

## **Evaluation of the knowledge level and usage attitudes of the medical students on the medicinal herbs and herbal products: a project of special study module in the first three years of the school of medicine**

**Hulya Guven<sup>1\*</sup>, Sule Kalkan<sup>1</sup>, Nil Hocaoglu<sup>1</sup>, Engin Yildiztepe<sup>2</sup>, Gamze Gokalp<sup>1</sup>**

<sup>1</sup>Department of Medical Pharmacology, School of Medicine, Dokuz Eylul University, Izmir, Turkey

<sup>2</sup>Department of Statistics, Faculty of Arts and Sciences, Dokuz Eylul University, Izmir, Turkey

**Received:** 07 February 2019

**Revised:** 14 February 2019

**Accepted:** 19 February 2019

**\*Correspondence to:**

Dr. Hulya Guven,

Email: [hulya.guven2@gmail.com](mailto:hulya.guven2@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### **ABSTRACT**

**Background:** In this survey, it was aimed to determine the types of medicinal herbs and herbal products, reasons of use and consciousness levels among the medical students in the first three years of the School of Medicine.

**Methods:** A cross-sectional descriptive questionnaire consisting of 50 questions was applied to all the students in the first three years of Dokuz Eylul University School of Medicine between September 1, 2016 and June 1, 2017.

**Results:** The results of 571 participating students were evaluated. Of these students, 301 (52.7%) were females and 270 (47.3%) were males. It was found that 73.4% (n=419) of the students used these products for treatment and mostly consumed linden, sage tea, mint and rosehip. Also, 11.6% of the students had chronic diseases (n=66). It was determined that 69.7% (n=46) of these students having chronic diseases used medicinal herbs and herbal products. Only 12.0% of the students had an opinion about the legal regulations regarding the use of herbs and herbal products in Turkey, while 39.7% of them had no idea, and 48.3% stated that such regulations on this matter were unreasonable. However, 59.7% of the respondents stated that legal regulations were necessary. It was found that the participating students used herbs and herbal products generally for therapeutic purposes without having sufficient knowledge about medicinal herbs; therefore it was necessary to increase their level of consciousness.

**Conclusions:** Medical students neither have adequate medical information about medicinal herbs and herbal products, nor about the regulations on these products. It is crucial to revise the courses in the medical education so that the students would get informed about the regulations as well as potential risks of herbal plants while still in the medical schools.

**Keywords:** Herbal products, Medicinal herbs, School of medicine students

### **INTRODUCTION**

It was reported that the use of Complementary and Alternative Therapy (CAM) showed an increase worldwide, both in developing and developed countries.<sup>1,2</sup> CAM involves herbs, vitamins, minerals and other natural products.<sup>3</sup> WHO reported that 60% of the world's population and 80% of the developing countries use herbs for primary health care.<sup>3</sup> In developing countries traditional medicine and herbal medicines have been observed to be widely used in the treatment of diseases due to their accessibility, affordability and availability. In

developed countries, a shift to herbal medicines was reported in patients with chronic diseases.<sup>4</sup> It was reported that the use of herbal medicines had an increasing trend worldwide for the treatment of obesity, chronic diseases, pain syndromes and for wellness.<sup>5-7</sup>

The popularity of herbal medicines in developed countries is based on the belief that they are safer than medical drugs because they are natural.<sup>8</sup> On the other side, it was also stated that the herbal products were not safe because of many side effects of medicinal herbs reported in the literature.<sup>2,8-11</sup> Neustadt reported that the interaction

between herbs and modern medicines led to undesirable pharmacokinetic and pharmacodynamic effects.<sup>12</sup> Therefore, patients' health will depend on the physicians' knowledge about medicinal plants and their products regarding potential adverse effects.<sup>13</sup> Nowadays, standardization, efficacy, quality of CAM methods and their interactions with drugs are questioned, since they represent an alternative to modern medicine.<sup>14,15</sup>

Several studies showed that herbal medicines are used as CAM among pharmacy and medical students.<sup>16</sup> In a research study about herbal medicine use of physicians, it was determined that, appropriate quality control could not be implemented for the rational use of herbal drugs (65.6%) and inadequate information about adverse effects was a limiting factor in their use (62.5%).<sup>17</sup> Although some medical schools offer adequate medical education for CAM, the proportion of medical schools in the world offering such a training is very low.<sup>9</sup> Studies have shown that medical students have limited knowledge about CAM and medicinal plants.<sup>18,19</sup> There are also very few medical schools in Turkey providing education about herbal products.<sup>20</sup>

