

Use of dietary supplements among physicians at a hospital in Turkey

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Summary. *Background and aim:* This research was carried out as a descriptive study in order to determine the status of dietary supplement and dietary habits of physicians working at Erciyes University Faculty of Medicine. *Methods:* A total of 370 people, 165 women, and 205 men, were included in the study. Data were collected by face-to-face interview using questionnaire forms. *Results:* The ratio of physicians using dietary supplements was 7.3%. Use of multivitamin-mineral supplements (51.9%) and daily dietary supplements (40.7%) constituted the majority. Maintaining good health was the primary reason for using the dietary supplement. It was found that dietary supplement use was more common in middle-aged physicians (51.9%) compared to younger physicians (37.0%) ($p < 0.05$). Those who used dietary supplement consumed more quantities of dairy products and vegetables and fruits compared to those not using the dietary supplement ($p < 0.05$). Consumption of legumes for 2-3 times a week was higher in participants using dietary supplements (66.7% vs. 44.6%, $p = 0.029$). In the group using dietary supplements, the daily consumption of dairy products and vegetables-fruits was higher than those who did not use dietary supplements ($p < 0.05$). *Conclusion:* As our knowledge, this is the first research determined the using of dietary supplements among physicians in Turkey. Although physicians using dietary supplement were found to have better dietary habits than those who did not use, neither user nor non-user physicians consumed food groups at the recommended frequency and amounts.

Key words: dietary supplement, dietary habits, physician

Introduction

Dietary supplements are products with predetermined daily doses in the form of capsules, tablets, pastilles, disposable powder packets, liquid ampoules, dropper bottles and other similar liquid or powder forms, containing nutrients such as vitamins, minerals, proteins, carbohydrates, fibers, fatty acids, amino acids or concentrates or extracts of other plants, substances of vegetable and animal origin, or bioactive substances with nutritional or physiological effects, used alone or in combination with each other to supplement current diet (1).

An adequate and balanced diet is the most appropriate approach to provide sufficient nutrients to our

bodies. We can meet the energy and nutrient needs of our bodies in an adequate and balanced manner by following healthy nutrition recommendations (2). Turkey Dietary Guidelines (TDG) (3) contains appropriate healthy eating advice appropriate to the conditions of our country.

Dietary supplements are used to support vitamins, minerals and other nutrients that cannot be taken adequately by the daily diet. Dietary supplement plays an important role in the treatment of vitamin and mineral deficiencies (2). It is determined that the use of the dietary supplement is effective in preventing chronic diseases such as cardiovascular diseases, cancers, birth defects and infectious diseases (2, 4). However, high

doses of dietary supplements due to uncontrolled use may cause neurological disorders, gastrointestinal symptoms, liver toxicity, birth defects and drug interactions. It has been reported that high doses of β -carotene, vitamin E, and folate, in particular, have adverse effects (2, 5).

In the United States, it was found that the rate of dietary supplement usage has increased over the years (excluding pregnancies and infants under 1 year of age) and reached 49% over the whole population (6). In Australia, 43.2% of individuals over the age of 18 are using dietary supplements at least once every two weeks (7). In the Netherlands, it was found that 20% of individuals aged 19-91 were using multi-vitamin-mineral supplements every day (8). In Poland, the ratio of multi-vitamin mineral use the day before was found to be 31% for males and 40% for females between the ages of 20-74 (9). In Japan, the use of dietary supplements for one week or a year was 11.0% for males and 16.4% for females aged 45-74 years (10). Based on the results of the European Prospective Cancer and Nutrition Survey (EPIC) conducted in 10 European countries, including Denmark, France, Germany, Greece, Italy, the Netherlands, Norway, Spain, Sweden and the United Kingdom, the highest use of food supplements within the last 24 hours in individuals aged 35-74 were found in Denmark (male: 51.0%, female: 65.8%), whereas the lowest use of food supplements was found in Greece (male: 2%, female: 6.7%) (11). Turkey Nutrition and Health Survey (TNHS) reported that 1.5% of individuals over the age of 12 years had used multivitamin-mineral supplements in the last seven days, the rate of dietary supplement use increased with age, and the most common dietary supplement was vitamin B12 (12).

