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Dietary supplement use and associated variables among Turkish women: cross-sectional study

Uso de suplementos dietéticos y variables asociadas entre mujeres turcas: estudio transversal

Elif Didem Örs[a], Zeynep Göktaş[b,*]

a Department of Nutritional Sciences, Hacettepe University, Ankara, Turkey

b Department of Nutrition and Dietetics, Faculty of Health Sciences, Hacettepe University, Altindag, Ankara, 06100, Turkey

* zeynep.goktas@hacettepe.edu.tr

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ABSTRACT

Introduction: Dietary supplement use is continuously increasing in the world and it seems to be more common among women. Data on supplement habits of women in Turkey are still limited. The purpose of this study is to determine dietary supplement use and to evaluate associated factors in Turkish women in the pre-COVID-19 period.

Methods: A total of 727 Turkish women (33.4[10.3] years; 25.9[4.57] kg/m^2; 162.9[6.81] cm) participated in this cross-sectional study. After piloting, the participants completed a six-part questionnaire form that was administered either face-to-face or over the phone by a trained dietitian. The questionnaire intended to collect data about demographic characteristics, use of dietary supplements and factors influencing supplement choices such as eating habits, physical activity and lifestyle habits.

Results: A total of 307 participants (42.2%) used at least one dietary supplement within the previous year. The most commonly used was iron (30.6%) followed by vitamin D (30.6%), vitamin B12 (26.7%), multivitamins (18.2%), and calcium (11.4%). Supplement use decreased with higher physical activity (p=0.002). Furthermore, it was significantly higher among women who consume meals at regular times (p=0.001) and those that avoid fast food consumption (p=0.014). However, the use of dietary supplements was not associated with lower BMI, older age or higher academic level (p>0.05).

Conclusions: More than 40% of women were reported using dietary supplements. The use of supplements was not associated with lower BMI, higher physical activity, older age, higher academic level smoking or drinking. Turkish women seem to show a different consumer profile from typical dietary supplement users.

Keywords: Food Supplements; Women; Cross-sectional study; Turkey

RESUMEN

Introducción: El uso de suplementos dietéticos aumenta continuamente en el mundo y parece ser más común entre las mujeres. Los datos sobre los hábitos de suplementación de las mujeres en Turquía aún son limitados. El propósito de este estudio es determinar el uso de suplementos dietéticos y evaluar los factores que influyen en las mujeres turcas en el período anterior COVID-19.

Metodología: Un total de 727 mujeres turcas (33,4[10,3] años; 25,9[4,57] kg/m^2; 162,9[6,81] cm) participaron en este estudio transversal. Después del pilotaje, las participantes completaron un formulario de cuestionario de seis partes que un dietista capacitado administró personalmente o por teléfono. El cuestionario fue destinado a recopilar datos sobre características demográficas, uso de suplementos dietéticos y factores que influyen en la elección de suplementos, hábitos alimenticios, actividad física y hábitos de estilo de vida.

Resultados: Un total de 307 participantes (42,2%) utilizaron al menos un suplemento dietético en el año anterior. Los más utilizados fueron hierro (30,6%), vitamina D (30,6%), vitamina B12 (26,7%), multivitamínicos (18,2%) y calcio (11,4%). El uso de suplementos dietéticos disminuyó con mayor actividad física (p=0,002). Además, el uso de suplementos fue significativamente mayor entre las mujeres que consumían comidas en horarios regulares (p=0,001) y evitaban el consumo de comida rápida (p=0,014). Sin embargo, el uso de suplementos dietéticos no se asoció con menor índice de masa corporal, mayor edad y mayor nivel educativo (p>0,05).

Conclusiones: Más del 40% de las mujeres informaron que usaban suplementos dietéticos. El uso de suplementos no se asoció con menor IMC, mayor actividad física, mayor edad, mayor nivel educativo y no fumar y beber. Las mujeres turcas parecen mostrar un perfil de consumidor diferente al de las usuarias típicas de suplementos dietéticos.

