

## Original Research Article

### ATTITUDES, KNOWLEDGE AND PRACTICE OF HERBAL REMEDY USE AMONG THE POPULATION VISITING PHARMACIES AND HEALTH CARE PROVIDERS IN ALEXANDRIA, EGYPT: A CROSS-SECTIONAL STUDY

Hoda Fathy,<sup>1\*</sup> Raghda El-Hawy<sup>2</sup> and Raghda Hassan<sup>2</sup>

<sup>1</sup>Department of Pharmacognosy, Faculty of Pharmacy, Alexandria University,  
Egypt.

<sup>2</sup>Community pharmacies, Alexandria, Egypt.

---

#### ABSTRACT

**Aims:** To show the levels of awareness, attitude, practices and socioeconomic factors related to consuming herbal products among Alexandrian citizen visiting pharmacies. The findings of this study are meant also to show the practices and beliefs of healthcare providers regarding using herbal remedies in treatment, including advising patients, reporting adverse effects and possessing knowledge about specific herb-drug interactions.

**Study design:** people visiting pharmacies as well as pharmacists in their pharmacies and physicians in their clinics were invited to complete a questionnaire about their knowledge and personal experience in the consumption of herbal remedy. Anonymity was guaranteed. Questionnaire consists of three parts: demographic data, personal experience and a part concerning health care providers.

**Place and Duration of Study:** Study area is the city of Alexandria, Egypt from the 1<sup>st</sup> July through September 2018.

**Methodology:** This is a descriptive cross-sectional study that used a self-administered, questionnaire from 213 participants (153+ 60 health care providers HCPs).

**Results:** Almost half the respondents preferred to be treated with herbs because they believed that herbs are safe. But they are not the proper choice to cure chronic diseases. Only 25% of herb users recorded suffering from side effects. The most common source of information about herbs was via internet, followed by family and friends, television and other types of media. Herbal remedies were purchased mainly from outlets other than pharmacies. The willingness to buy such products was not affected by participants' education level or their monthly income. The public didn't feel it's important to mention any herbal remedy they consume to their physician; similarly HCPs did not ask them. Generally, it was shown that HCPs have inadequate knowledge about herbs.

**Conclusion:** The prevalence of herb usage is moderate among the Alexandrian population. And it is imperative to educate HCPs about the benefits, risks and interactions of herbal supplements.

17 Keywords: *Alexandria, Herbal Medicines, Herb-drug Interactions, Questionnaire*

## 18 **1. INTRODUCTION**

19

20 During the last few decades, the phenomenon “back to nature” is spreading globally, along  
21 with a growing market demand for herbal remedies [1]. Even in industrialized regions such  
22 as Europe and North America, more than 50% of the population has used complementary or  
23 alternative medicine at least once [2]. According to the World Health Organization (WHO),  
24 about 80% of the population in most developing countries, especially in Africa, mainly  
25 depends on plant-based traditional medicines since they are often the only accessible and  
26 affordable treatment available for primary health care [3]. WHO also stated that health goals  
27 can't be achieved without the incorporation of herbal medicines [4].

28 Using herbs is common in the Arab world. Egypt has great plant biodiversity, which has  
29 provided a foundation for the use of traditional herbal medicine throughout the decades [4]. It  
30 is also important to note that medicinal herbs are not classified as drugs by the United State  
31 Food and Drug Administration (FDA) [5].

32 Until 2015, The Egyptian Guidelines for Registration of Herbal Medicines allowed for the free  
33 use of indigenous herbal remedies by the local community or in the local region, even if  
34 there was a lack of detailed information on these remedies. They had to meet the  
35 requirements of safety and efficacy, as specified in the Egyptian regulations for herbal  
36 medicines, only if they entered the market [6]. However, this changed in 2016, when  
37 traditional herbal medicines were defined as medicinal herbs used inside Egypt for a period  
38 of not less than fifteen years and that they should be supported by references for safety and  
39 efficacy [7]. However, these regulations applied only to pharmacies, which are the only outlet  
40 under control of the Ministry of Health. In herb stores, herbal medicines are widely and freely  
41 available to Egyptian citizens, with no regulatory control [8].

42 Population in Egypt are accustomed to regularly consult pharmacist about minor as well as  
43 major health problems, they usually seek the pharmacy to buy their cosmetics “shampoo,  
44 diapers, creams and perfumes” the thing that made it easy to distribute the questionnaire in  
45 the pharmacy.