Studying the use of dietary supplement by physicians is interesting for several reasons. 1-Health-related habits of physicians significantly affect counseling they provide to their patients (13). For this reason, the use of dietary supplements by physicians may affect the status of dietary supplement usage of their patients, therefore the society. 2- The use of dietary supplement has been found to be more prevalent in those with higher education levels (6, 14). Since the education level of physicians is high, the ratio of dietary supplement use among physicians is thought to

be higher than the society in general (15). 3- There are data available on the use of dietary supplements by healthcare professionals and physicians (15-18). No study on the national or the local level that aimed to investigate the use of dietary supplements by physicians in Turkey. Two studies on different topics provided findings on the use of herbal products and the dietary habits of physicians (19,20). This research was carried out to determine the dietary supplement usage status and dietary habits of physicians working at Erciyes University Faculty of Medicine.

Materials and methods

Study design and sampling

The population of this study consisted of 762 physicians working at Erciyes University Faculty of Medicine in 2015. The results of the study conducted on female physicians were taken into consideration in determining the sample size (17). The rate of dietary supplement use among physicians was taken as 30% and the sample size was calculated as 363 with 95% confidence level ($\alpha = 0.05$) and 80% power ($\beta = 0.20$). A total of 370 individuals, 165 women, and 205 men agreed to participate in the study, and written consent was obtained from all participants through a voluntary consent form. Physicians who were pregnant or lactating were not included in the study. Approval was obtained from Erciyes University Medical Faculty Clinical Investigations Ethics Committee (Decision No: 2015/163) to carry out the research.

Data collection

Data was collected via face-to-face interviews with questionnaire including questions on certain socio-demographic characteristics and dietary habits, food frequency questionnaire in the last month, dietary supplement usage, reasons for using, frequency, duration and content of dietary supplement. In this study, the use of dietary supplement was determined on the basis of the definition given in the Communiqué of the Turkish Food Codex on Supplementary Foods in accordance with the declaration of the Republic of Turkey Ministry of Food, Agriculture and Livestock (1). Individuals receiving dietary supplements within

the last year were considered to be using regular or irregular a dietary supplement.

As the food frequency questionnaire was performed, consumption amounts were also questioned. The daily consumption quantities of the individuals who specified a quantity were calculated by to reference the BeBis software (21). For example, weekly total consumption of legumes was determined for an individual stating 50 g legume consumption three times a week (150 g), then this value was divided by seven and the daily consumption amount (21.4 g/day) was calculated.

While determining the status of the food consumption of individuals according to the recommended frequencies, TDG was used as a base. In this study, individuals regular consuming dairy products, eggs, bread, fruits and vegetables every day; red meat, chicken and fish 1-2 times a week; legumes 2-3 times a week; rice, pasta, bulgur and pastry etc. 3-4 times a week were accepted as consumption according to the recommended frequencies (3).

Physicians assessed their nutritional status by their own statements as good, moderate, or poor. Body weight and height were recorded by questioning the current measurements of the participants based on their statements. Using the weight and height values, body mass index (BMI) values were calculated using the formula [$\text{weight}(\text{kg})/\text{height}^2(\text{m}^2)$].

Statistical analysis

SPSS 22.0 (Statistical Package for Social Sciences Statistics-SPSS) program was used to analyze data obtained in this study. Descriptive findings were expressed in numbers and percentages. Chi-square test was used to determine the difference between categorical variables. The Shapiro-Wilk test was used to determine whether the data showed normal distribution. Independent sample t test and Mann Whitney-U test were used to compare two independent groups. The significance level was accepted as $p < 0.05$.

Results

The median age of the physicians included in the study was 29.0 (min-max: 23.0-67.0) years, 55.4% of the participants were male, 57.0% were married, and

the median duration of work was 4.0 (min-max: 1.0-43.0) years. The mean BMI was $26.2 \pm 3.0 \text{ kg/m}^2$ for males and $22.4 \pm 2.8 \text{ kg/m}^2$ for females ($p < 0.001$). 11.6% of the physicians were smokers, and 15.1% were consuming alcohol.

