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Herbal medicine use in the Jordanian population: A nationally representative cross-sectional survey

[Uso de medicina herbal en la población jordana: Una encuesta transversal representativa a nivel nacional]

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Abstract

Context: Despite of potential adverse effects, the use of herbal medicines has grown globally without proper regulatory measures. There is a scarcity of data on the pattern of use and general awareness towards herbal products among the Jordanians.

Aims: To assess the prevalence, utilization, and attitude toward herbal medicines among the Jordanian public.

Methods: A national cross-sectional self-reported survey on a random sample of adult population aged ≥ 18 years was conducted over two months to include 1820 adults in Jordan. A representative sample was collected using a proportionate random sampling technique, which enabled us to categorize the study population geographically. SPSS V26 was used for data analysis.

Results: The prevalence of herbal medicine use was 53.3% (971/1820), and respondents who aged >29 years were more likely to use herbal products. Predictors for using herbal products were: females (OR 4.23; 95%CI 1.97-9.55; p=0.0004), fair health status (OR 7.19; 95%CI 5.49-13.85; p=0.0001), and participants without chronic diseases were significantly less likely to use herbal medicines (OR 0.21; 95%CI 0.11-0.61; p=0.0007). The majority of respondents (86.5%, 1574/1820) thought herbal products were safe because they were made from natural ingredients. The most common reasons for using herbal products were chronic disease treatments (41.9%, 407/971), weight reduction (23.6%, 229/971), and to less extent improving the well-being (16.2%, 157/971).

Conclusions: More than half of the targeted population used herbal medicines, a quarter of whom experienced adverse effects. The findings of this study have major community health implications for Jordan.

Keywords: herbal medicine; Jordan; pharmacognosy; public health.

Resumen

Contexto: A pesar de los posibles efectos adversos, el uso de medicamentos a base de hierbas ha crecido a nivel mundial sin las medidas reglamentarias adecuadas. Hay escasez de datos sobre el patrón de uso y la conciencia general sobre los productos a base de hierbas entre los jordanos.

Objetivos: Evaluar la prevalencia, la utilización y la actitud hacia las medicinas a base de hierbas entre el público jordano.

Métodos: Se llevó a cabo una encuesta nacional transversal autonotificada sobre una muestra aleatoria de población adulta de ≥18 años durante dos meses para incluir a 1820 adultos en Jordania. Se recolectó una muestra representativa mediante una técnica de muestreo aleatorio proporcional, que nos permitió categorizar geográficamente la población de estudio. Se utilizó SPSS V26 para el análisis de datos.

Resultados: La prevalencia del uso de medicamentos a base de hierbas fue del 53,3% (971/1820), y los encuestados con >29 años tenían más probabilidades de usar productos a base de hierbas. Los predictores para el uso de productos a base de hierbas fueron: mujeres (OR 4,23; IC del 95%: 1,97-9,55; p=0,0004), estado de salud aceptable (OR 7,19; IC del 95%: 5,49-13,85; p=0,0001) y los participantes sin enfermedades crónicas usaron menos medicamentos a base de hierbas (OR 0,21; IC del 95%: 0,11-0,61; p=0,0007). La mayoría de los encuestados (86,5%, 1574/1820) pensaba que los productos a base de hierbas eran seguros porque estaban hechos con ingredientes naturales. Las razones más comunes para usar productos a base de hierbas fueron los tratamientos de enfermedades crónicas (41,9%, 407/971), la reducción de peso (23,6%, 229/971) y, en menor medida, la mejora del bienestar (16,2%, 157/971).

Conclusiones: Más de la mitad de la población destinataria utilizaba medicamentos a base de hierbas, una cuarta parte de los cuales experimentó efectos adversos. Los hallazgos de este estudio tienen importantes implicaciones para la salud comunitaria de Jordania.

Palabras Clave: farmacognosia; Jordania; medicina herbal; salud pública.

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INTRODUCTION

Herbal medicines (HMs) are among biologically based approaches within a general assortment of treatments referred to as complementary and alternative medicine (CAM) (Barnes, 2003; Ernst, 2010). HMs include crude or processed herbs, herbal materials, herbal preparations or finished herbal products in a form suitable for administration to patients (Gupta, 2015). Although the safety of HMs has not been addressed significantly (World Health Organization, 2002), the use of these products is increasing globally and till 2017, the global market of these products was estimated to be more than USD105 billion (Raynor et al., 2011).

The recent changes in the public lifestyle have proliferated the growth of chronic diseases (Khdour et al., 2013), and thus expanded the use of herbal medicines and natural products in general (Jamshidi-Kia et al., 2018). The use of HMs among the community has grown steadily over the past decades in the UK (Zollman et al., 2008; Posadzki et al., 2013; Zahn et al., 2019), USA (Moore, 1998; Rashrash et al., 2017), Canada (McFarland, 2002), Australia (Xue et al., 2007), Serbia (Samojlik et al., 2013), Saudi Arabia (Suleiman, 2014), Malaysia (Arumugam, 2019), Kuwait (Awad and Al-Shaye, 2014), and Italy (Cuzzolin and Benoni, 2009). The global prevalence of HM use among women was reported as 30.7 - 67.5% (Fakeye et al., 2009; Al-Ghamdi et al., 2017; Alsubaie et al., 2017; Tengku Mohamad et al., 2019). Most of the people in Germany used HMs for treating illness, and less frequently as a health promoter (Welz et al., 2018). Among different countries, HMs are easily accessible for the public through herbal shops without prescriptions or regulatory control (Maguire et al., 2007; Bach et al., 2014).

