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Knowledge, Attitudes, and Practices regarding Medicinal Plants Used by the Indigenous People in Bahrain

معارف شعب البحرين ومواقفهم وممارساتهم بشأن استخدام النباتات الطبية

Jameel Alkhuzai, Abdulameer Al-Laith, and Qaher Mandeel

جميل الخزاعي، عبدالأمير الليث وقاهر منديل

Department of Biology, College of Science, University of Bahrain, P.O. Box 32038, Sakhir Campus

Kingdom of Bahrain

E-mail: jalkhuzai@sci.uob.bh

Abstract: The use of plants in traditional medicine is well-documented in the archives of folk medicine of the Arab region. These, however, mainly report medicinal uses and forms of medication. This study examines the perception of uses as well as knowledge, attitude, and practice by Bahraini people from an ethnobotanical prospective in relation to gender and few other socio-cultural factors. A pre-structured questionnaire consisting of 22 questions was distributed on the major islands of Bahrain among 312 native Bahraini people. Data was analyzed using SPSS statistical software. The results show that 95.3% of respondents used medicinal plants and 57% are knowledgeable in herbal medicine. gap between the use and knowledge values indicated loss of knowledge within the Bahraini population. Both males (75%) and females (82.7%) believe that women are the largest users of medicinal plants. The results also show that 42.3% of females compared to 27.8% of males use medicinal plants frequently or always. Both males and females use these plants to treat ailments related to different organs of the body, particularly the skin and the ear, nose, and throat (ENT). However, eye diseases and piles were the conditions least treated for: 5.6% and 7.2% of males, and 4.9% and 4.4% of females, respectively. No difference was found between males and females in relation to attitude and willingness to use medicinal plants.

Keywords: *Knowledge, Attitudes, and Practices (KAP), gender, native, herbal medicine, Arabia.*

المستخلص: بالرغم من أن استخدام النباتات في الطب التقليدي تم توثيقه جيدا في محفوظات الطب الشعبي في المنطقة العربية، إلا أن هذا التوثيق لا يعدو كونه تقارير عن الاستخدام وأنماط الممارسات الطبية وأنواع الدواء. تفحص هذه الدراسة مدى معرفة الشعب البحريني باستخدام النباتات الطبية، وموقفه منها وممارسته لها من وجهة نظر إثنو-نباتية، ومدى تأثر ذلك بعامل الجنس والعوامل الإجتماعية الثقافية. فقد تم توزيع استبانة معدة التصميم مكونة من 22 سؤالا على 312 فردا بحرينيا في الجزر الرئيسية من مملكة البحرين. تم تحليل البيانات باستخدام البرنامج الإحصائي للعلوم الاجتماعية الإحصائية (SPSS). وقد أظهرت النتائج أن 95.3% من أفراد العينة تستخدم النباتات الطبية، وأن 57% على دراية بالأدوية العشبية. وتشير الفجوة بين الاستخدام والقيم المعرفية إلى إنحسار المعارف بين السكان البحرينيين. يعتقد كل من الذكور (75%) والإناث (82.7%) أن النساء هن الأكثر استخداما للنباتات الطبية. كما بينت النتائج أن 42.3% من الإناث مقابل 27.8% من الذكور تستخدم النباتات في كثير من الأحيان أو دائما. ويستخدم كل من الذكور والإناث النباتات لعلاج الامراض ذات الصلة بأجهزة مختلفة من الجسم، خصوصا الجلد والأذن والأنف والحنجرة. إلا أن أمراض العيون ومشاكل البواسير هي الأقل معالجة بالنباتات، فقد استخدمها 5.6 % و 7.2% من الذكور، و 4.9 % و 4.4 % من الإناث، على التوالي. لم يلاحظ وجود أية فروقات بين الذكور والإناث فيما يتعلق بموقفهما واستعدادهما لاستخدام النباتات الطبية.