In general, most of the studies were about the knowledge and the perception of medical students about CAM.<sup>9,18-21</sup> In this study, it was aimed to determine the types of medicinal herbs and herbal products, reasons of use and consciousness levels in the first three years students of the Dokuz Eylül University, School of Medicine. Our study is also the first ever survey in Turkey, assessing whether medical students have any information about the legal regulations issued on medicinal herbs and herbal products.

## METHODS

A cross-sectional descriptive questionnaire consisting of 50 questions was applied to all the students in the first three years of Dokuz Eylül University School of Medicine between September 1, 2016 and June 1, 2017. In the survey, the questions involved open-ended, closed (multiple-choice) and also attitudinal statements such as "yes", "no", "no idea". This was a project of the special study module, which is a research team composed of

medical students in the second year participating on the voluntary basis.

Ten students of the second year of the faculty were pre-tested in order to check the applicability of the test, including such aspects as the length of the questions and the clarity of the questionnaire. The questions were then modified according to the feedback obtained from pre-test. And those who participated in the pilot study were excluded from the main test. A total of 959 students of the first, second and third year students were included in the study. In this study, the study team asked all 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> grade students to complete the questionnaire before the course session. The reason for selecting the first three classes was that they were pre-clinical class.

The questionnaire aimed to evaluate the age and gender of medical students, how they obtained medicinal herbs and herbal products, and their knowledge on legal regulations. In addition, their knowledge and attitudes of medicinal herbs and herbal products and other CAM methods were also evaluated.

Statistical analyses were performed with IBM SPSS Statistics 20.0 (Chicago, IL). Chi square test was performed to test the association between variables in contingency tables.  $p < 0.05$  was considered statistically significant.

## RESULTS

Out of 959 students, 571 medical students completed the questionnaire. Average response rate of 959 students was 59.5% (1<sup>st</sup> year  $n=198/319$ , 62.1%; 2<sup>nd</sup> year  $n=218/336$ , 64.9%; 3<sup>rd</sup> year  $n=155/304$ , 50.9%). Medicinal herbs and herbal products were determined to be used by 73.4% ( $n=419$ ) of 571 responding students. Out of these students, 76.8% ( $n=322$ ) were determined to be using medicinal herbs, 18.4% ( $n=77$ ) herbal products and 4.8% ( $n=20$ ) using both. Average age of these students was  $19.9 \pm 1.6$  years (Table 1). When the use of herbal products for therapeutic purposes was evaluated, there was no significant difference between male and female students ( $p=0.830$ ).

**Table 1: Distribution of herbs and herbal products users and non-users.**

Gender	Medicinal Herbs and Herbal products			p value
	Users n (%)	Non-users n (%)	Total n (%)	
Female	222 (73.8)	79 (26.2)	301 (100.0)	p=0.830*
Male	197 (73.0)	73 (27.0)	270 (100.0)	
<b>Total</b>	419 (73.4)	152 (26.6)	571 (100.0)	
Year of school of medicine				
1 <sup>st</sup> year	153 (77.3)	45 (22.7)	198 (100.0)	p<0.001*
2 <sup>nd</sup> year	140 (64.2)	78 (35.8)	218 (100.0)	
3 <sup>rd</sup> year	126 (81.3)	29 (18.7)	155 (100.0)	
<b>Total</b>	419 (73.4)	152 (26.6)	571 (100.0)	

\* Users and non-users of herbs and herbal products were compared

In addition, when the use of medicinal herbs and herbal products among students' classes was examined, it was found that students used less medicinal herbs and herbal products in the second year ( $p < 0.001$ ).

When the students were asked whether they had chronic diseases, the rate of using herbs or herbal products was higher among the students with chronic diseases. The patients among the students with allergy and asthma were using herbs more than the others (Table 2).