With this global prevalence expanding, many significant adverse effects and drug-herb interactions were reported worldwide, and concerns were raised (Raynor et al., 2011). These apprehensions can turn into serious fears when friends and relatives account for the most common sources of

information for those who seek HMs (Williamson et al., 2009).

HMs have become increasingly popular in Jordan, mostly as a self-medication for infertile couples, diabetic, dyslipidemic and hypertensive patients (Nathan et al., 2006; Khader, 2009; Wazaify et al., 2011; 2013; Bardaweel et al., 2013; Issa and Basheti, 2017). However, it is difficult to provide precise data on the use of these products in Jordan as most of the recent studies targeted certain groups among the population within specific geographic distribution, and thus their outcomes could not be generalized. Therefore, this study tried to assess the prevalence of HM use comprehensively among the public, along with their attitude and factors driving it, thus assisting the development of a proper public health policy to minimize any risks related to HMs use, and incorporate any benefits into the healthcare system. This study also helped correct any misconceptions or myths associated with the use of HMs by encouraging health officials to implement raising awareness campaigns and encourage healthcare providers to monitor natural product use and record any interactions or adverse events. This study aimed to document the prevalence of HM use among the adult community in Jordan, examine the utilization of HMs, and investigate the attitude of the public toward HMs.

MATERIAL AND METHODS

Study design

A cross-sectional researcher-administered national survey was conducted over 2 months (01 November 2019 to 31 December 2019) in 12 governorates in Jordan: Amman, Irbid, Ajloun, Jerash, Mafraq, Balqa, Zarqa, Madaba, Karak, Tafilah, Ma'an, and Aqaba. The questionnaire was carried out as face-to-face interviews on a random sample of the adult population aged ≥ 18 years.

Sampling technique and size

The population of the study was divided using proportionate random sampling into 4 geograph-

ical regions: Northern Region (Irbid, Ajloun, Jerash, Mafraq), Southern Region (Karak, Tafilah, Ma'an, Aqaba), Capital Region (West Amman, East Amman) and Central Region (Balqa, Zarqa, Madaba). Each governorate was stratified geographically into rural and urban areas. Two urban areas and two rural areas were selected randomly from each governorate. A random sample was selected from each area.

The minimum recommended sample size of the study survey was 385 adults, using Raosoft sample size calculator (Raosoft, 2004). To include more representative sample, the authors decided to include a final sample size of 1820, distributed as in Table 1.

Study instrument

The study instrument was a researcher-administered questionnaire developed to serve the purpose of this research. The study tool was tailored to Jordan after analyzing previous studies that assessed the public use, and attitude toward herbal medicines (Awad and Al-Shaye, 2014; Issa and Basheti, 2017; Steel et al., 2018). The Arabic-translated version of the questionnaire was used and validated to be suitable for researching the Jordanian population. The translation was validated by two bilingual linguistic experts from the University of Petra who applied cultural and linguistic validation.

A cover letter was attached to the questionnaire, which explained the main purposes and importance of the study. In addition, a brief and simple definition of herbal medicine was provided.

The questionnaire was constructed to include the following topics:

Socio-demographic and personal characteristics

The following information was collected: age, gender, education, income, region, chronic diseases, and personal health.

Attitude toward herbal medicines

All participants answered questions about safety, efficacy, and claims of manufactures, health care providers' role, and regulations of herbal medicines. Responses were measured using a 5-point Likert scale (strongly agree, agree, neutral, disagree and strongly disagree).

Herbal medicine utilization

Participants using herbal medicines were targeted to answer specific questions about the reason for using herbal products, how often they used it, and the type they used. Also, the research team asked them about the source of information about herbal medicines and the place from where they purchased it. Herbal medicine users were asked to report any symptoms they experienced.

Reliability and validity of study instrument

Reliability was established using a pilot test by collecting data from 30 subjects in each governorate. Data collected were analyzed by SPSS Version 24 (Statistical Package for Social Sciences, by

Table 1. Calculation of proportionate sample distribution in Jordan (n = 1820).

Region	Areas	Population	% of total	Sample size
Capital	West Amman, East Amman	4,430,700	42.0	764
North	Irbid, Ajloun, Jerash, Mafraq	3,021,800	28.6	521
Central	Balqa, Zarqa, Madaba	2,261,800	21.4	389
South	Karak, Tafilah, Ma'an, Aqaba	839,700	8.0	146
Total	--------------	10,554,000	100.0	1820

IBM incorporated). Given the fact that Cronbach's alpha (*a*) is the most commonly used measure of internal consistency reliability (Noble and Smith, 2015; Bolarinwa, 2015). It was used it in order to test the instrument reliability. A reliability coefficient (alpha) of <0.5 was considered as bad reliability, above 0.5 and below 0.7 moderate reliability, above 0.7 good, and above 0.8 great reliability (Mchugh, 2012). The results showed good reliability (K = 0.81), and it was a significant result (p<0.05). Data of pilot testing were not included in the study results.