The ratio of physicians using dietary supplement was 7.3% ($n = 27$). Among these physicians, 44.5% were using a dietary supplement for less than one year, 51.9% ($n=14$) were using multivitamin supplements, and 40.7% were using dietary supplement on a daily basis (Table 1). "Maintaining good health" was the primary reason for using a dietary supplement (Table 2). It was determined that dietary supplement usage was significantly higher in middle-aged physicians (51.9%) compared with younger physicians (37.0%) (p

Table 1. Physicians' use, type, duration, and frequency of dietary supplement

	n	%
Use of dietary supplement		
User	27	7.3
Non-User	343	92.7
Total	370	100.0
Duration of work		
Less than 1 year	12	44.5
1-10 years	11	40.7
More than 10 years	4	14.8
Type of supplement		
Multivitamins-minerals	13	48.2
Omega-3 fatty acid	7	25.9
Protein powder	2	7.4
Chia seed	1	3.7
Group B vitamins and iron	1	3.7
Omega-3 fatty acid and probiotics	1	3.7
Black cumin oil and ginger extract	1	3.7
Multivitamins-minerals, omega-3 fatty acid, protein powder	1	3.7
Frequency		
Every day	11	40.7
Once every two days	1	3.7
Once a week	5	18.5
Once every fifteen days	1	3.7
Once a month	2	7.4
In certain periods (irregular)	7	26.0
Total	27	100.0

Table 2. Physicians' reasons of dietary supplement use

Reasons *	n	%
Maintaining good health	11	40.7
Using as support after exercise	6	22.2
Prevention of fatigue feeling	5	18.5
Providing nutrients that the individual thinks is inadequate	5	18.5
Improving physical performance	5	18.5
Having a protective effect on cardiovascular diseases	4	14.8
Being therapeutic	1	3.7
Improving memory at advanced age	1	3.7
Support during fasting at Ramadan	1	3.7

*Multiple reasons were stated.

< 0.01). Among physicians using a dietary supplement, 77.8% were married, whereas this ratio was only 55.4% among physicians not using a dietary supplement ($p < 0.05$). Most of the physicians (52.2%) stated their nutritional status as 'good' (Table 3).

The rate of consuming dairy products and fruits-vegetables on a daily basis was higher among physicians using dietary supplement compared to non-users ($p < 0.05$). Similarly, the rate of consuming legumes 2-3 times a week was significantly higher among physicians using a dietary supplement (66.7% in users, vs. 44.6% in non-users, $p < 0.05$) (Table 4). The median daily consumption amount of dairy products (250 g) and fruits-vegetables (250 g) was significantly higher

Table 3. Comparison of dietary supplement use and some characteristics of physicians

Characteristics	User	Non-User	Total	χ^2	<i>p</i>
	n (%)	n (%)	n (%)		
Age* (years)					
20-34	10 (37.0) ^a	239 (69.9)	249 (67.3)	14.899	0.001
35-50	14 (51.9) ^b	70 (20.5)	84 (22.7)		
51-67	3 (11.1)	33 (9.6)	36 (10.0)		
Gender					
Male	16 (59.3)	189 (55.1)	205 (55.4)	0.175	0.828
Female	11 (40.7)	154 (44.9)	165 (44.6)		
Marital Status					
Married	21 (77.8) ^a	190 (55.4) ^b	211 (57.0)	5.12	0.024
Single	6 (22.2)	153 (44.6)	153 (44.6)		
Self-evaluation of nutritional status					
Good	14 (51.9)	179 (52.2)	193 (52.2)	4.234	0.833
Moderate	11 (40.7)	127 (37.0)	138 (37.3)		
Poor	2 (7.4)	37 (10.8)	39 (20.5)		
Chronic diseases					
Yes	7 (25.9)	43 (12.5)	50 (15.6)	3.839	0.073
No	20 (74.1)	300 (87.5)	320 (84.4)		
Number of meals					
Less than three	7 (25.9)	68 (19.8)	75 (20.2)	3.967	0.186
Three	18 (66.7)	199 (58.0)	217 (58.6)		
More than three	2 (7.4)	76 (22.2)	78 (21.2)		
Exercise					
Yes	19 (70.4)	191 (55.7)	210 (56.8)	2.199	0.200
No	8 (29.6)	152 (44.3)	160 (43.2)		
Total	27 (100.0)	343 (100.0)	370 (100.0)		

* Significant difference between indicated cells (a, b).

among physicians using dietary supplement compared to non-users (185.5g, 123g, respectively, $p < 0.05$) (Table 5).

