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PAGES: 792-797

ORIGINAL PDF URL: <https://dergipark.org.tr/tr/download/article-file/3333699>

Herbal food supplements usage awareness of university students: Example of Echinacea and St. John's Wort

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Citation: Idug, T. (2023). Herbal food supplements usage awareness of university students: Example of Echinacea and St. John's Wort. International Journal of Agriculture, Environment and Food Sciences, 7 (4), 792-797

Received: August 16, 2023

Accepted: October 12, 2023

Published Online: December 19, 2023

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Available online at
<https://jaefs.com/>
<https://dergipark.org.tr/jaefs>



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Abstract

In recent years, usage of food supplements (Fs) has increased in order to maintain healthy living, have well-being, and be protected from the diseases. There are many medicinal plants used as herbal food supplements (HFs). Within the scope of this study, Echinacea and St. John's Wort were selected among the plants that are frequently encountered. This descriptive, cross-sectional study was conducted through completing a self-administered online questionnaire by health students. The questionnaire was filled out by 211 students studying at the faculties of Medicine, Dentistry, Pharmacy and Health Sciences at Istanbul Medipol University. The greatest participation was achieved with Pharmacy students (47.4%), whereas the lowest participation was reached with Dentistry students (5.7%). The most commonly used products as Fs were vitamin D (21.3%) and multivitamins (16.1%), while the use of HFs was 8.5%. St. John's Wort is commonly preferred for wound and burn treatment and Echinacea is used to boost immunity. In parallel with this use, St. John's Wort is preferred as olive oil maceration and Echinacea as herbal infusion. While the use of HFs was 58.3%, that of the Fs were 44.5%. Echinacea use was found to be 14.4% and St. John's Wort was 31.3%. The relationship between the presence of chronic disease and the use of Fs or HFs was not statistically significant. This study is significant to detect the opinions and knowledge levels of health students about Fs, especially HFs, St. John's Wort and Echinacea, which are available in the market.

Keywords: Herbal food supplements, Food supplements, Pharmacy students, Echinacea, St. John's Wort

INTRODUCTION

The food supplements (Fs) are studied in a wide range of aspects in terms of quality and resource. The plant-based products, the beneficial substances such as vitamins, minerals, fatty acids and the probiotics are examples of product types on the market (Lam et al., 2022). Especially the plants or the plant-based products are often included in the food supplement products (Bardia et al., 2007; Thakkar et al., 2020). In recent years, the use of Fs has increased in order to maintain healthy living, have well-being, and be protected from the diseases (Arslan et al., 2021). The reason behind the increase in the use of Fs is having fewer regulatory requirements for safety and efficacy compared to drugs and the Fs becoming more common (Bardia et al., 2007). Marketing claims such as providing overall health, improving physical and cognitive performance, boosting energy, losing excess weight, and reducing pain are included in the marketing strategies of the food supplements (Knapik et al., 2021). Although food supplements are subjected to different regulations in many countries, the interest and demand for them are increasing day by day (Biagi et al., 2016; Welz et al., 2019; Xiong et

al., 2021).

In Türkiye, Fs are sold over the counter with the approval of The Republic of Türkiye Ministry of Agriculture and Forestry. As of August 2023, more than 18000 approved supplementary foods are sold in Türkiye (Gıda Güvenliği Bilgi Sistemi-Food Safety Information System, n.d.) In the Ministry's "List of Restricted Substances Used in Supplementary Foods", the minimum and maximum daily doses of more than 250 components from fish oil to Vitamin B1 and Vitamin B12, which are limited to be used in the supplementary foods for children aged 4-10 years and adult individuals are provided (Gıda Güvenliği Bilgi Sistemi-Food Safety Information System, n.d.). Although there is no full consistency in the legal status of the food supplements across the EU countries, a regulatory framework has been established by the "Food Supplements Directive 2002/46/EC" (Food Supplements, n.d.). In the US., it is regulated at the federal level by the Food and Drug Administration (FDA), the Federal Trade Commission (FTC), and government agencies in all 50 states. The FDA has regulatory authority under the Federal Food, Drug, and Cosmetic Act. (Regulatory Information | FDA, n.d.).

The increasing interest in Fs might be attributed to various reasons such as self-medication due to pandemic conditions, ease of access to information, increasing healthy living, protection from diseases and motivation to create a routine for exercise and nutrition (Erarslan & Kültür, 2021; Gardiner et al., 2007; Neuhaus et al., 1999). However, various risks exist such as food supplements interacting with prescription medicine used or not used in the appropriate dose (Khampang et al., 2022).