Content validity was assessed by a multidisciplinary panel of 5 experts with phytochemistry, complementary and alternative medicine, clinical pharmacy and family medicine. The main investigator arranged a face-to-face meeting with the professionals in Amman (23 October 2019). The draft questionnaire with the score sheet was distributed to the group. Respondents were asked to rate the question out of 10 in relation to appropriateness, importance and phrasing. Also, raters' additional comments were collected. Overall means for appropriateness, importance and phrasing were (mean 8.51 ± 1.42 SD): 8.71 ± 1.23, 8.23 ± 1.47 and 8.61 ± 1.74, respectively. Amendments to the survey included adding extra information to attitude questions and utilization questions. Also, the panel recommended removing two questions deemed irrelevant to the utilization section.

Eligibility criteria

Those who aged ≥18 years, Arabic speakers, and permanently lived in Jordan were included. Those who lived in Jordan occasionally (less than 6 months a year), people with mental illness, and those who were not willing to participate were excluded.

Data collection

The final survey was delivered through face-to-face interviews with participants willing to participate, who met the inclusion criteria. Interviews were conducted by eight fifth-year pharmacy stu-dents at the University of Petra. These students (data collectors) received one lecture (2 hours) on the topic, and five training sessions on completing the study questionnaire; the main investigator (DAQ) provided all training. Eligible participants were approached randomly in seven public places: pharmacies, hypermarkets, herbal shops, restaurants, gyms, bus stations, and gardens. Students briefed the participants about the aims of the study, the time needed to complete the survey, and included people were given the choice to complete the questionnaire by themselves or by the data collector. Verbal consent was obtained from eligible respondents. Participants could withdraw from the interview at any time and had the right to refuse to answer any question without providing a reason. If a participant refused to complete the survey or was ineligible to participate, the data collector approached randomly the closest eligible participant. The authors ensured that the survey was anonymous and confidential. The study questionnaire was approved by the Institutional Review Board (IRB) at the University of Petra.

Ethics approval

The study was approved by the Institutional Review Board (IRB) at the University of Petra (No. 9H-06-2019, 08/10/2019).

Statistical analysis

Data were coded and entered into the Statistical Package for Social Science (SPSS®) version 24 (IBM, Chicago, IL, US) by the investigator. Descriptive results are presented as proportions (%) with 95% CIs, while logistic regression results are presented as adjusted ORs with 95% CI. Statistical significance was considered at p-value <0.05 (with a confidence limit at 95%). Logistic regression was used to determine the odds of herbal medicine users among all participants. Rao-Scott chi-square test, which is a design-adjusted version of the Pearson chi-square (Rao and Scott, 1987), was used to assess differences between categorical variables.

RESULTS

Participants

Participants' demographics and their association with the use of HMs are summarized in Table 2. To achieve the target sample size, 2051 adults were approached; 1820 completed the questionnaire (88.7% response rate); 47.2% (859/1820) of them were females. The prevalence of HM use was 53.3% (971/1820). Around a quarter (443/1820, 24.3%) of participants had chronic diseases, and most of participants had good (617/1820, 33.9%), excellent (594/1820, 32.6%) and very good (456/1820, 25.0%) personal health. Respondents with age groups 30 - 44, 45 - 59, and ≥60 years were 2.56, 14.79, and 6.16, respectively, more likely to use HMs. Females were more likely to use HMs (OR 4.23; 95%CI 1.97 - 9.55; p=0.0004). Participants without chronic diseases were significantly less likely to use HMs (OR 0.21; 95%CI 0.11 - 0.61; p=0.0007). Respondents who claimed to have good (OR 3.12; 95%CI 1.21 - 4.89; p=0.002) and fair (OR 7.19; 95%CI 5.49 - 13.85; p=0.0001) personal health status were more likely to use HMs. No location or income differences were significantly related to HM use.

Attitude toward HMs

As shown in Table 3, participants were more likely to agree (964/1820, 52.9%) and strongly agree (416/1820, 22.9) that HMs were used to treat illness. The majority of respondents agreed (1169/1820, 64.2%) and strongly agreed (405/1820, 22.3%) that HMs were safe because they were made of natural ingredients. Responses were divided about this statement "*Herbal medicines are better for me than conventional medicine*". Participants were less likely to agree (307/1820, 16.9%) and strongly agree (141/1820, 7.7%) with this statement "*A lot of health claims made by the manufacturers about herbal products are unproven*". Most of the respondents (1575/1820, 86.5%) thought that health officials should regulate HMs. Participants were less likely to agree (490/1820, 26.9%) and strongly agree (67/1820, 3.7%) that consumers had

sufficient information to make informed decisions about herbals they purchased. There was no significant difference between participants' responses to this statement "*I think it is important to talk to pharmacist or physician before use herbal products*".