Palabras clave: Suplementos alimenticios; Mujeres; Estudio transversal; Turquía

KEY MESSAGES

- The most commonly used dietary supplements were: iron (30.6%), vitamin D (30.6%), vitamin B12 (26.7%), multivitamins (18.2%), and calcium (11.4%).
- The use of dietary supplements was not associated with lower BMI, higher physical activity, older age, higher educational level, smoking or drinking.
- Habits like avoiding fast food, drinking enough water, and consuming meals at regular times were associated with dietary supplement use.

INTRODUCTION

Dietary supplements (DS) include vitamins, minerals, herbs, amino acids, botanicals, and other various ingredients. DS come in numerous forms, including capsules, tablets, drinks, powders, energy bars, and gummies[1]. The global market of these products increased over the past 30 years, especially after the coronavirus outbreak[2]. Although the use of DS is increasing in popularity, the pattern of use, the contents, availability and/or consistency is not clearly documented. DS are generally safe for the use of nutrient deficiency under the guidance of a medical professional; however, taking more than required will increase costs and may cause side effects[3]. The dangers of consuming excessive DS include illnesses such as organ damage due to toxicity, negative interactions with other medications, allergic reaction, or other problematic health issues[4, 5].

DS are frequently used for different reasons including dietary support, maintaining good health, meeting the bodies energy requirements, improvement of health and immunity, losing weight and improving skin and hair[6,7]. In addition, supplement users vary considerably among different populations and have certain characteristics such as; users tend to be women[8,9], tend to be older[10], are less likely to use cigarettes[11], have a lower body mass index (BMI)[7], have higher educational levels[10], are more physically active[12], and adopt more health-related habits when compared to those who do not use DS[6, 7,13].

Some studies have been conducted by medical professionals to evaluate the prevalence and associated variables of supplements used in Turkey. The rate of DS consumption has been reported at 7.3% with multivitamin-mineral supplements as the most commonly used[14]. Interestingly, this has been more prevalent among older women with higher physical activity level, individuals with higher income and educational levels, and non-smokers with low-to-normal BMI[14]. In another study conducted with 253 participants, it was found that DS were used mainly for immunity. The most preferred products were Omega 3 fish oil and multivitamins[15]. This is agreement with findings in university students where the most notable purpose of supplement use was to improve health and boost immunity[14]. In fact, this study did not reveal correlation between age, sex, physical activity status, frequency of main meals and snacks, BMI, smoking or alcohol consumption between users and non-users. All of these studies are limited to small specific groups of students, physicians, or general population[14-17]. Notwithstanding, further research is needed to understand the main characteristics of DS consumption in women.

Thus, the purpose of this cross-sectional study is to determine DS use and to evaluate associated factors in Turkish women. We hypothesized that Turkish women with all of these characteristics increased their use of DS.

METHODS

Study design

This research was a cross-sectional study involving a questionnaire administered by a trained dietitian. The participants completed the six-part questionnaire form that was developed after a review of the literature and administered face-to-face or over the phone.

Subjects

Participants were recruited from the principal cities of Turkey: Ankara, Istanbul, Izmir, Antalya, and Konya. Subjects were call to participate from social media, university, shopping centers and health centers. The participants were not chosen from a specific place to avoid bias. Subjects were all women and they were recruited from 2016 to 2017. The exclusion criteria were as follows: chronic metabolic diseases, pregnancy and lactation. Each participant was informed about the study and written consent was obtained. The study protocols had Institutional Review Board (IRB) approval from Hacettepe University. The IRB protocol number was GO 15/524 and the date of approval was on 29th July, 2015.

Data sources / measurement

The anonymous questionnaire included 46 questions which were either multiple choice or open-ended questions and divided into 6 major sections. The first section contained questions covering demographic and socio-economic characteristics (age, sex, body mass and stature, academic level and employment status). The second section included questions concerning use of DS (multivitamins, vitamins/minerals, multimineral, iron, glutamine, vitamin E, vitamin C, vitamin D, magnesium, calcium, protein supplements, sport bars, creatine, fish oil etc.) estimated intake and who recommended these products. Section three covered the factors associated to DS choices, knowledge, attitudes, and the reason for use. The fourth section focused on eating habits, like fast-food consumption and number of daily meals. The last two sections, physical activity and lifestyle habits, were used to calculate physical activity levels and types. The questionnaire was administered by the same dietitian and completed within 15 minutes of the pilot test.

