %** (65) |
| | Don't know | **11.0 %** (29) |
| **Regularity of use** | Regularly | **24.2 %** (64) |
| | Sometimes | **49.8 %** (132) |
| | Never | **26.0 %** (69) |
| **Who do you purchase dietary supplements for*** | Child | **12.2 %** (35) |
| | Husband/Wife | **15.4 %** (44) |
| | Grandparents | **9.8 %** (28) |
| | Friends and acquaintances | **6.3 %** (18) |
| | Don't purchase | **56.3 %** (161) |
| **Expenses for dietary supplements per month** | More than €10 | **37.8 %** (100) |
| | Less than €10 | **26.0 %** (69) |
| | Don't purchase | **36.2 %** (69) |
| **Place of purchase of dietary supplements** | Pharmacy | **55.8 %** (148) |
| | Internet | **6.8 %** (18) |
| | Fitness centre | **6.8 %** (18) |
| | Supermarket chains | **3.0 %** (8) |
| | Don't purchase | **27.6 %** (73) |
| **Feeling after dietary supplement use** | Better | **42.6 %** (113) |
| | Worse | **0.4 %** (1) |
| | No change | **57.0 %** (151) |
| **Occurrence of adverse effects** | No | **99.6 %** (264) |
| | Yes | **0.4 %** (1) |

**The number of the respondents in this item was 286; they could select one or more answer choices*

Vitamins were chosen by the respondents as the most frequently used group of dietary supplements (35.0 %), with products containing vitamin C and a complex of vitamins B being the most prevalent. The use of dietary supplements containing minerals and trace elements was reported by 19.0 % of the respondents, with magnesium and zinc being the most predominant. The use of probiotics was reported by 18.0 % of the respondents. The use of other kinds of dietary supplements was indicated by the respondents at the level of five percent and less: omega fatty acids (5.0 %), proteins and various products for athletes (4.0 %), dietary supplements containing chlorella, gingko, gynaecological products and products for pregnant and breastfeeding women, and products intended for joint nutrition (2.0 % each), cranberry extracts and vision improvement products (1.0 % of the respondents each). The category "other" was represented by 9.0 % of the respondents and included supplements containing fibre, aloe vera, green barley, echinacea, and melatonin.

When evaluating the awareness of dietary supplements (Table 3), it was found that up to 57.0 % of the respondents had enough information on dietary supplements. The internet was the most frequent source of information for them (23.8 %). The pharmacist and physician were reported to be the source of information on dietary supplements by 18.6 % and 14.6 % of the respondents, respectively. The results show that the decision to use a dietary supplement was made by the respondent on their own in 32 % of the cases; 21.5 % of the respondents did so based on a physician's advice, 11.5 % based on a pharmacist's advice, and another 11.5 % of the respondents decided to use dietary supplements on the advice of friends and acquaintances. Commercials as a source affecting the decision-making on dietary supplement use were chosen by a mere 1.8 % of the respondents. Disease prevention was the most common reason for dietary supplement use in our respondents, having been selected by as many as 30 % of them. Tiredness, exhaustion, and weight loss as reasons for dietary supplement use were reported by 19 % of the respondents. In 16 % of the respondents, treatment of a disease was the reason for dietary supplement use; 13 % of them used dietary supplements as a supplement to other medications; 12.1 % used them based on a physician's and/or pharmacist's advice; and 9.9 % of the respondents indicated the answer "other", where the reasons stated included pregnancy and sporting activity. In case the respondents used no dietary supplements, the reasons indicated were that the respondents did not need them (42.3 %), that they did not trust them (19 %), that the supplements were useless (13.5 %), that they were unaware of them (12.5 %), and that their price was high (12.5 %).

When evaluating the respondents' general knowledge on dietary supplements (Table 4), they were shown to perceive the difference between a dietary supplement and a medication (78.1 %). They knew that no doctor's prescription was necessary (72.0 %) and that a dietary supplement must be labelled as such on the outer packaging (64.5 %). Also, 58.5 % of the respondents declared they did not consider a dietary supplement to be a medication, while only 25.3 % of them classified it correctly as food for particular nutritional uses. A low number of the respondents (21.9 %) thought that a dietary supplement should only be used by a healthy person. As many as 71.3 % of the respondents believed that it was advisable to consult dietary supplement use with a physician and/or pharmacist, and 61.3 % agreed that a dietary supplement may have adverse effects. This corresponded with the finding that only 34.0 % of the respondents considered dietary