Discussion

Not being able to reach any study in the literature that was conducted in Turkey on the use of dietary supplements by physicians shows the significance of our study. This is the first study conducted in Turkey with the opportunity of obtaining first-hand data about the use of dietary supplement among physicians. The rate of dietary supplement usage was among physicians at 7.3%, this ratio was still higher than the general population as revealed by TNHS results (multi vitamin-mineral 1.5%, omega-3 fatty acids 0.3%, iron 1.2%, and vitamin B12 2.4%) (12). In a study conducted on health workers in the United States (Nurses' Health Study and Health Professionals Follow-Up Study /NHS-HPFS), it was found that the rate of dietary supplement usage was about 65% in 1986, and this rate increased to 85% by 2006. It was shown that dietary supplement usage was higher in health workers compared to the general population, which was attributed to health workers'

Table 4. Comparison of dietary supplement use of physicians and consumption status of food groups at the suggested frequency

Food/Food Groups	User (n=27)	Non-User (n=343)	χ^2	<i>p</i>
	Sayı (%)	Sayı (%)		
Dairy products			4.645	0.040
Every day	19 (70.4)	167 (48.8)		
Red meat			0.002	1.000
1-2 times a week	6 (22.2)	75 (21.9)		
Chicken- fish			1.489	0.234
1-2 times a week	15 (55.6)	149 (43.4)		
Eggs			0.029	1.000
Every day	4 (14.8)	55 (16.0)		
Legumes			4.900	0.029
2-3 times a week	18 (66.7)	153 (44.6)		
Bread			0.531	0.548
Every day	13 (48.1)	190 (55.4)		
Rice, pasta, bulgur, pastry etc.			0.053	0.836
3-4 times a week	8 (29.6)	109 (31.8)		
Vegetables and fruits			4.520	0.040
Every day	19 (70.4)	168 (49.0)		

Table 5. Comparison of daily consumption amounts of some food groups and the use of dietary supplement by physicians*

Food/Food Groups	User	Non-User	<i>Z</i>	<i>p</i>
	Median (min-max) (n)	Median (min-max) (n)		
Dairy products (g)	250.0 (57.0-600.0) (n=16)	185.5 (13.0-800.0) (n=72)	0.185	0.001
Red meat (g)	85.5 (9.0-150.0) (n=16)	86.0 (10.0-525.0) (n=65)	0.908	0.853
Chicken and fish (g)	52.0 (10.0-114.0) (n=14)	58.5 (5.0-550.0) (n=64)	0.546	0.364
Eggs (g)	29.0 (2.0-50.0) (n=15)	15.0 (1.0-300.0) (n=61)	0.361	0.170
Legumes (g)	12.0 (7.0-50.0) (n=14)	28.0 (0.3-143.0) (n=52)	0.527	0.598
White bread (g)	50.0 (1.0-125.0) (n=11)	53.5 (1.2-450.0) (n=50)	1.373	0.585
Whole-grain bread (g)	37.5 (3.0-100.0) (n=10)	25.0 (0.8-225.0) (n=36)	1.209	0.718
Nuts-seeds (g)	15.0 (2.0-29.0) (n=12)	9.0 (0.1-114.0) (n=36)	3.323	0.226
Vegetables and fruits (g)	250.0 (110.0-450.0) (n=16)	123.0 (28.0-500.0) (n=52)	3.074	0.002

*Only those specifying amounts were taken into consideration.

knowledge of dietary supplements being higher than the general public (15). A study published in 1984, involving dietitians in the state of Washington, found that the usage rate of dietary supplements was approximately 60% (16). Again, in the United States, the rate of regular (47.3%) and occasional (17.0%) use of any dietary supplement among female physicians were high (17). In our study, the rate of dietary supplement usage was 6.7% among female physicians ($n = 11$ in 165 physicians), and 7.8% among males ($p > 0.05$) (Table 3). These ratios were remarkably lower compared to the study conducted in the United States.