HMs utilization

As shown in Table 4, among participants using HMs, 41.9% (407/971), 23.6% (229/971), 16.2% (157/971), and 13.9% (135/971) were using HMs to treat chronic illnesses, for weight reduction, to improve well-being, and to treat an acute problem, respectively. Only 4.4% (43/971) of HM users were using HMs to enhance their sexual performance. Around half (467/971, 48.1%) of them were using HMs more than once per month. Tablets or capsules (313/971, 32.2%) and herbal beauty products (264/971, 27.2%) were the most frequently used forms of HMs. Around one-third of HM users tried oils (211/971, 21.7%) and herbal teas (102/971, 10.5%), and only 8.4% (81/971) were using other forms that they preferred not to talk about. Around two-thirds of HM users were spending less than USD50 per month on HMs, and around a quarter (237/971, 24.4%) of them was spending USD 50 - 100 per month on HMs. More than two-thirds of HM users thought the prices of HMs were nearly the same (377/971, 38.8%) or somewhat lower (234/971, 24.1%) compared to conventional drugs. The majority (697/971, 71.8%) of HM users recommend using herbals to their friends/relatives. More than one-quarter of HM users (257/971, 26.5%) experienced unpleasant symptoms including: diarrhea/constipation/abdominal pain (76/257, 29.6%), nausea/vomiting (67/257, 26.1%), and allergic reactions (55/257, 21.4%); unpleasant symptoms are illustrated in Fig. 1. The most common sources of information about HMs and the places from where HM users purchased their products are shown in Figs. 2 and 3, respectively. Friends/relatives, social media, and herbalists were the most common sources of information for HM users. Females (267/614, 43.5%) were more likely to purchase their HMs from herbal shops compared to males (49/357, 13.72%).

Table 2. Socio-demographic characteristics of participants (n = 1820).

Demographics	Participants			
	Total (n, %)	HM users (n, %)	None- HM users (n, %)	Predicting HM users, OR (95% CI)
Age (years)				
18-29 (Ref)	708, 38.9	221, 31.2	487, 68.8	1.00
30-44	624, 34.3	335, 53.7	289, 46.3	**2.56 (1.41 - 4.84)***
45-59	416, 22.8	362, 87.0	54, 13.0	**14.79 (9.01 - 18.77)****
≥60	72, 4.0	53, 73.6	19, 26.4	**6.16 (3.41 - 8.37)****
Gender				
Male (Ref)	961, 52.8	357, 37.1	604, 62.9	1.00
Female	859, 47.2	614, 71.5	245, 28.5	**4.23 (1.97 - 9.55)*****
Educational level				
Bachelor (Ref)	1081, 59.4	544, 50.3	537, 49.7	1.00
MS.c or PhD	107. 5.9	54. 50.5	53. 49.5	1.00 (0.49 - 1.97)
Diploma or less	632, 34.7	373, 59.0	259, 41.0	1.42 (0.56 - 2.66)
Monthly income				
≤ 500 USD (Ref)	864, 47.5	421, 48.7	443, 51.3	1.00
501-1000 USD	784, 43.1	446, 56.9	338, 43.1	1.37 (0.26 - 3.41)
≥1000 USD	172, 9.4	104, 60.5	68, 39.5	1.61 (0.79 - 2.99)
Location				
Capital region (Ref)	764, 42.0	364, 47.6	400, 52.4	1.00
North region	521, 28.6	343, 65.8	178, 34.2	2.10 (1.41 - 4.57)
Central region	389, 21.4	186, 47.8	203, 52.2	1.01 (0.71 - 3.22)
South region	146, 8.0	78, 53.4	68, 46.6	1.26 (0.45 - 2.19)
Chronic disease				
Yes (Ref)	443, 24.3	367, 82.8	76, 17.2	1.00
No	1377, 75.7	706, 51.3	671, 48.7	**0.21 (0.11-0.61)*****
Personal health				
Excellent (Ref)	594, 32.6	**217, 36.5**	377, 63.5	1.00
Very good	456, 25.0	**236, 51.7**	220, 48.3	1.87 (0.97 - 3.51)
Good	617, 33.9	**395, 64.0**	222, 36.0	**3.12 (1.21 - 4.89)****
Fair	153, 8.4	**123, 80.4**	30, 19.6	**7.19 (5.49 - 13.85)*****

*p<0.05, **p<0.01, ***p<0.001 indicate statistically significant differences; p>0.05 was considered not significant. OR: Odd ratio; CI: confidence interval; Ref: reference; HM: herbal medicine; USD: United States Dollar.

Table 3. The attitude of participants toward herbal medicine use (n = 1820).