46 Health care providers have a professional responsibility to advise patients about potentially  
47 harmful aspects of herbal remedies, including contraindications or interactions with synthetic  
48 medications [9]. Previous studies from Nigeria, Kuwait, the United Arab Emirates and  
49 Australia have shown that most community pharmacists do not possess enough knowledge  
50 about the potential interactions and side effects of herbal medicines that they supply [10-12].

51 Thus, this study is designed to determine the awareness, patterns of use, attitude and  
52 socioeconomic factors among the general public visiting pharmacies and HCPs in  
53 Alexandria city, Egypt.

54

## 55 **2. METHODOLOGY**

56

### 57 **2.1 General procedures:**

#### 58 **2.1.1. Study area**

59 Study area is the city of Alexandria, the second-largest city in Egypt situated on the northern  
60 coast on the Mediterranean Sea, 2.6 Km<sup>2</sup>, it has a large harbor and its population is more  
61 than four and half million (4,799,740 in March 2015) divided into 6 directorate .

62 **2.1.2.Study design and setting**

63 The study is based on a cross-sectional survey that used a self-administrated questionnaire  
64 designed to obtain information about the behavior regarding, knowledge of and use of  
65 medicinal herbs among Alexandrian society in different areas, with varied social and cultural  
66 levels.

67 We started with a pilot study on twenty Alexandrian citizens; not included in the study; to  
68 help determine the most suitable design and length of the questionnaire. Minor language  
69 adjustments were made.

70 **2.1.3.Participants**

71 Questionnaires were distributed and collected by the authors. Clients; eighteen years of age  
72 and above; who entered community pharmacies during the study period were enrolled in the  
73 study by way of a random sampling process—they were free to refuse participation in the  
74 survey. Data were collected anonymously via a self-administered questionnaire. Those who  
75 agreed to take part in the study were given the questionnaires, which were completed  
76 anonymously and collected after completion. They were assured of confidentiality, and they  
77 gave verbal consent to participate in the study.

78 **2.1.3.1.inclusion criteria:**

79 Clients; eighteen years of age and above; residents in Alexandria and are willing to  
80 participate in the questionnaire

81 **2.1.3.2. exclusion criteria:**

82 Non-Alexandrian clients.

83 Since it is self-administered questionnaire, Illiterate clients were not enrolled in the study.

84 Clients under 18 years old

85

86 **2.1.4.Health care providers' participants**

87 The questionnaire was handed to pharmacist in their pharmacies and to physicians in their  
88 clinics. Both were free to refuse participation, and data collection was completed as above.

89 **2.1.5.Questionnaire**

90 The content of the questionnaire was generated by reviewing the literature [10, 13–18]. No  
91 guidance or assistance was provided to participants as they completed the questionnaire  
92 during their visit to the pharmacy.

93 The questionnaire was in Arabic, and it comprised three sections. (the first two sections  
94 designed to be filled by both public respondents and HCP's and the third section directed  
95 only for HCP's) .The first section included questions related to sociodemographic and  
96 education characteristics, including age, gender, marital status, occupation, health insurance  
97 and monthly income. The second section addressed people's beliefs and behaviors related  
98 to herbal remedies. Respondents were asked to answer a series of questions concerning

99 herbal remedy purchases and uses in the twelve months prior to the study, including the  
 100 type of herbs being used, their main source ,their price, the reasons behind their use, and to  
 101 report any adverse events they suffered. Participants were asked to provide only one answer  
 102 for each question except for two questions; the first one regarding the herb source and the  
 103 second whether they suffer from chronic disease. The third section had to do with HCPs'  
 104 knowledge and how they advise their patients about the safe use of herbal products, how  
 105 they report adverse effects, and how they check for an herb's interaction with conventional  
 106 drugs that they dispense or prescribe.

107 The study was conducted from the 1st July through September 2018. An English translation  
 108 of the questionnaire is available from the authors.

## 109 2.2.Statistical analyses

110 The data were analyzed using the Statistical Package for the Social Sciences (SPSS)  
 111 software program version 17.0 (SPSS Inc., Chicago, IL, USA).  
 112

## 113 3. RESULTS AND DISCUSSION

### 114 3.1.Demographic and socioeconomic data of the study population

116 In all, 153 participants, all residents of Alexandria, out of 200 distributed questionnaires in 6  
 117 different pharmacies each in one of the six directorate of Alexandria, responded and  
 118 completed the questionnaires appropriately for inclusion into the study. This was a response  
 119 rate 76.5%.