There are many medicinal plants used as herbal food supplements (HFs). Within the scope of this study, Echinacea and St. John's Wort were selected from the plants are frequently encountered. *Echinacea* is a genus of Asteraceae family. Principally *E. angustifolia*, *E. pallida* and *E. purpurea* have been used in traditional medicine for centuries to treat respiratory tract infections and inflammatory conditions, including the common cold, coughs, bronchitis, and inflammation of the mouth and pharynx, upper respiratory infections, and some additional inflammatory conditions (Catanzaro et al., 2018; Percival, 2000). *Hypericum* is a genus of Hypericaceae family. *Hypericum* species have been used in the traditional medicine for antidepressant, sedative, diuretic, antiphlogistic and analgesic purposes (Galeotti, 2017; Schepetkin et al., 2021). The well-known and the most studied species of the genus is *H. perforatum* (also known as St. John's Wort). *H. perforatum* is known for its antimicrobial, pain relief and antioxidant effects (Schepetkin et al., 2021; Yilmaz et al., 2019; Zhang et al., 2020).

E. purpurea and *H. perforatum* are two medicinal plants often used as HFs (Agbabiaka et al., 2017; Smith et al. 2022; Thakkar et al., 2020). However, interactions of

these two species with drugs, especially through CYP 450 enzymes, are common (Freeman & Spelman, 2008; Mannel, 2004).

The aim of this study is to evaluate the use, attitude and awareness of HFs and other Fs among students studying in the faculties of Pharmacy, Medicine, Dentistry and Health Sciences based on *H. perforatum* and *E. purpurea* species. In addition, the participant's personal use and preferred dosage forms were also investigated.

MATERIALS AND METHODS

This descriptive, cross-sectional study was conducted by completing a self-administered online questionnaire during October 2019-April 2020 by Medicine, Pharmacy, Dentistry and Health Science (Nursing, Nutrition and Dietetics, Physical therapy and Rehabilitation, Healthcare Management) students. This group was selected to obtain an overview of the level HFs knowledge of students studying health.

With the 53-question questionnaire prepared, essential health, demographic information, lifestyle, drug and Fs use and information of the two selected plants were collected. The questionnaire includes yes/no, open-ended, numbered evaluation scale and multiple choice questions. The preparation and configuration of the questionnaire were in accordance with the existing literature on the subject with some modifications (Karelakis et al., 2020; Nakhal et al., 2020; Niva & Mäkelä, 2007). This study was approved by the Ethics Committee of Istanbul Medipol University. The survey was provided to 211 randomly selected participants.

Data analysis

The results and significance values were analyzed with Statistical Package for the Social Science (SPSS) version 22.0. The 53-question survey is prepared under five headings: 1) sociodemographic information such as gender, age, lifestyle (smoking/drinking alcohol); 2) general health status and usage of prescription or over-the-counter medications; 3) usage of food supplements; 4) usage of herbal food supplements and the level of knowledge; 5) yes/no, open ended, numbered evaluation scale, multiple choice questions that evaluate the level of knowledge in Echinacea and St. John's Wort. The data were analysed with Chi-square test. Differences between values at $P < 0.05$ levels were considered significant.

RESULTS AND DISCUSSION

The online questionnaires were filled out by 211 students studying at the faculties of Medicine, Dentistry, Pharmacy and Health Sciences at Istanbul Medipol University. The greatest participation was achieved with Pharmacy students (47.4%), whereas the lowest participation was reached with Dentistry students (5.7%) (Table 1).

Majority of the participants (71.5%) described their health status as good; 26.5% as moderate; 1.4% as bad

Table 1. Sociodemographic characteristics of the participants

Sociodemographic Characteristics (n=211)											
Gender	n	%	Age	n	%	Faculty	n	%	Academic Year	n	%
Female	192	91	19-20	26	12.3	Pharmacy	100	<u>47.4</u>	1 st Year	16	7.6
			21-22	105	<u>49.8</u>	Nutrition and Dietetic	49	23.2	2 nd Year	30	14.2
			23-24	68	32.2	Medicine	22	10.4	3 rd Year	79	<u>37.4</u>
Male	19	9	25 and +	12	5.7	Dentistry	12	5.7	4 th Year	50	23.7
						Other	28	13.3	5 th Year	36	17.1

* The highest values are underlined.

and 0.48% as very bad. 17.5% of the participants reported having a chronic disease. 37.8% of the participants were seen by a doctor regularly. 44.5% of the participants indicated using food supplements. The most commonly used products as Fs were vitamin D (21.3%) and multivitamins (16.1%), while the use of HFs was found to be 8.5%. In the question of food supplement use, participants were able to select more than one option (Table 2). The most preferred places to obtain Fs were pharmacies. Among the reasons for preferring HFs, the first place was to use it for weight loss and the second place was to boost immunity. The herbal infusion was the most preferred form (43.7%). As a result of using the HFs, 86.9% of the participants reported positive effects. Of the two plants examined in this study, St. John's Wort was used for the treatment of wounds and burns, and Echinacea was preferred to boost immunity. In parallel with this use, St. John's Wort was preferred as olive oil maceration and Echinacea as herbal infusion.