Items	Strongly agree[a] (n, %)	Agree[b] (n, %)	Neutral[c] (n, %)	Disagree[d] (n, %)	Strongly disagree[e] (n, %)	#P value (a + b vs. c + d + e)
Herbal medicines can be used to treat all illnesses	416, 22.9	964, 52.9	176, 9.7	165, 9.1	99, 5.4	*P<0.05
Herbal products are safe, because they are made from natural ingredients	405, 22.3	1169, 64.2	88, 4.8	91, 5.0	67, 3.7	*P<0.05
Herbal medicines are better for me than conventional medicine	291, 16.0	470, 25.8	369, 20.3	549, 30.2	141, 7.7	P>0.05
A lot of health claims made by the manufacturers about herbal products are unproven	141, 7.7	307, 16.9	841, 46.2	431, 23.7	100, 5.5	¥P<0.05
Herbal medicines should be regulated by health officials	374, 20.5	1201, 66.0	81, 4.4	98, 5.3	66, 3.6	*P<0.05
I think it is important to talk to pharmacist or physician before use herbal products	197, 10.8	807, 44.3	469, 25.8	299, 16.4	48, 2.6	P>0.05
Consumers have enough information to make informed decisions about herbals they purchase	67, 3.7	490, 26.9	476, 26.2	601, 33.0	186, 10.2	¥P<0.05

#P values from Rao-Scott *Chi*-square test; *(a) + (b) significantly greater than (c) + (d) + (e), ¥(a) + (b) significantly less than (c) + (d) + (e)
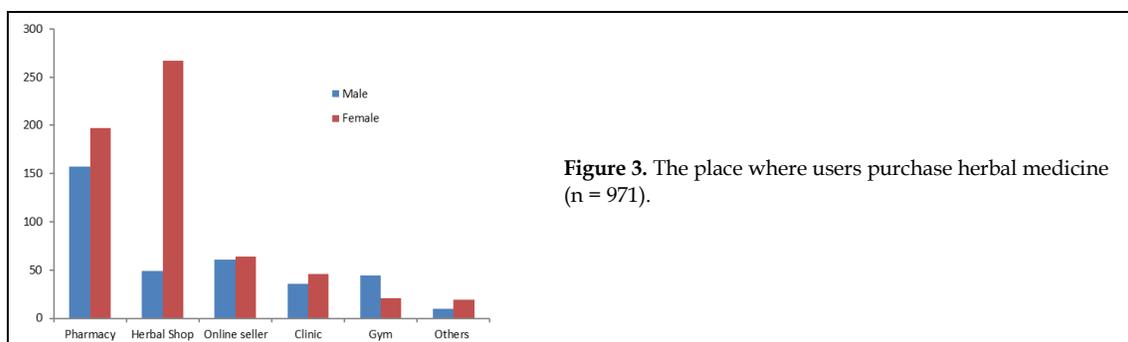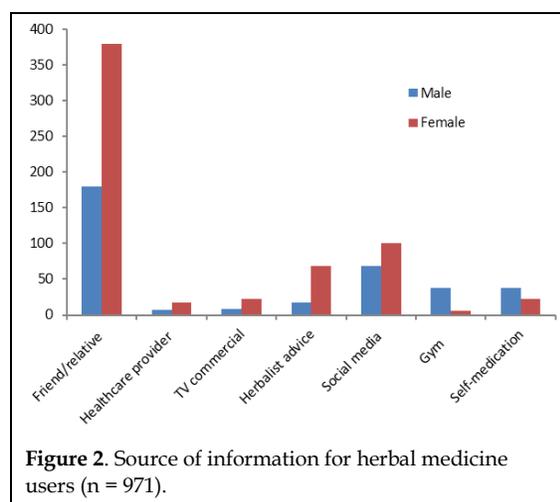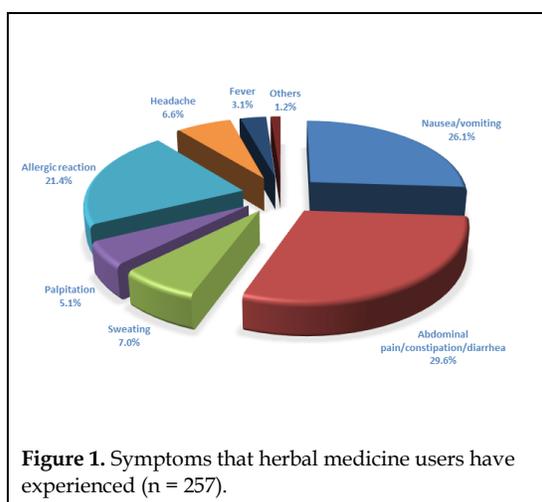

Figure 1. Symptoms that herbal medicine users have experienced (n = 257).

Figure 2. Source of information for herbal medicine users (n = 971).

Figure 3. The place where users purchase herbal medicine (n = 971).

Table 4. Herbal medicine utilization (n = 971).