A pilot study was performed with 20 subjects to test the questionnaire form and capabilities of study design. Furthermore, the questionnaire form was evaluated by nine experts. Scale content validity index based on average was 0.97 while based on the universal agreement method it was 0.89. The questionnaire form can be found as a supplementary file.

Statistical Analysis

Statistical analyses were performed using the IBM SPSS Statistics for Windows v22.0 (IBM Corp., Armonk, NY). Shapiro-Wilk and Kolmogorov–Smirnov normality tests were used to analyze the distribution of variables. Nominal data was examined using chi-square or Fisher's exact test. Data were presented as numbers and percentages or mean (standard deviation). Differences were considered significant at $p<0.05$.

RESULTS

A total of 727 female subjects between the ages of 19-64 years participated in the study. Figure 1 shows the flowchart of participant selection.

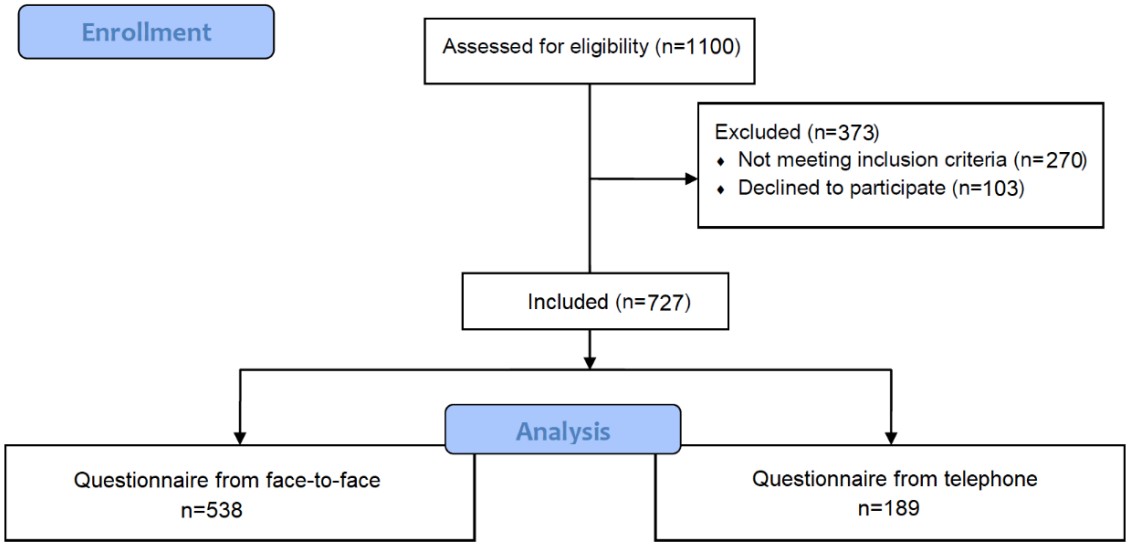

Figure 1. Flow chart of participants.

Table 1 reports the demographic and anthropometric characteristics of the study population (n=727). The average age of all women was 33.4 years (10.37), and the average BMI was 25.9 kg/m² (4.57). A total of 19.3% of women smoked and 45.8% were college graduates.

Table 1. Demographic and anthropometric characteristics of subjects

Characteristics	n=727
Age (years)	33.4 (10.37)
Body Mass Index (kg/m^2) (mean ± SD)	25.9 (4.57)
Smoking habit % (Y/N)	19.3/80.7
College graduation % (Y/N)	45.8/54.2

Data are presented as mean(SD) at least otherwise is indicated.

Table 2 shows the prevalence of DS use among participants. A total of 307 (42.2%) of women have used at least one DS over the past year. The most commonly used DS were: iron (30.6%), vitamin D (30.6%), vitamin B12 (26.7%), multivitamins (18.2%) and calcium (11.4%).