120 In addition to a total of 60 out of 100 distributed questionnaires to HCPs (pharmacists and  
 121 physicians) responded (60% response rate). The demographic and economic characteristics  
 122 of the participants are listed in Table 1.

123 **Table 1. Demographic and socioeconomic data of study population**

|                               | Frequency of citizens<br>(153) | Frequency of HCP's<br>(60) | total |
|-------------------------------|--------------------------------|----------------------------|-------|
| <b><u>Sex:</u></b>            |                                |                            |       |
| Male                          | 57                             | 8                          | 65    |
| Female                        | 95                             | 52                         | 147   |
| missing                       | 1                              | -                          | 1     |
| <b><u>Age:</u></b>            |                                |                            |       |
| 18-24                         | 42                             | 13                         | 55    |
| 25-39                         | 46                             | 40                         | 86    |
| 40-60                         | 56                             | 6                          | 62    |
| Above 60                      | 8                              |                            | 8     |
| missing                       | 1                              | 1                          | 2     |
| <b><u>Marital status:</u></b> |                                |                            |       |
| Single                        | 56                             | 32                         | 88    |
| Married                       | 52                             | 16                         | 68    |
| Married with children         | 38                             | 9                          | 47    |
| Divorced or widow             | 8                              | 3                          | 11    |
| <b><u>Working status:</u></b> |                                |                            |       |
| None                          | 8                              |                            |       |
| Government employee           | 88                             |                            |       |
| Worker                        | 2                              |                            |       |

|                                     |     |                  |     |
|-------------------------------------|-----|------------------|-----|
| housewife                           | 15  |                  |     |
| student                             | 35  | 7 (postgraduate) |     |
| other                               | 5   | 53               |     |
| <b><u>Educational level:</u></b>    |     |                  |     |
| Non educated                        | 1   |                  | 1   |
| Primary                             | 4   |                  | 4   |
| Middle school                       | 30  |                  | 30  |
| High school                         | 16  |                  | 16  |
| University                          | 95  | 41               | 136 |
| Postgraduate                        | 7   | 13               | 20  |
| <b><u>Monthly income 'L.E.:</u></b> |     |                  |     |
| none                                | 42  |                  | 42  |
| 500-1000 (30-60 'USD)               | 19  | 1                | 20  |
| 1000-3000 (60-180 USD)              | 40  | 31               | 71  |
| Above 3000 (above 180 USD)          | 26  | 4                | 31  |
| Prefer not to answer                | 26  | 24               | 51  |
| <b><u>Chronic diseases*:</u></b>    |     |                  |     |
| None                                | -   | 48               |     |
| Hepatic diseases                    | -   | -                |     |
| Renal diseases                      | 107 |                  | 115 |
| Diabetic                            | 2   |                  | 2   |
| Cardiac diseases and hypertension   | 10  |                  | 10  |
|                                     | 10  |                  | 10  |
| Bronchial asthma                    | 24  | 1                | 24  |
| Others                              | 3   | 2                | 3   |
| missing                             |     | 9                |     |
| <b><u>Health insurance:</u></b>     |     |                  |     |
| Yes                                 | 100 | 39               | 139 |
| No                                  | 52  | 13               | 65  |
| missing                             | 1   | 7                | 8   |

124 \*participants were allowed to choose more than one disease

125 'LE is the acronym of Egyptian pound, USD united state dollars

126 The majority of the healthcare respondents (66.3%) were between 25–39 years old, while  
 127 36.6% of the public respondents were between 40–60 years old .A total of 51 people  
 128 reported having chronic disease.

129 The majority of total respondents (citizens and HCP's) were female (147, 69%). About two-  
 130 thirds (63.8%) of the respondents had attended university. Reported monthly income varied,  
 131 with 34.6% earning between 1,000–3,000 Egyptian pounds (LE), 15.1% earning more than  
 132 3000 LE, 9.7% earning between 500–1,000 LE, 20.5% with no income (housewives and  
 133 students), and 14.1% preferring not to answer this question.

134 Most of the respondents were married (115 participants, 56%), and 65.2% (139 participants)  
 135 had health insurance. 63.7% of citizens participants were government employees

### 136 3.2.The use of Herbal remedies

137 A total of 109 (93 + 16 HCPs) preferred to use herbs in general for treatment. But only 98  
 138 (76 + 22 HCP's) of them admitted to prior treatment with herbs—35 were males, and 63  
 139 were females-.