Items	Total (n, %)
Why did you start using herbal medicine?	
To treat chronic illness	407, 41.9
For weight reduction & obesity	229, 23.6
To improve well-being, immunity & memory	157, 16.2
To treat an acute problem	135, 13.9
Improve sexual performance	43, 4.4
How often you use herbal medicines?	
Very often (more than once per month)	467, 48.1
Often (at least once per month)	206, 21.2
Sometimes (3 to 5 times per year)	154, 15.9
Rarely (once or twice per year)	144, 14.8
Which type of herbal did you use?	
Tablets or capsules which contain herbal ingredients	313, 32.2
Herbal beauty products (skin or hair products)	264, 27.2
Oils (olive, flaxseed, sesame, almond, among others)	211, 21.7
Herbal teas (green tea, lavender, chamomile, among others)	102, 10.5
Immune boosters (ginseng, echinacea, among others)	62, 6.4
Others	19, 2.0
Approximately, how much do you spend on herbal medicines monthly?	
< 50 USD	614, 63.2
50 to 100 USD	237, 24.4
> 100 USD	120, 12.4
When compared to regular drugs, how do you rate the prices of herbal drugs?	
Nearly the same	377, 13.6
Somewhat lower	234, 17.8
Much higher	167, 58.4
Much lower	193, 5.9
Have you experienced unpleasant symptoms or side effects?	
Yes	257, 26.5
No	714, 73.5
Do you recommend herbal medicine to your friends /relatives?	
Yes	697, 71.8
No	274, 28.2

USD: United States Dollar.

DISCUSSION

This was the first known national study to document the patterns of use, attitude, and awareness toward herbal medicines (HMs) among the Jordanian population. The findings can provide a robust quantitative measurement of HMs prevalence, utilization, and associated socio-economic factors. The data were self-reported, which may have incorporated some bias in the pattern of responses, especially for those questions containing sensitive information about the respondent, such as using herbals as a sexual performance enhancer. The cross-sectional nature of the data in this study, which represented one point in time, would not reflect the changes in attitude and use upon interventional measures. Also, the research was unable to comprehensively measure the health outcomes of HMs use. However, the researchers have reasons to believe that this would not have a significant impact on the integrity of the study data, and in spite of these drawbacks, the nationally representative sample and the appropriate sampling technique afforded generalizability to the study findings and considerable value to health officials, researchers, and health providers.

The findings of this study indicated that the prevalence of HMs use among the public was 53.3%, and it associated with gender (females), age (>29 years), personal health status (good and fair), and the presence of chronic diseases. The previous literature in Jordan showed considerable variations in prevalence of HMs; 31.0% (Nathan et al., 2006), 58.5% (Issa and Basheti, 2017), 87.3% (Kemper, 2007), 44.7% (Bardaweel et al., 2013). Similar results were found in Saudi Arabia (Kamel et al., 2017), and Kuwait (Awad and Al-Shaye, 2014). Less prevalence of HMs use was reported in the UAE (Maguire et al., 2007). However, previous studies in Jordan had some limitations: small sample size, the geographic distribution of the sample was narrow, and researchers used ambiguous sampling methods. Since HMs are not regulated by law, the researchers in this study believe individual factors can drive people to use these products as they need and based on their desires as well. However, there is no reason to believe that

HMs are completely safe to be used widely among the public, and thus the research team recommends further prospective research on consequences of HM use on community health.

The majority of the participants in this study thought HMs were safe because they were made of natural resources, and they could be used to treat all illnesses. This was consistent with Issa and Basheti's research (Issa and Basheti, 2017). This finding, along with the majority of the participants' orientation toward the need for more proven information about HMs and regulatory control activities, urge health official and healthcare providers, including practitioners and pharmacists, to raise their interest in educating the public in order to fill the awareness gaps and correct their misconceptions. Furthermore, greater efforts are necessary to build and strengthen the communication between healthcare providers and herbal shop owners to ensure safer dispensing of herbal products.

The most common reasons for using HMs were chronic diseases and overweight; however, sexual performance accounted for the least frequent reason. The findings of this study suggested a potential association between HMs use and the prevalence of obesity and chronic diseases among the public in Jordan. Also, the researchers believe the proportion of people who use HMs for sexual consideration is much higher than indicated, and thus a separate research on HMs use for sexual performance enhancement is recommended. In line with the findings in this study, most people in Germany use HMs to treat illnesses, and too much less extent promoting health (Welz et al., 2018). These findings support the idea that using medicines for promoting health or preventing illnesses becomes necessary for the public only when they confront with an imminent health-threat, and not as long as they have excellent personal health status (Welz et al., 2018).

Tablets or capsules and herbal beauty products were the most frequent forms of herbal preparation used by the population in this study. This was inconsistent with a recent study conducted in Malaysia, where raw herbs were the most frequent

form of HMs used (Tengku Mohamad et al., 2019). Geographic distribution and cultural variation might have contributed to this outcome as crude herbal materials are commonly used as a traditional pattern in Southeast Asian countries (Sulaiman and Ming, 2016)

The results of this study demonstrated the most common unpleasant symptoms that HM users experienced: constipation, diarrhea, nausea/vomiting, and allergic reactions. Clinical studies showed that HMs contain pharmacologically active ingredients that may cause moderate to severe side effects (Chitturi and Farrell, 2000; Bajaj et al., 2003; Baum, 2009). Despite the fact that this study was unable to clinically monitor those with a history of unpleasant symptoms and confirm its association with HMs, this study brought the attention of policymakers in Jordan to the seriousness of this issue.