Table 2. Prevalence of dietary supplements among users

Use of dietary supplement (n, %)	307, 42.2%
Supplements	**(n, %)**
Iron	94, 30.6%
Vitamin D	94, 30.6%
Vitamin B12	82, 26.7%
Multivitamins	56, 18.2%
Calcium	35, 11.4%
Magnesium	26, 8.5%
Vitamin C	20, 6.5%
Folate	8, 2.6%
Supplement recommended by;	**(n, %)**
Physician	184, 59.9%
Self-recommended	41, 13.3%
Dietitian	38, 12.4%
Family, friends	18, 5.9%
Internet, social media	17, 5.5%
Pharmacist	12, 3.9%

Supplement use was mainly recommended by a physician (59.9%) or a dietitian (12.4%). However, the use of DS was not associated with lower BMI, older age or academic level (p>0.05). The most common reasons for using supplements were "to supplement the diet and to improve overall health" (43.3%), "to improve low iron levels" (32.3%) and "to improve low vitamin D levels" (19.9%). There was a significant trend of vitamin B_{12} use to supplement the diet and to improve overall health (p=0.001) (Table 3).

Table 3. Rationale for using each dietary supplements

Rationale	(n, %)	Type of Supplements
To supplement the diet and to improve overall health	133, 43.3%	Vitamin B12 (p=0.001*)
To improve low iron levels	99, 32.2%	Iron (p<0.001*)
To improve low vitamin D levels	61, 19.9%	Vitamin D (p<0.001*)
For bone health	38, 12.4%	Calcium (p<0.001*)
For menopause related issues	19, 6.2%	Calcium (p<0.001*)
For breastfeeding	15, 4.9%	Iron (p>0.05)

**Differences were considered significant at p < 0.05. Fisher's exact test was performed to analyze the data*

The preferred physical activity types were hiking (56.8%), fitness and weight lifting (48.3%), pilates and yoga (23.2%), cardio aerobics (9.9%), jogging (6.2%), and swimming (5.7%). There was no significant relationship between physical activity type and DS use.

Table 4 compares the health-related habits of DS users and non-users. Women with higher physical activity levels (PAL) show a lower ratio of DS use (p=0.002). Furthermore, eating meals at regular times (p=0.001) and avoiding fast food consumption (p=0.001) were correlated with higher supplement use ratio. There was no significant relationship between DS use and healthy and balanced dietary habits, smoking, academic levels, snacking or night eating habits.

Table 4. Health-related habits of dietary supplements users and nonusers.

	User	Nonuser	
Physical activity level (PAL)	**(n, %)**	**(n, %)**	**p**
Sedentary	163 (48.1%)	176 (51.9%)	p=0.003*
Moderately Active	117 (39.8%)	177 (60.2%)	p>0.05
Active	27 (28.7%)	67 (71.3%)	p=0.004*
Total	307	420	p=0.002*
Healthy and balanced dietary habits	114, 47.5%	126, 52.5%	p>0.05
Smoking	59, 42.1%	81, 57.9%	p>0.05
University level graduation	181, 45.9%	213, 54.1%	p>0.05
Fast food habit	89, 34.4%	170, 65.6%	p<0.05*(p=0.001)
Snacking habit	219, 40.8%	318, 59.2%	p>0.05
Night eating habit	83, 39.7%	126, 60.3%	p>0.05
Keeping regular meal times	165, 49.0%	172, 51.0%	p<0.05*(p=0.001)

**Differences were considered significant at p < 0.05. Chi-square test was performed to analyze the data*

DISCUSSION

The purpose of this cross-sectional study was to determine the types of DS used among Turkish women and to evaluate associated factors. In this cross-sectional study, the use of DS was frequent among young women, a total of 42.9% of the participants were between 19 and 29 years old. Socio, demographic and lifestyle characteristics including academic level and healthy lifestyle factors, such as not smoking or drinking were correlated positively with supplement use[13, 18, 19]. Moreover, previous studies have demonstrated typical users tend to be older in age[10,13].

In this research, there was no significant relationship between DS use and smoking, alcohol use or academic level. Furthermore, age was not associated with the use of DS. Supplement users were associated with lower BMI[6] however in our study, there was no significant relationship with lower BMI.