**Table 2: Distribution of users and non-users of herbs and herbal products regarding chronic diseases (n=66).**

Chronic Diseases	Medicinal Herbs and Herbal Products		
	Users n (%)	Non Users n (%)	Total
Allergy diseases	15 (22.7)	8 (12.1)	23 (34.8)
Asthma	8 (12.1)	3 (4.6)	11 (16.6)
Psychiatric diseases	5 (7.6)	3 (4.6)	8 (12.1)
Thyroid diseases	3 (4.6)	1 (1.5)	4 (6.1)
Endocrine diseases	3 (4.6)	1 (1.5)	4 (6.1)
Musculoskeletal system diseases	3 (4.6)	-	3 (4.6)
Hypertension	2 (3.0)	2 (3.0)	4 (6.1)
Cardiovascular diseases	2 (3.0)	1 (1.5)	3 (4.6)
Gastrointestinal problems	2 (3.0)	-	2 (3.0)
Haemophilia	2 (3.0)	-	2 (3.0)
Diabetes mellitus	1 (1.5)	1 (1.5)	2 (3.0)
Total	46 (69.7)	20 (30.3)	66 (100.0)

Users having more than one chronic diseases (n=66)

**Table 3: The opinion of medical students on the use of medicinal herbs and herbal products with conventional therapy.**

Question	Yes n (%)	No n (%)	No idea n (%)	Missing n (%)	Total n (%)
Do you think that the use of medicinal herbs are safe?	290 (50.8)	106 (18.6)	124 (21.7)	51 (8.9)	571 (100.0)
Do you think that the use of herbal products are safe?	221 (38.7)	152 (26.6)	155 (27.2)	43 (7.5)	571 (100.0)
Do you think that the combined use of medicinal herbs and conventional therapy is more effective?	275 (48.2)	117(20.4)	134 (23.5)	45 (7.9)	571 (100.0)
Do you think that the combined use of herbal products and conventional therapy is more effective?	215 (37.7)	172 (30.1)	141 (24.7)	43 (7.5)	571 (100.0)
Do you think that the combined use of medicinal herbs and conventional therapy is safe?	203 (35.6)	126 (22.1)	194 (33.9)	48 (8.4)	571 (100.0)
Do you think that the combined use of herbal products and conventional therapy is safe?	151 (26.4)	174 (30.5)	201 (35.2)	45 (7.9)	571 (100.0)
Do you think that the medicinal herb therapy can be used in place of conventional therapy?	137 (24.0)	295 (51.7)	95 (16.6)	44 (7.7)	571 (100.0)
Do you think that the herbal products therapy can be used in place of conventional therapy?	158 (27.7)	278 (48.7)	92 (16.1)	43 (7.5)	571 (100.0)

There were comparatively much less students believing medicinal herbs and herbal products (respectively 18.6%, n= 106; 26.6%, n=152) were not safe. And the rate of those having no idea on this issue was determined to be 21.7%, n=124; and 27.2%, n=155 respectively.

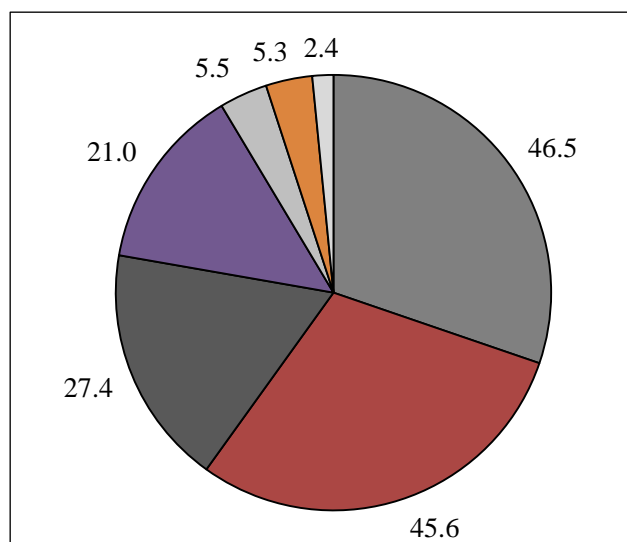
The number of students who believed that the use medicinal herbs and herbal products in combination with conventional therapy would be more effective was higher

(respectively 37.7%, n=215; 35.6%, n= 203). However, the rate of students responding to these questions as “no idea” varied between 21% and 35%.