140 **3.3.The reason behind choosing to be treated with herbal remedies**

141 Overall, 89 (77 + 12) HPCs, from the 109 herb users, believed that herbs are safe. The  
 142 details of the remaining reasons are summarized in table 2.

143 **Table 2. Frequency of herb users and non users and reason behind their opinion**

| reason  | Herb users |       | reason   | Herb non users |       |
|---|------------|-------|--|----------------|-------|
|   | frequency  |       |  | frequency      |       |
|   |            | HCP's |  |                | HCP's |
| Herbs are safe                                    | 77         | 12    | I didn't get the expected results                        | 14             | 14    |
| They have rapid onset of action                   | 4          | 1     | I don't have a trusted source of information about herbs | 34             | 23    |
| Their reasonable price                            | 5          | 2     | Herbs might have dangerous side effects                  | 5              | 4     |
| Herbs are more effective than regular medications | 7          | -     | Their price is not reasonable                            | 1              | -     |
| missing   | -          | -     |  | 3              | 2     |
| total   | 93         | 16    |  | 60             | 44    |

144 **3.4.Source of herbs**

145 The 98 that were previously treated with herbs admitted that the most common source for  
 146 buying herbs was at herb stores (60 [50 +10 HCPs]), followed by 24 (17 + 7 HCPs) from  
 147 pharmacies, 6 from supermarkets, 6 from family or friends and 2 from TV commercials.  
 148 Strikingly, when linking the educational levels of herb users to the source of buying herbs, 33  
 149 of the university graduates bought the herb from herb stores, versus only 6 buying from the  
 150 pharmacy. The monthly income did not affect the source of buying the herbs.

151 **3.5.Side effects reported**

152 Few (26%) herb users indicate that they have experienced certain associated side effects.  
 153 Six participants suffered from nausea, two from vomiting, seven from diarrhea, four from  
 154 constipation, one from irritability, one from skin rash and four didn't specify which side  
 155 effects. It is worth mentioning that 15 out of 21 stated that they obtain their information about  
 156 herbs from the internet, and eight said that they get their information from family and friends.  
 157 Unfortunately, no one mentioned if they reported these side effects to a physician. In  
 158 addition, no one specified the name of the herb(s) that caused these side effects.

159 **3.6.The reasons that encourage them to buy a herb**

160 These are summarized in table 3.

161 **Table 3. The frequency of the reasons that encourage them to buy a herb**

| Reason*                                      | frequency | Frequency of HCPs |
|--|-----------|-------------------|
| Price  | 50        | 9                 |
| As a nice drink                              | 72        | 27                |
| According to speed of onset of action        | 19        | 8                 |
| Package                                      | 2         | 1                 |
| I trust the store                            | 16        | 8                 |
| Whether there is any associated side effects | 15        | 12                |
| Media  | 30        | 12                |

|             |    |    |
|-------------|----|----|
| Known brand | 27 | 14 |
| Good offer  | 3  | -  |

162 \*participants were allowed to choose more than one reason

### 163 3.7.The maximum price they are willing to pay for a herb

164 The study showed that the maximum limit that participants will pay to purchase herbal  
 165 products ranges between 1–10 LE equivalent to 0.06-0.6 USD (29.5% [53 + 10 HCPs]) and  
 166 11–50 LE equivalent to 0.68- 3.1 USD (35.6% [54 + 25 HCPs]). A total of 28 participants  
 167 were willing to pay between 51–100 LE equivalent to 3.18-6.2 USD, and the remaining 10  
 168 chose to spend between 100–300 LE equivalent to 6.2-18.7 USD. It is worth mentioning that  
 169 14 of those 28 stated that their monthly income is above 3,000 LE (187 USD)

### 170 3.8.Effect of monthly income on using herbs

171 Monthly income did not affect the decision on whether to use herbs, as the ratio between  
 172 herb users and non-users was almost the same among all categories.

### 173 3.9.Source of information about the herbs

174 The most common sources for recommending and providing information regarding the use  
 175 of herbs was the internet followed by family and friends, table 4.