The concerns of the research team were proliferated when HM users exhibited their most common sources of information about HMs, which were friends/relatives, social media and herbalists. In spite of the long professional experience, herbalists in Jordan had a low level of education without training on drug-herb interactions and precautionary safety measures of HMs (Issa and Basheti, 2017), and thus cannot be considered a trusted point for public health advice.

To sum up, a high prevalence of HM use was reported among a representative sample of the Jordanian population, and most of them relied on unofficial or unqualified sources for information. Therefore, health authorities in Jordan are urged to intervene and regulate the distribution, selling, and administrating of HMs. Healthcare professionals especially phytotherapy specialists should be encouraged to raise the awareness of community about the safety, efficacy and potential drug-herb interactions.

CONCLUSIONS

A high prevalence of HMs use was reported among the Jordanian population, and many of HM users were females, and they had chronic diseases. Policymakers should utilize the data of this study

to plan appropriate measures to organize, regulate, and monitor the practice of herbal products dispensing and use in Jordan.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

Al-Ghamdi S, Aldossari K, Al-Zahrani J, Al-Shaalan F, Al-Sharif S, Al-Khurayji H, Al-Swayeh A (2017) Prevalence, knowledge and attitudes toward herbal medication use by Saudi women in the central region during pregnancy , during labor and after delivery. BMC Complement Altern Med 17: 196.

Alsubaie SF, Alshehri MG, Ghalib RH (2017) Awareness, use, and attitude towards herbal medicines among Saudi women-cross sectional study. Imp J Interdiscip Res 3(2): 285–290.

Arumugam N (2019) Knowledge, attitudes and practices (KAP) towards medicinal plants among Malaysian consumers. Medicinal Aromat Plants 8(6): 341.

Awad A, Al-Shaye D (2014) Public awareness, patterns of use and attitudes toward natural health products in Kuwait: A cross-sectional survey. BMC Complement Altern Med 14: 105.

Bach HG, Wagner ML, Ricco RA, Fortunato RH (2014) Sale of medicinal herbs in pharmacies and herbal stores in Hurlingham district, Buenos Aires, Argentina. Rev Bras Farmacogn 24(2): 258–264.

Bajaj J, Knox JF, Komorowski R, Saeian K (2003) The irony of herbal hepatitis: Ma-Huang-induced hepatotoxicity associated with compound heterozygosity for hereditary hemochromatosis. Dig Dis Sci 48(10): 1925–1928.

Bardaweel SK, Shehadeh M, Suaifan GARY, Kilani MVZ (2013) Complementary and alternative medicine utilization by a sample of infertile couples in Jordan for infertility treatment: Clinics-based survey. BMC Complement Altern Med 13: 35.

Barnes J (2003) Quality, efficacy and safety of complementary medicines: fashions, facts and the future. Part I. Regulation and quality. Br J Clin Pharmacol 55(3): 226–233.

Baum M (2009) Complementary and alternative medicine (CAM) and cancer: The ugly face of alternative medicine. Int J of Surg 7(5): 409–412.

Bolarinwa OA (2015) Principles and methods of validity and reliability testing of questionnaires used in social and

health science researches. Niger Postgrad Med J 22(4): 195–201.

Chitturi S, Farrell GC (2000) Herbal hepatotoxicity: An expanding but poorly defined problem. J Gastroenterol Hepatol 15(10): 1093–1099.

Cuzzolin L, Benoni G (2009) Attitudes and knowledge toward natural products safety in the pharmacy setting: An Italian study. Phytother Res 23(7): 1018–1023.

Ernst E (2010) Phytotherapy: A quick reference to herbal medicine. Focus Altern Complement Ther 9(2): 164.

Fakeye TO, Adisa R, Musa IE (2009) Attitude and use of herbal medicines among pregnant women in Nigeria. BMC Complement Altern Med 7: 53.

Gupta MP (2015) Herbal medicinal products. Pharm Policy Law 17(1–2): 231–249.

Issa RA, Basheti IA (2017) Herbal medicine use by people in Jordan: Exploring believes and knowledge of herbalists and their customers. J Biol Sci 17(8): 400–409.

Jamshidi-Kia F, Lorigooini Z, Amini-Khoei H (2018) Medicinal plants: Past history and future perspective. J Herbmed Pharmacol 7(1): 1–7.

Kamel FO, Magadmi RM, Hagras MM, Magadmi B, AlAhmad RA (2017) Knowledge, attitude, and beliefs toward traditional herbal medicine use among diabetics in Jeddah Saudi Arabia. Complement Ther Clin Pract 29: 207–212.

Khader Yf, Sawair FA, Ayoub A, Ayoub N, Burgan SZ, Amarin Z (2009) Knowledge and attitudes of lay public, pharmacists, and physicians toward the use of herbal products in North Jordan. Journal Altern Complemen Med 14(10): 1186–1187.

Khdour MR, Hallak HO, Shaeen M, Jarab AS, Al-Shahed QN (2013) Prevalence, awareness, treatment and control of hypertension in the Palestinian population. J Hum Hypertens 27(10): 623–628.

Maguire A, Douglas I, Smeeth L, Thompson M (2007) Determinants of cholesterol and triglycerides recording in patients treated with lipid lowering therapy in UK primary care. Pharmacoepidemiol Drug Saf 16: S228.