Table 2. Food supplement preferences

Food supplement (n=211)	n	%
Vitamin D	45	21,3
Multivitamin	33	16,1
Fish oil/ Omega 3	31	15,6
Vitamin C	28	13,3
Vitamin B	21	10
Coenzyme Q10	19	2,8
Probiotic / Prebiotic	19	9
Magnesium	18	8,5
Iron	17	8,1
Herbal food supplement	17	8,5
Zinc	16	7,6

* Higher values are taken. More than one option can be selected.

Over-the-counter drug use was found to be 15.6%. It was stated that the participants received the majority of the over-the-counter drug recommendations from doctors (41.4%) and pharmacists (20.7%), which were followed by non-recommendation usage (17.2%), family-friends (10.3%) and their own research (10.3%). The most common reason for using over-the-counter drugs was "Failure to get the desired result from previously used prescription medicines" (61.5%).

While the use of HFs was 58.3%, that of the Fs were 44.5%. Echinacea use was found to be 14.4% and St.

John's Wort was 31.3%. The most commonly used herbal food supplement was green tea, which was preferred for weight loss. The least used ones were Ginseng and Passiflora. When we investigate the participants who use Fs and have chronic diseases, we revealed that 37 of participants had chronic diseases, 19 people (44.5%) of them were given Fs and 22 people (58.3%) of them were using HFs. 50.7% of the smokers were taking Fs and 65.7% of them were on HFs. The relationship between the presence of chronic disease and the use of Fs or HFs was not statistically significant. In addition, no relationship has been detected between having a chronic disease and the use of St. John's Wort and Echinacea. The connection between smoking or drinking alcohol and using Fs or HFs was also not significant.

The participants were asked "How adequate do you find the sources of information given in the options below about the herbal food supplements?". The medical students replied that the doctors were more adequate, whereas the other students indicated that pharmacists were more competent. The least adequate information source was "tv-radio".

In the evaluation of the level of personal knowledge about the plants, the participants were requested to score between 0-5 (0: the least, 5: the most), about the purpose of use, preparation, dose, side effect, drug, plant and food interactions of the plant and the average score was found as 2.3. The highest mean score was the purpose of use (2.9) and the scores with lower means were drug, plant and food interactions (1.8).

In a study by Tuğut et al., 77.5% of the participants described their health status as "good" and 0.6% of them as "very bad" (Tuğut & Bekar, 2008). The studies conducted on university students from different countries revealed that chronic disease status was found to be Slovakia 26.1% (Klemenc-Ketis et al., 2011), USA 27% (Herts et al., 2014) and Serbia 16.5% (Gazibara et al., 2018).

The most preferred Fs in this study were vitamins/multivitamins similar to previous studies (Dickinson et al., 2014; Knapik et al., 2021; Knudsen et al., 2002; Serdarevic et al., 2019). Although there are some differences, the most preferred Fs were found in products such as multivitamins and fish oil, which is in accordance with our study (Knapik et al., 2021; Knudsen et al., 2002; Nakhal et al., 2020).

In our study, those who had chronic diseases and used

HF despite not using Fs were also identified. For this reason, the outlook on HFs might be considered as more positive compared to other Fs. Our findings are the first to demonstrate the relationship between chronic diseases and Fs use among university students in Türkiye. In general, there are limited studies on the use of food supplements, especially HFs, by university students, and the number of studies on students of health departments is very low (Axon et al., 2017; Bukic et al., 2018; Nakhal et al., 2020; Stanojević-Ristić et al., 2017).

Since the departments of the Faculty of Health Sciences and the Faculties of Pharmacy in Türkiye predominantly have female students, the results were not classified based on gender. Although there were differences between the groups, these differences were not statistically significant because the sample size was small. Use of Fs varies depending on many different factors such as age, gender and socioeconomic status. People use Fs as a form of self-medication (Knudsen et al., 2002).

In a previous study (n=6666), it was determined that 17% of the participants used HFs and 26% were smokers, 24% were regular alcohol users. 21% of smokers and 24% of those who consumed alcohol used HFs (Gardiner et al., 2007).