176 **Table 4. Participants' opinions regarding the current available source of information**  
 177 **on herbs**

| Source               | frequency |
|----------------------|-----------|
| Television and media | 47        |
| Internet             | 89        |
| Family and friends   | 55        |
| Herb stores          | 25        |
| Pharmacist           | 33        |
| Physician            | 12        |
| others               | 5         |

178

### 179 3.10.Whether herb can treat chronic diseases

180 A total of 75 (62 + 13 HCPs) believed that they can, while 134 (90 + 44 HCPs) believed that  
 181 they cannot. An education level up to university graduates and postgraduates (almost 60  
 182 [70%]) were more likely to believe that they cannot.

### 183 3.11.Health care providers' responses

184 The following is the summary of their answers on the first and second sections:

185 The demographic and economic characteristics of the participants are listed in Table 1.The  
 186 majority of the healthcare respondents (66.3%) were between 25–39 years old, most of them  
 187 were females (52, 86.7%) and single (32 participants, 53.3%). with only 3 reported having  
 188 chronic disease. Their monthly income varied, with 31 earning between 1,000–3,000  
 189 Egyptian pounds (LE), 4 earning more than 3000 LE, 1 earning between 500–1,000 LE, ,  
 190 and 24 preferring not to answer this question.

191 16 preferred to use herbs in general for treatment. But 24 admitted to prior treatment with  
192 herbs. The most common source for obtaining herbs was at herb stores 10, followed by 6  
193 from pharmacies, 4 from a physician, and 6 from supermarkets. Six herb users suffered from  
194 nausea, two from vomiting, seven from diarrhea, four from constipation, one from irritability,  
195 one from skin rash and four from unspecified side effects.

196 Among the non users, 23 were concerned about the source of the herbs, 8 were afraid they  
197 might suffer from dangerous side effects, 14 stated that they did not see any results when  
198 using herbs, and the remaining were worried about herb prices.

### 199 **3.12.The third sector of the questionnaire**

200 This sector was designed to target the health care providers; pharmacists and physicians; to  
201 measure the extent of their behavior and knowledge relating to the study topic.

#### 202 **3.12.1.Attitude towards herbal remedy**

203 The first question was “Before prescribing a medication, do you ask the patients if they are  
204 taking medicinal herbs?” The answers differed between “I occasionally ask them” (23  
205 [43.4%]), “No, I do not ask them” (23 [43.4%]) and “I often ask them” (7 [13.2%]).

#### 206 **3.12.2.Dispensing/prescribing herbal remedies**

207 A total of 71% did not prefer to dispense/prescribe herbs for treatment, and 78% did not  
208 believe that herbs can treat chronic diseases. The reasons behind their refusal to use herbs  
209 included not getting the required results (26%) or concerns about the herb source (38.5%).

210 The third question, “Do you advise your patients to consume herbs as a medication?” was  
211 crucial to figure out HCPs’ behavior regarding the dispensing of medicinal herbs. The  
212 participants answered evenly between “yes” (50%) and “no” (50%).

#### 213 **3.12.3.Source of information about herbs**

214 Almost 30% chose the most commonly trusted sources to provide information, including “by  
215 Google search” (28%), “searching in books” (30%), and asking academic colleagues or a  
216 pharmacist (18%). The worrisome percentages were, 12% get their information from family  
217 and friends, 6 % get their information from herb stores, and a small percent do not bother to  
218 ask (6%).

#### 219 **3.12.4.General knowledge about herb-drug interactions**

220 At the end of the questionnaire, we added three questions that may give us a general  
221 perspective about medical participants’ knowledge of medicinal herbs. The first question  
222 was: “What is the herbal product that interacts with hypolipidemic drugs such as  
223 Atorvastatin”. They were offered three choices; garlic, ginkgo and hibiscus. The correct  
224 answer was “garlic,” which has a powerful synergistic effect with hypolipidemic drugs [18]. A  
225 total of 57.7% of respondents answered this question correctly, and 11 participants didn’t  
226 respond to the question

227 The second question was about the herb that may cause abortion or premature labour to  
228 pregnant women. They had three answers to choose from fenugreek, parsley or anise and  
229 the correct answers were “fenugreek” or “parsley”—potent uterine stimulants [19, 20]. The



230 percentage of those who answered correctly was 59.6%. Five chose not to answer, and  
231 three chose “anise”.

232 The third and final question was about the herb-drug interaction between the evening  
233 primrose herb with anticoagulants, blood pressure medications and non steroidal anti-  
234 inflammatory drugs [21]. A total of 25% answered correctly, with eight participants didn't  
235 answer.