**Tab. 3.** *The respondents' awareness of dietary supplements*

| | |
|---|---|
| **Have you got enough information on dietary supplements?** n = 265 | |
| Yes | **57.0%** |
| No | **43.0%** |
| **What is your source of information on dietary supplements?*** n = 396 | |
| Internet | **23.8%** |
| Pharmacist | **18.6%** |
| Physician | **14.6%** |
| Not interested | **10.8%** |
| Magazines and press | **10.3%** |
| Friends and acquaintances | **9.6%** |
| Another expert | **6.8%** |
| TV and radio commercials | **4.5%** |
| Other | **1.0%** |
| **What are your decisions about dietary supplement use based on?*** n = 390 | |
| On my own decision when I think I need it | **32.0%** |
| On a physician's advice | **21.5%** |
| On a pharmacist's advice | **11.5%** |
| On the advice of a friend and/or acquaintance | **11.5%** |
| On another expert's advice | **7.8%** |
| On articles and books | **7.2%** |
| Other | **6.7%** |
| On commercials | **1.8%** |
| **Indicate your reasons for dietary supplement use:*** n = 364 | |
| As a way of prevention | **30.0%** |
| Due to tiredness, exhaustion, weight loss | **19.0%** |
| During treatment of a disease | **16.0%** |
| As a supplement to other medications | **13.0%** |
| On a physician's and/or pharmacist's advice | **12.1%** |
| Other | **9.9%** |
| **If you do not use dietary supplements, indicate your reasons why:*** n = 104 | |
| I do not need them | **42.3%** |
| I do not trust them | **19.2%** |
| They are useless | **13.5%** |
| I am unaware of them | **12.5%** |
| They are expensive | **12.5%** |
| Other | **0%** |

**the respondents could select one or more answer choices*

supplements to be completely safe products. Additionally, 66.4% of the respondents agreed with the statement that a dietary supplement is suitable in preventing disease, and 51.3% found it to be a way of complementing micronutrients in the diet. However, 27.2% of the respondents thought it was a product for treatment of a disease, and 19.6% perceived it as a medication in terms of its effect.

## Discussion

Dietary supplements have their indisputable advantages and their use is beneficial, particularly when there is excessive expenditure of some nutrients or when the usual nutrient intake from food fails to meet the body's demands. Owing to their relatively easy availability and extensive range, dietary supplements are often used by the general public without adequate knowledge of this product category as well as of their benefits and risks. Indeed, 64.5% of the respondents in the present study reported dietary supplement use, with 24.2% doing so regularly and 49.8% sometimes. The *National Health and Nutrition Examination Survey (2003–2006)* revealed that up to half of adult Americans used one or more dietary supplements, predominantly those containing multivitamins and multiminerals (1). A study conducted in Germany on a sample of 11,929 respondents showed that 40% of them used vitamins and/or minerals in the form of dietary supplements (13). Other studies document an even higher proportion of dietary supplement users: 68.33% (4) to 71.5% of the respondents (5). Mináriková et al. published that dietary supplement use as part of the general public's lifestyle with respect to cardiometabolic risk in metabolic syndrome was reported by 15% of the respondents only. Physical activity and fruit and vegetable consumption were identified by the respondents as lifestyle measures in preventing cardiometabolic risks (14).

More than half of our respondents reported to have enough information on dietary supplements (57.0%), with the main source being the internet in 23.8% of them. It was beyond the scope of this survey to identify which particular internet sources were used; however, it can be assumed that users access commonly available websites of manufacturers or internet shops and/or various discussion portals concerned with this topic. A pharmacist and a physician were indicated as the source of information by 18.6% and 14.6% of the respondents, respectively. Similarly, Bailey published that, in the United States, only 23% of dietary supplements were used based on the advice of healthcare professionals (6). By contrast, in 2014 Sekhri found that a physician was indicated as the source of information on dietary supplements containing multivitamins by as many as 69.1% of the respondents (4), which probably reflects the widespread use of various alternative and traditional therapeutic approaches.

Studies suggest that the general public accepts the pharmacist as a professional expert, as has been evidenced by a local study performed in Slovakia (15). According to that study, 73.6% of the respondents consider the pharmacist to be a professional expert in medications, medical devices, and other products in the pharmacy, and 65.1% perceive him/her as a consultant and expert in issues concerning health, illness, treatment or prevention. This raises the question why the public does not accept pharmacists to a higher degree and take advantage of them, and of the physicians, as experts in dietary supplements, and rather relies on incompetent and unguaranteed sources. Evidence that patients expect counselling on the safety and efficacy of dietary supplements from healthcare professionals has been published (16), as have been data documenting significant barriers for pharmacists and physicians to meeting these expectations (17, 18). A nationwide survey in Slovakia on patient satisfaction with the health care provided showed a high degree of satisfaction among the general public in terms of interpersonal relationships and overall satisfaction; however, satisfaction was sub-

stantially lower in the case of management of patient treatment (19). Failure of pharmacists to fulfil their professional role, due to their concentrating on the issue of medications only, may lead to a higher dissatisfaction of patients with the care provided (20) and, ultimately, negatively affect the economics of community pharmacies (21).