كلمات مدخلية: *معارف، مواقف وممارسات، الجنس، محلي، طب الأعشاب، المنطقة العربية.*

INTRODUCTION

Use of herbal plants in traditional medicine has been known for thousands of years. People from ancient civilizations in different parts of the world have used medicinal plants for the treatment of many diseases (Merlin, 2003; Halberstein, 2005). Papyrus documents of ancient Egypt and clay tablets recovered from Mesopotamian civilizations preserved a number of plant remedies (Yesilada, 2005). Islamic history reveals the names of many herbalists whose works are still being followed in many of Arab countries as guides for reliable disease remedies by traditional herbalists in local markets and shops, extending from Morocco in the northwest of Africa to Bahrain in southwest Asia (Ben Mrad, 1991; Abbas and Al-Saleh, 2002; Abu-Irmailah and Afifi, 2003).

In some regions such as the Arabian Peninsula, herbal medicine is widely practiced by the inhabitants of remote areas or by nomads who generally inhabit the desert and some areas of the steppe and the uplands (Afifi and Abu-Irmaileh, 2000; Khafagi and Dewedar, 2000). In cities and urban areas, herbal medicine is widely practiced by herbalists who prescribe and dispense not only native medicinal plants, but also imported medicinal herbs. Many studies have investigated the use of medicinal plants by people of certain geographical regions with particular emphasis traditionally given to rural and tribal communities (Merzouki, *et al.* 2000; Pieroni, *et al.* 2004; Estomba, *et al.* 2006).

The islands of Bahrain have been part of and influenced by a number of neighboring civilizations throughout history. Ancient historical that dates back 5000 years reveal that Dilmun (ancient name of Bahrain) had many interactive socio-economic relationships with the Assyrian civilization of ancient Iraq, Islamic State in the Arabian Peninsula, Persia, and India (Bibby, 1996). Gilgamesh, according to an old myth, searched for the flower of eternity in Dilmun (Dickson, 2007).

Bahrain is a very small country with an area of 741.4 km2 with few cities and many villages, most situated on the border of cities and towns, the rest within a very short distance of the cities. Therefore, differences between urban and rural societies are undetectable. The modern society of Bahrain is a mixture of different ethnic and geographical origins, with Arabs being the dominant ethnic group. In addition to native Bahrainis, Arabs include Yemenis, Syrians, Egyptians, Jordanians, Sudanese and others Non-Arabic ethnic groups include people from the Indian-subcontinent, the Philippines, Thailand, Iran, Europe and others. This mixture, combined with ancient history, had an impact on the use of plants in traditional medicine in Bahrain. It is normal to have in traditional herbalist shops with a variety of medicinal plants in Bahrain and Arabia as well as from other countries such as Iran and the Indian subcontinent. Modern herbalists and outlets for alternative medicine provide herbal medicine from India, Thailand, the Philippines and China.

In their study on medicinal plants of Bahrain, Abbas, *et al.* (1992) and Abbas and Al-Saleh (2002) reported the use of medicinal plants in traditional medicine in Bahrain for the treatment of a number of ailments. Examples of plants used include: Leptadenia pyrotechnica (Forssk.) Decne (Asclepiadaceae; diuretic); Capparis spinosa L. (Capparaceae; aperient, tonic, expectorant, gout, anthelmintic); Suaeda vermiculata Forssk. Ex J. F. Gmelin (Chenopodiaceae; asthma); Anastaticha hierochuntica L. (Cruciferae; birth inducer); Alhagi graecorum Boiss. (Leguminosae; jaundice, opacity of cornea, migraine, expectorant, rheumatism, diaphoretic, aphrodisiac); Teucrium polium L. (Labiatae; hypoglycemic, anti-inflammatory, anti-pyretic, coolant).