236

#### 237 **4. CONCLUSION**

238

239 Most of the studies conducted in the United States and Europe were interested in  
240 complementary medicine in general, a term that encompasses many forms of treatment,  
241 such as acupuncture and spiritual healing. Only few of the studies were focused purely on  
242 the use of herbal remedies. Rates of use were low, ranging between 10–20%, whereas in  
243 the United Arab Emirates, the percentage of herbal remedy users was higher (60%),  
244 compared to 43% in this study. This was partly expected, due to the different cultures of the  
245 Arab world and Western countries [22]. Herb users believed that herbs are safe, which  
246 agrees with worldwide popular belief [14].

247 Meanwhile, the need for accurate, up-to-date information on the prevalence and socio-  
248 cultural and personal factors (knowledge, beliefs and attitudes) that underlie an individual's  
249 decision to use herbal remedies is of national importance.

250 Study evidence shows that many herbal remedies are mainly purchased from outlets other  
251 than pharmacies, where herbal remedies are sold freely, without regulation of the Ministry of  
252 Health [21]. Herbal stores in Egypt are usually run by unqualified personnel, who transmit  
253 the information from generation to generation. Herbs are vulnerable to being contaminated,  
254 misidentified or adulterated.

255 Most of the information about herbs is taken from television and the internet due to the  
256 increased online availability of information about herbal remedies [22]. Both the public and  
257 their HCPs do not give/ask information about any herbal remedy they use when prescribing  
258 or during consuming conventional drugs. Nondisclosure of herbal remedy use may cause  
259 individual to be at risk of undue harm. This may be justified by Fear of negative response  
260 from doctors. In addition to doctor's communication skills and providing enough time for the  
261 patient [23]. A study conducted in USA showed another perspective which is; most of the  
262 physicians were not comfortable in counseling their patients about CAM treatments [24].

263 Although natural health products are routinely available without prescription, that does not  
264 mean they are completely safe for all individuals. Many of the participants (99, 46.5%)  
265 admitted consuming common herbs daily, as soothing drinks, without knowing that these are  
266 actually herbal drugs and without knowledge of possible serious drug interactions [25].

267 Few (26%) herb users indicate that they have experienced certain associated side effects,  
268 which is higher than the number reported in North America [17]. Monthly income did not  
269 affect the decision on whether to use herbs, as the ratio between herb users and non-users  
270 was almost the same among all categories.

271 Social influencing factors, such as friends or family members, have been reported in other  
272 studies and are consistent with the results of the factor analysis of this questionnaire [26].

273 The findings related to the influence of sex on herbal remedy use were found to be slightly  
274 higher percentage of women compared to men in agreement with the previous study [26,  
275 27]. The reasons for consuming herbs ranged from safety, perceived efficacy and ease of  
276 access—this agrees with previous studies [26]. In addition, the study showed a deficit in  
277 information among HCPs regarding herb-drug interactions. Knowledge deficiencies found in  
278 this study were also reported by many studies in the Arab region, including Saudi Arabia,  
279 Jordan, Oman, Kuwait, Qatar and Lebanon, as well as in the United States [26, 28, and 29].  
280 A possible reason for HCP's missing answers is because participants were hesitant to  
281 answer them, as they did not know the correct answers [28-30].

282 There is a need of proper education about herbal products among pharmacists, especially  
283 community pharmacists, who are expected to provide correct information about their proper  
284 use, adverse effects and interactions [29-30].

## 285 **5. POTENTIAL LIMITATIONS TO THIS STUDY**

286 These include the small number of responders; the majority of whom were females may be  
287 because women are more open and receptive to a health concern and tend to share  
288 problems [23, 27]. Future studies should focus on testing a larger sample, of equal males  
289 and females percentages in order to avoid gender bias. The self-administered questionnaire  
290 also has limitations, as the data collection relied on self-reported answers, which could be  
291 subject to errors because of memory recall or social-desirability bias.

292

## 293 **COMPETING INTERESTS**

294

295 Authors have declared that no competing interests exist.

296

297

## 298 **CONSENT (WHERE EVER APPLICABLE)**

299

300 All authors declare that 'verbal informed consent was obtained from the participants.

301

## 302 **ETHICAL APPROVAL (WHERE EVER APPLICABLE)**

303

304 The survey was approved by the ethical committee in the faculty of Pharmacy, Alexandria  
305 University, Egypt and was given the number (EC18/1) confirms either that this study is not  
306 against the public interest, or that the release of information is allowed by legislation.