McFarland B, Bigelow D, Zani B, Newsom J, Kaplan M (2002) Complementary and alternative medicine use in Canada and the United States. Am J Public Health 92(10):1616–1618.

Mchugh ML (2012) Lessons in biostatistics Interrater reliability: the kappa statistic. Biochem Med 22(3): 276–282.

Moore M (1998) Alternative medicine use in the United States. J Insur Med 30(4): 270–271.

Nathan PJ, Lu K, Gray M, Oliver C (2006) The neuropharmacology of L-theanine(N-ethyl-L-glutamine): a possible neuroprotective and cognitive enhancing agent. J Herb Pharmacother 6(2): 101–122.

Noble H, Smith J (2015) Issues of validity and reliability in qualitative research. Evid Based Nurs 18(2): 34–35.

Posadzki P, Watson LK, Alotaibi A, Ernst E (2013) Prevalence of use of complementary and alternative medicine (CAM) by patients/consumers in the UK: Systematic review of surveys. Clin Med 13(2): 126–131.

Rao JNK, Scott AJ (1987) On simple adjustments to chi-square tests with sample survey data. Ann Stat 15(1): 385–397.

Raosoft L (2004) Raosoft sample size calculator. Retrieved from http://www.raosoft.com/samplesize.html [Consulted: October 12, 2019].

Rashrash M, Schommer JC, Brown LM (2017) Prevalence and predictors of herbal medicine use among adults in the United States. J Patient Exp 4(3): 108–113.

Raynor DK, Dickinson R, Knapp P, Long AF, Nicolson DJ (2011) Buyer beware? Does the information provided with herbal products available over the counter enable safe use? BMC Med 9: 94.

Samojlik I, Mijatović V, Gavarić N, Krstin S, Božin B (2013) Consumers' attitude towards the use and safety of herbal medicines and herbal dietary supplements in Serbia. Int J Clin Pharm 35(5): 835–840.

Steel A, McIntyre E, Harnett J, Foley H, Adams J, Sibbritt D, Wardle J, Frawley J (2018) Complementary medicine use in the Australian population: Results of a nationally-representative cross-sectional survey. Sci Rep 8: 17325.

Sulaiman N, Ming L (2016) Use of herbal products in Southeast Asian countries. Archives of Pharmacy Practice 7(Suppl. 1): S1–S4.

Suleiman AK (2014) Attitudes and beliefs of consumers of herbal medicines in Riyadh, Saudi Arabia. J Community Med Health Educ 4(2): 269.

Tengku Mohamad TAS, Islahudin F, Jasamai M, Jamal JA (2019) Preference, perception and predictors of herbal medicine use among malay women in Malaysia. Patient Prefer Adherence 13: 1829–1837.

Wazaify M, Alawwa I, Yasein N, Al-Saleh A, Afifi FU (2013) Complementary and alternative medicine (CAM) use among Jordanian patients with chronic diseases. Complement Ther Clin Pract 19(3): 153–157.

Wazaify M, Fatma UA, El-Khateeb M, Ajlouni K (2011) Complementary therapies in clinical practice complementary and alternative medicine use among Jordanian patients with diabetes. Complement Ther Clin Pract 17: 71–75.

Welz AN, Emberger-Klein A, Menrad K (2018) Why people use herbal medicine: Insights from a focus-group study in Germany. BMC Complement Altern Med 18(1): 92.

Williamson E, Driver S, Baxter K (2009) Stockley's herbal medicines interactions: A guide to the interactions of herbal medicines, dietary supplements and nutraceuticals with conventional medicines. London, United Kingdom: Pharmaceutical Press. pp. 423.

World Health Organization (2002) WHO Traditional Medicine Strategy 2002-2005. Geneva: World Health Organization. Retrieved from

https://www.who.int/medicines/publications/tradition alpolicy/en/ [Consulted: October 12, 2019].

Xue CCL, Zhang AL, Lin V, Da Costa C, Story DF (2007) Complementary and alternative medicine use in Australia: A national population-based survey. J Altern Complement Med 13(6): 643–650.

Zahn AR, Perry N, Perry E, Mukaetova-Ladinska EB (2019) Use of herbal medicines: Pilot survey of Northern England (UK) users' views. Complement Ther Med 44: 83–90.

Zollman C, Thomas K, Relton C (2008) Users and practitioners of complementary medicine. In ABC of Complementary Medicine. 2nd edition. Zollman C, Vickers A, Richardson J Eds. Unites Kingdom: John Wiley & Sons, pp. 7-11.

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Concepts or ideas	x	x			x	x	x	x	x
Design	x		x	x			x		x
Definition of intellectual content		x	x	x	x				x
Literature search	x		x	x	x				x
Experimental studies	x	x				x		x	
Data acquisition	x	x	x	x	x			x	x
Data analysis	x		x	x	x	x		x	x
Statistical analysis					x			x	x
Manuscript preparation	x	x			x		x	x	x
Manuscript editing	x	x	x	x		x			
Manuscript review	x	x	x	x	x		x	x	x

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