Among dietary supplements, the most commonly used are multi-vitamin minerals (6, 7, 11, 22, 23). In our study, among the dietary supplements users ($n = 27$), multivitamins and minerals were the most common (48.3%). In the United States, the use of multi-vitamins&minerals (regular and occasional) was found to be 84.5% in health workers (NHS-HPFS) and 49.8% among female physicians (15, 17). In our study, the ratio of multi-vitamins&minerals users ($n = 14$) was 3.8% among all physicians participating in the study ($n = 370$) (Table 1). It has been reported that low doses of multivitamin supplements may reduce the risk of cancer (particularly in malnourished individuals or men previously diagnosed with cancer) and age-related cataracts, and it has been reported that high dose of β carotene, folate, and vitamin E supplements may have harmful effects (5). Marine-derived omega-3 (n-3) fatty acids have beneficial effects on cardiovascular risk factors and for prevention of cardiovascular mortality and morbidity (24). The American Heart Association (AHA) has suggested that healthy adults consume two portions per week of preferably fatty fish (equivalent to 400-500 mg/day of n-3 fatty acid) (25). The American and Canadian Dietitians' Association suggests 500 mg/day of marine-origin n-3 fatty acid intake (26). AHA recommends intake of 1g/day n-3 fatty acids in patients with cardiovascular disease, and 2-4 g/day in patients with high triglyceride levels (> 500 mg/dl) under supervision of a physician (25). Cardio-protective benefits of marine-origin n-3 fatty acids can be partially explained by mechanisms such as antiarrhythmic effect, lowering triglycerides and blood pressure, reducing platelet aggregation, improving vascular functions and reducing inflammation (24).

In the meta-analysis published in the JAMA Cardiology journal in 2018, it was concluded that the use of n-3 fatty acid supplements based on recommendations in individuals with risk of developing cardiovascular disease did not support the prevention of fatal coronary heart disease or any cardiovascular disease (27). In terms of diet-disease relationship, a more appropriate approach than focusing on a single food or nutritional item is to focus on all dietary components. In a Cochrane review examining the effect of the Mediterranean Diet on prevention of cardiovascular diseases; it was found that an increase in the components of the Mediterranean Diet in the daily diet will have positive effects on total cholesterol and LDL cholesterol levels. The Mediterranean Diet is a nutritional model where the main fat source is olive oil, with high consumption levels of plant foods (vegetables, fruits, legumes, cereals, oilseeds) and complex carbohydrates (whole-grain bread), moderate consumption levels of fish, eggs, poultry and dairy products (cheese, yogurt, etc.), low consumption levels of red meat and processed meat (fish, eggs, poultry and dairy products), and in which red wine is consumed at a low-moderate level with meals. It naturally contains important nutrients and phytochemicals (mono- and poly-unsaturated fatty acids, fiber, antioxidant vitamins and minerals, and polyphenols) and has a low saturated fat, trans fat and added sugar content (28). In our study, the ratio of n-3 fatty acid users alone ($n = 7$) or in combination with multiple food supplements ($n = 2$) was 2.4%. Among the physicians using dietary supplements ($n = 27$), n-3 fatty acids (33.3%) were most commonly used after multivitamin&minerals (Table-1). In the NHS-HPFS study, most commonly used dietary supplements were calcium, vitamins D, C, and E in women, and vitamin C, E and calcium in men, followed by fish oil, and the usage rate was 20.2% (15).

The lifestyles of individuals using dietary supplements are generally positive. For example; they do not smoke, consume alcohol or consume alcohol at moderate levels, exercise regularly, consume more vegetables and fruits. They are also more susceptible to nutrition-related messages (maintaining ideal body weight, eating micronutrients at an adequate level, consuming fruits and vegetables, etc.) (29). It was reported that individuals assessing their health condition as good use

more dietary supplement than those who assess their health condition as poor (22, 29). On the contrary, it was also found that individuals who assessed their health condition as poor used dietary supplements at a rate approximately twice that of individuals who assessed their health condition as good (23). According to the EPIC study, a dietary supplement was found to be more frequent in individuals reporting their health condition as good than those who reported a moderate/poor health condition, except for England (11). It was also found that supplement users had one or more illness than those who did not. In addition, it was reported that individuals with hypertension, cancer, and heart disease used less dietary supplement than those without these diseases (29). In our study, approximately half (52.2%) of the physicians rated their nutritional status as good. This was similar for physicians who use a dietary supplement (51.9%) and non-users (52.2%). Although the presence of chronic diseases (25.9%) and exercising (70.4%) was higher in physicians using dietary supplement than in non-users (12.5% and 55.7%, respectively), this difference was not significant ($p > 0.05$, Table 3). Individuals who use dietary supplements use these to maintain and improve health rather than preventing diseases (29). In our study, similarly, most of the physicians using food supplements (40.7%) reported that they used a dietary supplement to maintain good health.