307

## 308 **REFERENCES**

309

310 1. Ekor M. The growing use of herbal medicines: issues relating to adverse reactions  
311 and challenges in monitoring safety. *Front Pharmacol.* 2014; 4:177;  
312 doi:10.3389/fphar.2013.00177.

313 2. Al-Kindi RM, Al-Mushrafi M, Al-Rabaani M, Al-Zakwani I. Complementary and  
314 Alternative Medicine Use among Adults with Diabetes in Muscat Region, Oman.  
315 *Sultan Qaboos Univ Med J.* 2011;11(1):62–68; doi.org/10.15344/2456-  
316 8171/2016/106

317 3. WHO traditional medicine strategy 2014- 2023 via:

318 [https://www.who.int/medicines/publications/traditional/trm\\_strategy14\\_23/en/](https://www.who.int/medicines/publications/traditional/trm_strategy14_23/en/)

- 319 4. Mostafa N, Singab A . Prospective of Herbal Medicine in Egypt. *Med Chem (Los Angeles)* 2018; 8: 116-117; doi: 10.4172/2161-0444.1000502  
320
- 321 5. Dietary supplement Health and Education Act 1994, Public Law 103-417,103rd  
322 congress page. Food and Drug Administration Website. Available at  
323 <http://www.fda.gov/opacom/laws/dshea.html>. [access date 05.03.2019]
- 324 6. The Egyptian Guidelines for Registration of Herbal Medicines 2015  
325 [http://www.eda.mohip.gov.eg/images/News/F\\_53.pdf](http://www.eda.mohip.gov.eg/images/News/F_53.pdf). [access date 05.06.2019]
- 326 7. The Egyptian Guidelines for Registration of Herbal Medicines 2016  
327 [http://www.eda.mohip.gov.eg/images/News/F\\_67.pdf](http://www.eda.mohip.gov.eg/images/News/F_67.pdf). [access date 05.06.2019].
- 328 8. Pharmaceutical country profile.
- 329  
330 [https://www.who.int/medicines/areas/coordination/Egypt\\_PSCPNarrativeQuestionnaire\\_27112011.pdf](https://www.who.int/medicines/areas/coordination/Egypt_PSCPNarrativeQuestionnaire_27112011.pdf) . [access date 29.05.2019]  
331
- 332 9. Farrell J, Ries N, Boon H. Pharmacists and Natural Health Products: A systematic  
333 analysis of professional responsibilities in Canada. *Pharm Pract (Granada)*.  
334 2008;6(1):33–42. doi: 10.4321/s1886-36552008000100006
- 335 10. Oshikoya K, Oreagba I, Ogunleye OO, Oluwa R, Senbanjo I, Olayemi S. Herbal  
336 medicines supplied by community pharmacies in Lagos, Nigeria: pharmacists'  
337 knowledge. *Pharm Pract (Granada)*. 2013;11(4):219–227; doi: 10.4321/s1886-  
338 36552013000400007
- 339 11. Hutchinson S, Mitchell K, Hansford D, Stewart D. Community pharmacists' views  
340 and experiences of counter-prescribing in pregnancy. *Int J Pharm Pract*. 2001;9:15–  
341 21; doi.org/10.1111/j.2042-7174.2001.tb01024.x
- 342 12. Chang ZG, Kennedy DT, Holdford DA, Small RE. Pharmacists' knowledge and  
343 attitudes toward herbal medicine. *Ann Pharmacother*. 2000;34:710–715;  
344 doi:10.1345/aph.19263
- 345 13. Sekhria K., Bhanwrab S., Nandhaa R. Herbal products: a survey of students'  
346 perception and knowledge about their medicinal use. *Int J Basic Clin Pharmacol*  
347 2013;2:71-6; doi: 10.5455/2319-2003.ijbcp20130114
- 348 14. Griffin B., Citkovitz C. Survey: Preferences and Limitations of Herbal Medicine Use  
349 Among Patients at a Community Acupuncture Clinic. *Acupunct Med* 2017; 29 (1);  
350 doi.org/10.1089/acu.2016.1204
- 351 15. Ameade E., Amalba A., Helegbe G. Mohamed B. Herbal medicine: a survey on the  
352 knowledge and attitude of medical students in Tamale, Ghana model. *PJMMPR* 2015;  
353 3 (1) 1-8; doi: 10.1016/j.jtcme.2015.03.004
- 354 16. Fahmy SA, Abdu S, Abuelkhair M. Pharmacists' attitude, perceptions and  
355 knowledge towards the use of herbal products in Abu Dhabi, United Arab Emirates.  
356 *Pharm Pract (Granada)* 2010; Apr-Jun;8(2):109-115; doi: 10.4321/S1886-  
357 36552010000200005