The number of students responding “no” to the question as to whether the use of medical herbs and herbal products could substitute for conventional therapy or not were higher (respectively, 51.7%, n=295; 48.7%, n=278)

though, those responding “yes” were still not very low (respectively, 24.0%, n=137; 27.7%, n=158) (Table 3).

In response to the question about the reasons of using medicinal herbs and herbal products, it was found that 46.5% of the students used them for the treatment of diseases, 45.6% for feeling better and 27.4% for an alternative drug without any side effects. The other reasons were expressed as easy accessibility, lower cost, advertisements and naturalness (Figure 1).



\*Users could select more than one option

**Figure 1: The reasons for using medicinal herbs and herbal products as (n=419).**

The most popular medicinal herbs and herbal products were mentioned as linden, sage, mint, rosehip, chamomile, cinnamon, green tea, ginger, lemon, thyme, black cumin, cherry stalk and fennel. Comparatively less preferred herbs in the list were rosemary, urtica dioica, St. John’s Wort, olive leaves, flaxseed, marjoram, senna, hibiscus, purslane, sycamore leaves, oleander, turmeric, melissa, squirting cucumber, *Aloe vera* and carob (Table 4).

Medicinal herbs and herbal products can be used as infusion (53.7%, n=253) and decoction (31.8%, n=150), or can be eaten (9.8%, n=46), and applied to the skin (4.7%, n=22) (the numbers show multiple responses).

Besides, as for the rate of using the other alternative medicines, it was significantly higher for the students using medicinal herbs and herbal products for their treatment, in comparison to the non-users (p<0.05) (Table 5).

The other most common Complementary and Alternative Therapy (CAM) methods were vitamin and mineral supplementation (44.6%, n=71), massage therapy (22.0%, n=35), bone setting (11.3%, n=18), healing water drinking (9.4%, n=15), meditation-yoga (8.1%, n=13), religious prayer/reiki (each of 5.7%, n=9), acupuncture and cupping

(each of 1.6%, n=3), ozone therapy and leech application (each of 0.6%, n=1).

**Table 4: Medicinal herbs used by students\* (n=419).**

Medicinal herbs	Latin name	n (%)
Linden	<i>Tilla Sp.</i>	371 (88.5)
Sage	<i>Salvia Sp.</i>	317 (73.4)
Mint	<i>Mentha piperita</i>	301 (71.8)
Rosehip	<i>Rosa canina</i>	254 (60.6)
Chamomile	<i>Asteraceae Sp.</i>	194 (46.3)
Cinnamon	<i>Cinnamomum Sp.</i>	232 (55.4)
Green tea	<i>Camellia sinensis</i>	241 (57.5)
Ginger	<i>Z. officinale</i>	221 (52.7)
Lemon	<i>Citrus lemon</i>	205 (48.9)
Thyme	<i>Lamiaceae Sp.</i>	189 (45.1)
Black cumin	<i>Nigella sativa</i>	127 (30.3)
Cherry stalk	<i>Prunus avium</i>	98 (23.4)
Fennel	<i>Foeniculum vulgare</i>	98 (23.4)
Rosemary	<i>Rosemerinus officinalis</i>	73 (17.4)
Urtica dioica	<i>Urticaceae Sp.</i>	71 (16.9)
St. John’s Wort	<i>Hypericum perforatum</i>	63 (15.0)
Olive leaves	<i>Olea europaea</i>	34 (8.1)
Flaxseed	<i>Linium usitatissimum</i>	34 (8.1)
Origanum majorana	<i>Lamiaceae Sp.</i>	26 (6.2)
Senna	<i>Cassia Sp.</i>	26 (6.2)
Hibiscus	<i>Hibiscus</i>	26 (6.2)
Purslane	<i>Portulaca olearacea</i>	26 (6.2)
Sycamore leaves	<i>Platanus Sp.</i>	16 (1.6)
Oleander	<i>Nerium oleander</i>	16 (3.8)
Turmeric	<i>Curcuma munga</i>	5 (1.2)
Melissa	<i>Melissa officinalis</i>	5 (1.2)
Squirting cucumber	<i>Ecballium elaterium</i>	3 (0.7)
Aloe vera	<i>A. vera</i>	2 (0.5)
Carob	<i>Ceratonia siliqua L.</i>	2 (0.5)

\*Numbers show multiple responses

It was determined that the students learned the use of medicinal herbs (n=322) and herbal products (n=77) from their families (75.5% and 7.8%), followed by the internet (24.2% and 3.7%), their friends (23.3% and 1, 9%), herb-dealers (22.7% and 2.5%), their neighbours (18.6% and 0.6%), the television (14.9% and 1.6%) and others (35.1% and 7.5%). However, they principally obtained herbs from herb-dealers and supermarkets (Table 6).