Evaluations of the general public's level of knowledge on health awareness by means of awareness studies have frequently been published. Their significance lies in revealing the population's knowledge-based attitudes that are inevitable and paramount for a potential behavioural change. If an individual possesses appropriate knowledge, they can be motivated to introduce certain changes; however, without this prerequisite, change is impossible or may not be guided in the right direction. The general public's health awareness has been paid little attention to in Slovakia. Since 2001, the *American Institute for Cancer Research* has regularly monitored public awareness of various cancer risk factors. According to their data, only 20% of Americans think that cancer can be prevented effectively; however, in the case of heart attack, as many as 45% of the respondents believed that there was effective prevention. While only 51% of Americans were aware of the risk relationship between body fat and cancer, as many as 94% of them were aware of the risk relationship between smoking and cancer (22). In Slovakia, obesity was considered to be a cancer risk factor by 73.8% of adults in a nationwide survey published in 2014. Moreover, the survey revealed that awareness corresponded with the level of educational attainment and/or with the combination of education and age (23). The information obtained should serve as a means of targeted directing of society-wide public health activities and allow monitoring of how successfully they have been implemented.

To our knowledge, no data have been published concerning dietary supplement attitudes and knowledge among the general public in Slovakia. The results obtained show that a large proportion of the respondents (78.1%) perceive relatively clearly that there is a difference between a medication and a dietary supplement, despite being unable to identify it precisely. This was particularly reflected by the fact that only 58.5% of the respondents stated clearly that a dietary supplement is not a medication, and merely 25.3% classified it as food for particular nutritional uses.

**Tab. 4.** *Knowledge level of the respondents on dietary supplements*

| Knowledge level | Agree (% of respondents) |
|---|---|
| **General** | |
| There is a difference between a dietary supplement and a medication. | **78.1** |
| A dietary supplement can be obtained without a doctor's prescription. | **72.0** |
| A dietary supplement must be labelled as "dietary supplement" on the outer packaging. | **64.5** |
| A normal and varied diet provides sufficient nutrients. | **60.4** |
| A dietary supplement contains vitamins and other substances. | **54.0** |
| A dietary supplement is not a medication. | **58.5** |
| A dietary supplement belongs to foods for particular nutritional uses. | **25.3** |
| A dietary supplement should only be used by a healthy person. | **21.9** |
| **Safety** | |
| It is advisable to consult dietary supplement use with a physician and/or pharmacist. | **71.3** |
| A dietary supplement may have adverse effects. | **61.3** |
| A dietary supplement may alter the action of a medication in the body. | **55.1** |
| A dietary supplement is completely safe. | **34.0** |
| **Efficacy** | |
| A dietary supplement is suitable in preventing disease. | **66.4** |
| A dietary supplement is only used to complement micronutrients in the diet. | **51.3** |
| A dietary supplement treats various diseases. | **27.2** |
| A dietary supplement is as effective as a medication. | **19.6** |

Of course, the general public need not be familiar with precise legislative definitions and regulations concerning medicinal products. It is, however, much more essential for it to know that these are different groups of products, with a different legislative framework and requirements that ultimately guarantee their certain qualitative properties and affect their safety and efficacy. The public seems to place major emphasis on dietary supplement safety of which it is informed relatively well. More than half agreed that the use of dietary supplements may lead to adverse effects or interactions, and only over a third of the respondents considered them to be safe products. Contrary to this, the results published by Owens et al. suggest that the general public perceives dietary supplements as safe and rather tended to disagree with the statement on their possible adverse effects or interactions (5). Less than a third of our respondents agreed that dietary supplements were suitable in treating disease, and an even smaller proportion considered them to be as effective as medications. Paradoxically, however, a high number of the respondents (71.3%) find it appropriate to consult dietary supplement use with experts even though the reality is different, as has been shown by our results. In the Slovak health care system, there is a complete lack of nutrition counsellors and specialists who would manage dietary supplement use within comprehensive nutritional-medical care of the patient. All the more, this gap should and could be filled by community pharmacists. In this regard, their mission and role have also been stressed by the European Community Pharmacy Blueprint (24). Such activities may bring about a positive effect on the economic situation of community pharmacies as enterprising subjects, which, as a result of globalisation of the pharmaceutical market, takes on a negative turn in Slovakia as well (25).

## Conclusion

The aim of this study was to descriptively evaluate dietary supplement use among the general public in Slovakia as well as to ascertain their perception and knowledge of these products. Dietary supplement use in Slovakia appears to be comparable to that in other countries, even though it fails to achieve their degree and rate. Although the public mainly purchases dietary supplements in pharmacies, the pharmacists and physicians are not considered to be the main source information and thus have no significant effect on the decision to use these products. The general public perceives fairly well that a dietary supplement is different from a medication in terms of its efficacy and safety. It is also accepted that one should consult dietary supplement use with an expert. In the future, such analyses should be complemented by assessment of the effects of various variables, such as demographic and health characteristics of the population followed up, or by an analysis of patient expectations from the professionals.

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