- 358 17. Awad A. and Al-Shaye D. Public awareness, patterns of use and attitudes toward  
359 natural health products in Kuwait: a cross-sectional survey. *BMC Complem Altern M*  
360 2014; 14:105; doi: 10.1186/1472-6882-14-105
- 361 18. Reddy GD, Reddy AG, Rao GS, Kumar MV. Pharmacokinetics interaction of Garlic  
362 and atorvastatin in dyslipidemic rats. *Indian j. Pharmacol.* 2012; 44 (2), 246-252;  
363 doi:10.4103/0253-7613.93860
- 364 19. Sim T, Sheriff J, Hattingh L., Tee L.: The use of herbal medicines during  
365 breastfeeding: a population-based survey in Western Australia. *BMC Complem*  
366 *Altern* 2013; 13:317; doi.org/10.1186/1472-6882-13-317
- 367 20. Shinde P, Patil P. and Bairagi V. Herbs in pregnancy and lactation: a review  
368 appraisal. *IJPSR*, 2012; Vol. 3(9): 3001-3006. doi.org/10.13040/IJPSR.0975-8232.
- 369 21. WebMd.www.content.health.msn.com/content/drugs/2/4046.Accessed March 10,  
370 2019.
- 371 22. AlBraik A., Rutter M., Brown D. A cross-sectional survey of herbal remedy taking by  
372 United Arab Emirate (UAE) citizens in Abu Dhabi. *Pharmacoepidemiol drug saf*,  
373 2008; jul 17 (7): 725-32; doi: 10.1002/pds.1591
- 374 23. Kelak JA, Cheah WL, Safii R. Patient's Decision to Disclose the Use of Traditional  
375 and Complementary Medicine to Medical Doctor: A Descriptive Phenomenology  
376 Study. *Evid Based Complement Alternat Med.* 2018:4735234;  
377 doi.org/10.1155/2018/4735234
- 378 24. Wahner-Roedler DL, Vincent A, Elkin PL, Loehrer LL, Cha SS, Bauer BA.  
379 Physicians' attitudes toward complementary and alternative medicine and their  
380 knowledge of specific therapies: a survey at an academic medical center. *Evid*  
381 *Based Complement Alternat Med.* 2006;3(4):495–501; 10.1093/ecam/nel036.
- 382 25. Sharma V, Holmes JH, Sarkar IN. Identifying Complementary and Alternative  
383 Medicine Usage Information from Internet Resources. A Systematic Review.  
384 *Methods Inf Med.* 2016;55(4):322–332; doi:10.3414/ME15-01-0154
- 385 26. Patterson C, Arthur H. A complementary alternative medicine questionnaire for  
386 young adults. *Integr Med Insights.* 2009;4:1–11. doi.org/10.4137/IMI.S2281.
- 387 27. Alwhaibi M, Sambamoorthi U. Sex Differences in the Use of Complementary and  
388 Alternative Medicine among Adults with Multiple Chronic Conditions. *Evid Based*  
389 *Complement Alternat Med.*2016:2067095. doi:10.1155/2016/2067095.
- 390 28. Hijazi MA, Shatila H, El-Lakany A, et al. Beliefs, Practices and knowledge of  
391 community pharmacists regarding complementary and alternative medicine: national  
392 cross-sectional study in Lebanon. *BMJ Open* 2019; 9:e025074; doi:10.1136/  
393 *bmjopen-2018-025074.*
- 394 29. Hilal M, Hilal S. Knowledge, attitude and utilization of herbal medicines by  
395 physicians in the Kingdom of Bahrain: A cross-sectional study. *J Assoc Arab Univ*  
396 *basic app sci*, 2017; 24, 325-333; doi.org/10.1016/j.jaubas.2016.11.001.

397  
398  
399  
400  
401  
402

30. Harris IM, Kingston RL, Rodriguez R, et al. Attitudes towards complementary and alternative medicine among pharmacy faculty and students. *Am J Pharm Educ* 2006; 70:129; doi:10.5688/aj7006129.

UNDER PEER REVIEW