As regards the question about legal terms, as to whether the students had adequate information about the legal regulations relevant to the use of medicinal herbs / herbal products (48.3%, n=254) was responded with “no”. Furthermore, the rate of students having “no idea” (39.7%, n=209) about regulations was much higher than the students responding “yes” (12.0%, n=63).

However, the rate of the students approving the necessity of legal regulations for medicinal herbs and herbal products

(59.7%, n=313) similar to the regulations about medicines was also high (57.9%, n=305) (Table 7).

**Table 5: The rate of the other alternative medicines used by the participants.**

	Other alternative medicine usage n (%)	No other alternative medicine usage n (%)	The number of students responding	p value
Medicinal herbs and herbal product users	130 (32.0)	276 (68.0)	406 (100.0)	p=0.007
Non-users	29 (20.1)	115 (79.9)	144 (100.0)	

**Table 6: Places where students obtained medicinal herbs and herbal products\*.**

	Medicinal herbs (n=322) n (%)	Herbal products (n=77) n (%)
Herb dealers	194 (60.2)	25 (32.4)
Supermarket	96 (29.8)	17 (9.1)
Traditional bazaar	64 (19.9)	6 (7.8)
Collecting from nature	56 (17.4)	-
Neighbors	30 (9.3)	4 (5.2)
Pharmacy	25 (7.8)	19 (24.6)
Friends	23 (7.1)	4 (5.2)
Internet	5 (1.6)	5 (6.5)

\* Numbers represent multiple selections

**Table 7: The awareness of medical students about legal regulations in Turkey.**

	Yes	No	No-idea	Total
Do you have any information about legal regulations regarding the use of medicinal herbs/herbal products?	63 (12.0)	254 (48.3)	209 (39.7)	526 (100.0)
Do you think there should be legal regulations about the use of medicinal herbs/herbal products?	313 (59.7)	95 (18.1)	116 (22.2)	524 (100.0)
Do you think that the regulations regarding the use of medicinal herbs/herbal products should be like conventional drugs?	305 (57.9)	117 (22.2)	105 (19.9)	527 (100.0)

## DISCUSSION

In this study, it was found that the rate of using medicinal herbs, herbal products and other alternative therapies by medical students was similar to the findings previous studies in the literature. Researchers reported that 26-79% of respondents among university students had used herbal medicines for various ailments.<sup>22-24</sup> It was found also in this study, that the rate of medical students using medicinal herbs and herbal products was 73.4%. It was observed that the gender of the students using herbal medicines did not affect the usage rate, similar to the studies of Ameade et al and Newberry et al.<sup>25,26</sup>

In this study, it was found that 66 students had chronic diseases such as allergy, asthma, psychiatric, endocrine and cardiovascular diseases. The students having chronic diseases reported to be using medicinal herbs and herbal products at the rate of 69.7%. In fact, previous studies have

generally revealed that the rate of using plants and herbal products was higher in patients with chronic diseases.<sup>7,27</sup>

It was also shown in this study that, the students used medicinal herbs and herbal products in order heal their diseases and for their health. Zimmerman stated that plant supplements were getting increasingly popular around the world, in preventing diseases and improving wellness.<sup>28</sup> Similarly, according to Shavan et al, most of the health science students participating in the survey supported the fact that herbal products could be useful for the treatment of certain medical conditions and for promoting health.<sup>29</sup>

In this study it was found that family was an important source of information on the use of medicinal herbs and herbal products. Other learning resources for medicinal herbs and herbal products were determined as the internet and friends. Frawley et al showed that, pregnant women obtained information regarding the use of the plants from their own families and their friends.<sup>30</sup> Perkin et al have



identified that the major source of information among of the university students was family.<sup>31</sup> Similarly, it was found that the alternative therapy methods were mostly learned from family and television in Turkey.<sup>32-34</sup> In another study performed among medical students, it was demonstrated that the majority of students acquired the knowledge about medicinal plants from their parents and their relatives.<sup>21</sup>