The widespread use of DS in developing countries is increasing. The most commonly used supplements are iron, vitamin B, and multivitamin complexes[13]. In a Turkish study (n=9224), multivitamins were the most used supplements. Furthermore, in a Turkish research, the most preferred DS were Omega 3 fish oil (26.9%), multivitamins (17.8%), and CoQ10 (7.9%)[15].

In this research, the most used DS was iron. This result is most likely influenced by the young demographic. In the last year, 42.2% of women used at least one DS. Among the most used were iron (30.6%), vitamin D (30.6%) followed by vitamin B12 (26.7%) and multivitamins (18.2%).

According to research conducted by Turkey Nutrition and Health Survey (TBSA) DS are mostly recommended by doctors however the use of omega3 is mostly influenced by media[20]. Similarly, in this research, DS were recommended by a physician for 59.9% of the participants. However, a total of 13.3% of women had no prescription and/or proper recommendation from health care professionals.

DS tends to be consumed for different reasons including preventing diseases, nutritional support, losing weight, improving athletic performance, treating vitamin and mineral deficiencies, and increasing mental performance[8,13,15,21]. A research estimated that participants take supplements as a preventative measure and to maintain their health[22]. Similarly, in this study, the supplement use reasons were to supplement the diet and to improve overall health (43.3%), to improve low iron levels (32.3%) and to improve low vitamin D levels (19.9%). Vitamin and mineral supplements remain the most commonly reported type of supplements.

The relationship between the rationale for using DS and the types of DS were also evaluated. The use of some supplements had precise reasons, for example; iron supplements for anemia, vitamin D against low vitamin D levels, and calcium for bone health and menopause. Other supplements were used for various reasons, for example, vitamin B_{12} was used to supplement diet, to enhance energy levels, and to combat muscle related issues. Therefore, supplement users reported various motivation for the same products. On one hand, these results for calcium and iron supplements reflect the consciousness of women with preventing osteoporosis and anemia; on the other hand, unless the use is based on a health professional's recommendation, the supplement may not be necessary when consuming a healthy and balanced diet.

More than 87% of Turkish women do not engage in proper physical activity[23]. According to data obtained from the TBSA, a total of 76.5% of women (over 12 years old) don't do physical activity for 30 minutes or more[20]. In this study, the majority of participants were sedentary. Commonly, supplement use is correlated positively with high physical activity[13,24]. However, in our research the lower physical activity level was associated with consumption of DS ($p = 0.002$).

Current studies show that people who do regular physical activity tend to have a healthier diet[25-28]. Comparatively, women who pay attention to healthy dietary habits have a higher association with DS use[13]. Nevertheless, in this cross-sectional study, there was no significant relationship between DS use and healthy and balanced dietary habits, snacking habits and night eating habits. On the other hand, habits like avoiding fast food, drinking enough water, and consuming meals at regular times were associated with DS use ($p<0.05$). Therefore, the profile of female DS users in Turkey seems to be different than other studies.

Limitations

The present study has several limitations. The small sample size in our study might limit the detection of other associations between DS and other lifestyle and socio demographic characteristics. Furthermore, all vitamin and mineral supplements were not assessed with a 24-h dietary recall but through a specific question.

CONCLUSION

The use of DS is prevalent among Turkish women; however, it is not associated with the adoption of other healthy habits or higher physical activity. The participants adopted only some healthy lifestyle and dietary habits. The use of DS was not associated with lower BMI, higher physical activity, older age, academic level, smoking or drinking. In conclusion, female DS users in Turkey seem to show a different consumer profile from typical DS users shown in scientific literature. Given the widespread use of DS, especially after the COVID-19 outbreak, it is necessary to identify the characteristics of DS users. Therefore, health care professionals could utilize the data to increase awareness of these products amongst Turkish women. We hope our findings encourage more studies be conducted on the use of DS as this will continue to increase dramatically due to the COVID-19 pandemic.

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AUTHORS' CONTRIBUTIONS

ZG designed the experiments and performed the statistical analyses. EDÖ performed the experiments and wrote the manuscript. The authors read and approved the final manuscript. The authors received no financial support for the research and publication of this article.

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CONFLICTS OF INTEREST

The authors state that there are no conflicts of interest when writing the manuscript.

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