Echinacea one of the two plants included in our study, is one of the well-known immunomodulatory plants that has gained popularity in recent years (Kim & Calderón, 2022; Lam et al., 2022). St. John's Wort is known to interact with different groups of drugs (Chrubasik-Hausmann et al., 2019). The preferred form of the product changes the amount of the active compounds. Side effects and drug interactions occur according to the amount of the active compounds as well. Therefore, it should be ensured that people who use these types of products are informed about the side effects and drug interactions by health professionals.

It is thought that the differences in opinion among the students of medicine, pharmacy and other departments regarding the information sources of the HFs are due to the courses taken by the students and the course contents (Aina & Ojedokun, 2014; Shahwan & Al Abdin, 2018).

The National Health and Nutrition Examination Survey (NHANES) is a face to face interview survey held in the United States since the 1970s and handed to 5,000 people who monitor the health and nutrition status of the public. For years, regular Fs usage was monitored this way (Moore et al., 2020). Similar surveys can be carried out regularly in different countries.

In the evaluation of the level of knowledge about Echinacea and St. John's Wort (0: the least, 5: the most), the lowest score in St. John's Wort was found as "oil preparation" with "2", the highest score was found as "storage conditions" with "3.75", the lowest score in Echinacea was found as "side effects" with "1.62" and the

highest score was found as "tea preparation" with "2.53" (Table 3-4). Given that the participants are in different classes and departments, their level of knowledge about plants might be less. The Pharmacy students were educated about the medicinal plants and Fs, whereas the Nutrition and Dietetics students took courses related to Fs. However, there were no related courses in other departments, which might explain their level of knowledge. In order to enhance the depth of knowledge, it would be advantageous to consider incorporating courses pertaining to the utilization of food supplements within various departments in the future.

Table 3. The level of knowledge on St. John's Wort

St. John's Wort		
N=71	Mean	Standard Deviation
Active compounds	2.69	1.7
Part of the plant used	2.76	1.7
Factors affecting quality	2.81	1.8
Drug and food interaction	<u>2.29</u>	<u>1.8</u>
Side effects	2.37	1.6
Tea preparation	<u>2.86</u>	<u>1.7</u>
Oil preparation	2.00	1.7
Conditions to be considered when using oil	3.62	1.8
Storage conditions	3.75	1.8

*The highest values are underlined.

Table 4. The level of knowledge on Echinacea

Echinacea		
N=34	Mean	Standard Deviation
Active compounds	2.18	1.9
Part of the plant used	2.41	1.8
Factors affecting quality	2.03	1.9
Drug and food interaction	<u>1.62</u>	<u>1.8</u>
Side effects	1.97	1.6
Tea preparation	<u>2.53</u>	<u>1.8</u>

*The highest values are underlined.

The questionnaire used in this study was not validated. The data collection tool lacks validity and reliability. However, such research on food supplements, particularly herbal food supplements, is scarce. Use of Fs is a rising trend with the concept of healthy living and wellness. This descriptive study will be beneficial as it will provide information for future research.

CONCLUSION

Food supplements whether of plant base or not, are not an alternative to a prescribed medicine. It should be used as a supportive or complementary treatment. The approach of health professionals such as doctors, pharmacists and dietitians to these products is very important for the compliance of patients with treatment. For this reason, health professionals play an important role in ensuring that patients reach the right and reliable

product. This study is important in terms of determining the opinions and knowledge levels of health students about the Fs, especially the HF, St. John's Wort and Echinacea, which are also available in the market. The increase in the knowledge levels of the students on medicinal plants and food supplements, especially the health students other than pharmacy students, will prevent the unconscious consumption of these products.

COMPLIANCE WITH ETHICAL STANDARDS

Peer-review

Externally peer-reviewed.

Conflict of interest

The author claims that there is no conflict of interest.

Author contribution

The process of reviewing the study, preparing it as an article and submitting was completed by the author.

Ethics committee approval

Ethics committee approval was obtained from the NonInterventional Clinical Research Ethics Committee of Istanbul Medipol University (Decision No. 04/03/2020/227).

Funding

No financial support was received for this study.

Data availability

Not applicable.

Consent for publication

Not applicable.

Acknowledgements

I am thankful to Pakize Yiğit from Istanbul Medipol University School of Medicine for its support in statistical analysis and Meryem Tenha Kılıç for support in data collection. It should be noted that they didn't have any role in writing of the manuscript; or the decision to submit. Also, I would like to thank all volunteers that take a part in this study.

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