It was observed in this study that, most common alternative therapies the students preferred were vitamin and mineral supplementation, massage therapy, bone setting, healing water drinking, meditation-yoga, religious prayer/reiki, acupuncture, cupping, ozone therapy and leech application. However, medicinal herbs were determined to be used most (76.8%) among CAM methods. James and Bach found that the most popular CAM among students was medicinal herbs, which was followed by acupuncture, massage, prayer and meditation, respectively.<sup>16</sup> Studies have revealed the variances in the knowledge and the use of (CAM) remedies between countries, based on the differences in education, geography and cultures. For example the best known CAM in Singapore was acupuncture, and it was herbal medicine in Ghana and America.<sup>35-37</sup> It was also found in this study that the students mostly used medicinal herbs.

Herb-dealers and supermarkets were determined to be the main places where the students buy medicinal herbs and herbal products but the herbs were also obtained from the traditional markets or by means of collecting in nature by themselves.

The survey was conducted with the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> grade students in the School of Medicine, on their behaviors of using medicinal herbs and herbal products, the herbs they used, the sources of their knowledge on herbs. The results we obtained were similar to the results of the previous studies, where the researchers have also shown that the information medical students had about medicinal herbs was not at proficient level.<sup>38</sup> Medical education in Turkey has focused on modern approaches, in general. Therefore, physicians do not have adequate knowledge about the alternative therapeutic methods such as herbal therapy. For all these reasons, researchers have been asserting the approach that information about CAM should be given in medical schools.<sup>39</sup> As a result of this survey, it was also revealed that students had little information about the laws related to medicinal herbs and herbal products. Only 12.0% of the students responding the questionnaire stated that they knew the laws. When the opinions of the students about the legal regulations were evaluated, 59.7% of the respondents stated that regulations were required and 57.9% stated that the regulations for herbs and medical drugs should be alike. However, 20%-39% of the respondents stated that they did not have ideas on that issue and 18%-21% considered legal regulations as unnecessary. However, the Ministry of Health, Turkey Pharmaceuticals and Medical Devices Agency issued regulations on herbal products in 2010. Subsequently, herb-dealers were

prohibited from selling 35 types of plants known to be toxic.<sup>40</sup> While the herbs used by the students for a variety of reasons were examined in this study, some certain types of herbs having harmful effects were also seen, such as St. John's Wort, turmeric, squirting cucumber, and *Aloe vera*. Relevant information about the effects and toxicity of medicinal herbs and herbal products can be provided for the medical students by organizing medical education programs or by adding to the pharmacology courses.

There were some limitations in this study. First, the findings are based on self-reported information; thus, participants may have provided different information about the use of medicinal herbs and herbal products. Secondly, the students completed the questionnaires before the lecture started. They may therefore be subject to time constraints.

## CONCLUSION

In conclusion, this is an important matter in the education of prospective physicians, who can use medicinal herbs and herbal products rationally now while they are students and can hopefully handle such problems consciously with patients in the future. Physicians have limited experience with herbal medicines during their training. Since the resources on the internet are not always reliable, physicians may sometimes encounter adverse and toxic effects caused by herbs. At the same time, the physicians must be informed about the regulations relevant to banned or harmful herbs. While managing the therapy, the physicians having information as to whether the patient was using a herb/herbal product, would prevent any negative therapeutic outcome, even sometimes would avoid any interference between adverse effects of herbs and drugs. For this reason, it is crucial to revise the courses in the medical education so that the students would get informed about the regulations as well as potential risks of herbal plants while still in the medical schools.