A balanced and sufficient diet is the most appropriate approach to achieve sufficient intake of nutrients into our body. Dietary supplements are used to compensate for vitamins, minerals, and other nutritional substances that are not sufficiently supplied by a person's daily diet (2). As completely opposed to this case, it was reported that those who used dietary supplements had better diets than those who did not (18). In agreement with the literature, a significant result of our study was that the dietary habits of those who used dietary supplements had higher quality in comparison to those who did not use such supplements. Our findings that support this case are described below.

In our study, the daily consumption rates of dairy products and vegetables-fruits were higher in physicians using the dietary supplement ($p < 0.05$). Similarly, the rate of consuming legumes 2-3 times a week was higher in physicians using the dietary supplement

(66.7% compared to 44.6%) ($p < 0.05$) (Table 4). The median daily consumption amount of dairy products (250 g) and fruits-vegetables (250 g) was significantly higher among physicians using dietary supplement compared to non-users (185.5 g, 123 g, respectively) (Table 5). Turkey Dietary Guidelines recommends that adults should consume 3 servings of dairy products, and at least 5 servings (400 g) of vegetables and fruits daily, and 3 servings of legumes weekly. A medium size cup of milk or yogurt (240 mL) or 40-60 g of cheese, 8-10 tablespoons (130 g cooked) of legumes constitute a serving or portion (3). It is seen that physicians using dietary supplement consume higher levels of milk, vegetables, fruits and legume groups closer to the recommended frequency by TDG than those who do not use a dietary supplement. However, although daily consumption amounts of dairy products and vegetables and fruit are higher (250 g), these are still lower than the daily amounts recommended by TDG. 250 g dairy products may be considered as approximately 1 portion, and 250 g vegetables-fruits as approximately 1-2 portions. In this case, it can be said that physicians using dietary supplement consume 1 portion of dairy products and 1-2 portions of vegetable-fruits per day. In a study conducted on female physicians, it was found that daily vegetable consumption (3.4 servings) was higher in participants taking supplements regularly than occasional users (2.9 servings) and non-users (2.8 servings). It was also found that those who used regular dietary supplements consumed less fat than occasional users and non-users. It was also shown that vegetarians are more likely to use regular dietary supplements than non-vegetarians (17).

In the studies we have accessed, in general, the use of food supplements was found to be more prevalent among women, in advanced age, in individuals with higher education levels and income levels, non-smokers, those with higher physical activity, and those with low or normal BMI (18.5-24.9 kg/m²) (6-10, 14, 19, 23). Among these studies, only one study conducted in the Netherlands found that the probability of using multi-vitamin minerals in individuals aged 19-34 years was higher than the age group of 65+ years. In the same study, the use of multi-vitamin&minerals was found to be more likely in single persons than in married (8). Regular use of dietary supplements also increases

among female physicians with age, whereas there is no significant relationship between marital status and dietary supplement (17). Consistent with the literature, in our study, middle-aged physicians (35-50 years) had a higher rate of dietary supplement use than younger participants (20-34 years). Usage rate was higher in married participants (77.8%) than single participants (55.4%). This suggests that a relationship with age exists since individuals are more likely to be married at advanced ages.

Conclusion

Although, as a result of our study, we obtained data on the rate of using dietary supplements among physicians (7.3%), the fact that the study was carried out at a single center may be misleading in terms of generalizing these data to the universe. Thus, the use of dietary supplements by physicians in Turkey should be determined by carrying out multi-center studies with larger samples. In addition to the use of dietary supplements, daily intake of energy and nutrients should be calculated by keeping records of food intake, and this should be compared to Dietary Reference Intakes (DRI).

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