## ACKNOWLEDGEMENT

Authors would like to thank the medical students named Ece Doganeroglu, Emre Gungor, Irem S. Sencan, Mert Kesimliler, Merve N. Celik, Furkan Bozkurt, Eren Eyupoglu, Elif B. Engin, Ebru C. Aydin, Zehra Kayik, Murat Ersoy, Cem D. Erdem, Betül Kucuk, Kubra Kalacik, Sevde Ates, Umran Gorus, Umut Ozdemir, who work on this special study module project.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Ethics Committee of Dokuz Eylul University (protocol no: 3071-GOA)*

## REFERENCES

1. Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children:

1. United States, 2007. Natl Health Stat Report. 2008;(12):1-23.
2. Bent S. Herbal Medicine in the United States: Review of Efficacy, Safety, and Regulation. *J Gen Intern Med.* 2008;23(6):854-9.
3. World Health Organization. General guidelines for methodologies on research and evaluation of traditional medicine, 2000. Available at: <http://apps.who.int/medicinedocs/pdf/whozip42e/whozip42e.pdf>. Accessed 06 February 2019.
4. Calixto J. Efficacy, safety, quality control, marketing and regulatory guidelines for herbal medicines (phytotherapeutic agents). *Braz J Med Biol Res.* 2000;33(2):179-89.
5. Aydın S, Bozkaya AO, Mazicioğlu MM, Gemalmaz A, Özçakir A, Öztürk A. What influences herbal medicine use? prevalence and related factors. *Turk J Med Sci.* 2008;38(5):455-63.
6. Saydah SH, Eberhardt MS. Use of complementary and alternative medicine among adults with chronic diseases: United States 2002. *JACM.* 2006;12(8):805-12.
7. Tulunay M, Aypak C, Yikilkan H, Gorpelioglu S. Herbal medicine use among patients with chronic diseases. *J Intercult Ethnopharmacol.* 2015;4(3):217-20.
8. Ernst E. Harmless herbs? A review of the recent literature. *Am J Med.* 1998;104(2):170-8.
9. Boparai JK, Singh A, Gupta AK, Matreja PS, Khanna P, Gupta V, et al. A study to determine the knowledge and level of awareness of medical undergraduates about herbal medicines and herb-drug interactions. *IJBCP.* 2016;6(1):17-24.
10. De Smet PA. Herbal remedies. *N Engl J Med.* 2002;347(25):2046-56.
11. Posadzki P, Watson L, Ernst E. Herb-drug interactions: an overview of systematic reviews. *Br J Clin Pharmacol.* 2013;75(3):603-18.
12. Neustadt J. Herb-drug interactions: What clinicians need to know. *Integrative Med.* 2006;5:16-26.
13. Clement YN, Williams AF, Khan K, Bernard T, Bhola S, Fortuné M, et al. A gap between acceptance and knowledge of herbal remedies by physicians: the need for educational intervention. *BMC Complement Altern Med.* 2005;5(1):20.
14. Chikezie PC, Ojiako OA. Herbal medicine: yesterday, today and tomorrow. *Altern Integr Med.* 2015;4:195.
15. Falci L, Shi Z, Greenlee H. Multiple Chronic Conditions and Use of Complementary and Alternative Medicine Among US Adults: Results From the 2012 National Health Interview Survey. *Prev Chronic Dis.* 2016;13.
16. James PB, Bah AJ. Awareness use attitude and perceived need for complementary and alternative medicine (CAM) education among undergraduate pharmacy students in Sierra Leone: a descriptive cross-sectional survey *BMC Complement Altern Med.* 2016;14:438.
17. Hilal M, Hilal S. Knowledge, attitude, and utilization of herbal medicines by physicians in the Kingdom of Bahrain: A cross-sectional study. *J Association Arab Universities Basic App Sci.* 2017;24(1):325-33.
18. Loh KP, Ghorab H, Clarke E, Conroy R, Barlow J. Medical students' knowledge, perceptions, and interest in complementary and alternative medicine. *J Altern Complement Med.* 2013;19(4):360-6.
19. Xu S, Levine M. Medical residents' and students' attitudes towards herbal medicines: a pilot study. *Can J Clin Pharmacol.* 2008;15(1):e1-4.
20. Yurtseven E, Vehid S, Bosat M, Sumer EC, Akdeniz SI, Cig G, et al. Assessment of knowledge and attitudes toward Complementary and Alternative Medicine (CAM) amongst Turkish medical faculty students. *AJTCAM.* 2015;12(5):8-13.
21. Strgar J, Piliš M, Pogačnik M, Žnidarčič D. Knowledge of medicinal plants and their uses among secondary and grammar school students: a case study from Slovenia. *Archives Biol Sci.* 2013;65(3):1123-9.
22. Ambrose ET, Samuels S. Perception and use of herbals among students and their practitioners in a university setting. *J Am Acad Nurse Pract.* 2004;16(4):166-73.
23. Johnson SK, Blanchard A. Alternative medicine and herbal use among university students. *J Am Coll Health.* 2006;55(3):163-8.
24. Sekhri K, Bhanwra S, Nandha R. Herbal products: a survey of students' perception and knowledge about their medicinal use. *IJBCP.* 2017;2(1):71-6.
25. Ameade EP, Amalba A, Helegbe GK, Mohammed BS. Herbal medicine: a survey on the knowledge and attitude of medical students in Tamale, Ghana. *Peak J Med Plant Res.* 2015;3(1):1-8.
26. Newberry H, Beerman K, Duncan S, McGuire M, Hillers V. Use of nonvitamin, nonmineral dietary supplements among college students. *J Am Coll Health.* 2001;50(3):123-9.
27. Leach MJ, Lauche R, Zhang AL, Cramer H, Adams J, Langhorst J, et al. Characteristics of herbal medicine users among internal medicine patients: A cross-sectional analysis. *J Herb Med.* 2017;10:59-63.
28. Zimmerman C. A pilot study to assess students' perceptions, familiarity, and knowledge in the use of complementary and alternative herbal supplements in health promotion. *Altern Ther Health Med.* 2012;18(5):28.
29. Shahwan M, Khawaja AH, Khasati DS. Knowledge, attitudes, and practices towards herbs and herbal products among health sciences students of a university in UAE. *Int J Res Ayurveda Pharm.* 2017;8(3):79-83.
30. Frawley J, Adams J, Steel A, Broom A, Gallois C, Sibbritt D. Women's use and self-prescription of herbal medicine during pregnancy: an examination of 1,835 pregnant women. *WHI.* 2015;25(4):396-402.
31. Perkin JE, Wilson WJ, Schuster K, Rodriguez J, Allen-Chabot A. Prevalence of nonvitamin, nonmineral supplement usage among university students. *J Acad Nutr Diet.* 2002;102(3):412-4.
32. Kucukoner M, Bilge Z, Isikdogan A, Kaplan MA, Inal A, Urakci Z. Complementary and alternative medicine

- usage in cancer patients in southeast of Turkey. *AJTAM*. 2013;10(1):21-5.
33. Ozer O, Santasa F, Yildirim HH. An evaluation on levels of knowledge, attitude and behavior of people at 65 years and above about alternative medicine living in Ankara. *AJTAM*. 2013;10(1):134-41.
  34. Yesilada E, Sezik E. A survey on the traditional medicine in Turkey: Semi-quantitative evaluation of the results. *Recent Progress in Medicinal Plants*. 2003;7:389-412.
  35. Ameade EPK, Amalpa A, Helegbe GK, Mohammed BS. Medical students' knowledge and attitude towards complementary and alternative medicine-A survey in Ghana. *J Tradit Complement Med*. 2016;6(3):230-6.
  36. Chez RA, Jonas WB, Crawford C. A survey of medical students' opinions about complementary and alternative medicine. *Am J Obstet Gynecol*. 2001;185(3):754-7.
  37. Yeo AS, Yeo JC, Yeo C, Lee CH, Lim LF, Lee TL. Perceptions of complementary and alternative medicine amongst medical students in Singapore-a survey. *Acupunct Med*. 2005;23(1):19-26.
  38. Templeman K, Robinson A, McKenna L. Student identification of the need for complementary medicine education in Australian medical curricula: A constructivist grounded theory approach. *Complement Ther Med*. 2015;23(2):257-64.
  39. Tan M, Uzun O, Akcay F. Trends in complementary and alternative medicine in Eastern Turkey. *JACM*. 2004;10(5):861-5.
  40. TR Ministry of Health TPaMDA. NO: 46085174, 2016. Available at: <https://www.titck.gov.tr/mevzuat/2539>. Accessed 06 February 2019.

**Cite this article as:** Guven H, Kalkan S, Hocaoglu N, Yildiztepe E, Gokalp G. Evaluation of the knowledge level and usage attitudes of the medical students on the medicinal herbs and herbal products: a project of special study module in the first three years of the school of medicine. *Int J Basic Clin Pharmacol* 2019;8:394-401.