In Bahrain, 323 plant species were reported in the flora of Bahrain (El-Oqlah and Abbas, 1994) of which 81 species are considered frequently used medicinal plants (Abbas and Al-Saleh, 2002). The latter researchers were the first to report comprehensively way the significance of native plants as medicinal plants used by local people in Bahrain for the treatment of various ailments. The plant parts commonly used consist of roots, stems and leaves with a few seeds or fruits, either alone (decoctions) or in combination with other parts (concoctions). These plant parts are used to treat many diseases such as pneumonia, fever, renal problems,

diarrhea, internal helminthes, bone fractures, eczema, rheumatoid arthritis, bronchitis plus skin and stomach disorders (Abbas and Al-Saleh, 2002; Mandeel and Taha, 2005). Locally, herbal drug remedies are commonly consumed on a daily basis as herbal tea or added to drinks as concentrated distillates. Many small factories use distillation methods to prepare a variety of liquid medicines used to treat various diseases. These products are displayed in all food shops and supermarkets. Accordingly, the Kingdom of Bahrain is known among neighboring Arabian Gulf countriesas one of the main distribution centers for herbal medicine.Mandeel and Al-Laith (2007) studied various ethnomycological aspects of desert truffles among native Bahraini and non-Bahraini people. Two other studies reported on the anti-microbial activities of selected plant species (Mahasneh, *et al.* 1996; Al-Saleh, *et al.* 1997).

In the Arab region, few ethno-botanical studies are reported knowledge, attitude, and practice pertaining to the use of medicinal plants.These are mainly from the Palestinian area, Morocco and Jordan (Ali-Shtayeh, *et al.* 2000; El-Hilaly, *et al.* 2003; Aburjai, *et al.* 2007; Hudaib, *et al.* 2008; Al-Qura'n, 2009). To our knowledge, there are no reports from Bahrain and the whole of the Arabian Peninsula related to the above- mentioned issues. Therefore, the objectives of this study were to: (1) estimate the general perception of the Bahraini population as to the use of medicinal plants; (2) determine if the use of plants in herbal medicine is related to age, income, and education; (3) evaluate the general knowledge, attitude, and practices regarding the use of medicinal plants for medication in relation to gender. Based on these three objectives, the following hypotheses were tested: (1) medicinal plants usage by Bahraini people; (2) the use of medicinal plants in herbal medicine as influenced by age, income, and education; and (3) the relationship of gender to knowledge, attitude, and practices regarding use of medicinal plants.

Study Area

Geography and Geomorphology

Bahrain is a group of 33 islands located in the Arabian Gulf to the east coast of Saudi Arabia with a total area of 741.4 km2 and a total population of 742.6 thousand (Bahrain Government, 2009). Bahrain is connected to the eastern coast of Saudi Arabia by a 26 km causeway. The largest island Bahrain, followed by Muharraq and Sitra. The Hawar Islands are part of the Kingdom of Bahrain, but are less inhabited than the main islands of Bahrain, Muharraq, and Sitra.

Climate

Bahrain is part of the climatologically arid belt which extends from Morocco in North Africa to Mid Asia. The climatic diagram of Bahrain shows its climate is a typically of arid environment (El-Oqlah and Abbas, 1994). The dry season covers most of the year, extending from April to October. During this period, the average temperature is 40oC with a maximum of 48oC during June and July. Scattered rainshowers occur in the period from November to March. The temperature in this period is moderate, ranging between 10 and 20oC. Rainfall is low and scattered with an annual average of 74 mm.

Flora

The flora of Bahrain is comprised of 323 species (El-Oqlah and Abbas, 1994). The Saharo-Arabian element is represented by 123 species (38%) and the dominant life form is therophytes, representing 48% of total flora. These therophytes are dormant during summer in the dry season and flourish after the rain in the wet season (El-Oqlah and Abbas, 1992). Out of the 323 species native to Bahrain, Abbas and Al-Saleh (2002) reported a total of 81 species (25%) used as medicinal herbs by Bahrainis or by others in the Arabian Peninsula or neighboring countries. Native plants are found in a variety of contrasting habitats including sabkhas and salt pans; sand dunes and phytogenic mounds; coastal plain; mangroves, stone pavements, and bedrocks of the jabals (El-Oqlah and Abbas, 1992).

The majority of these habitats exist under drought conditions and many are also characterized by high salinity (Abbas and El-Oqlah, 1992). Plants in such habitats are considered under ecological drought stress or physiological drought stress being both xeric and saline or wet and saline (Mahajan and Tuteja, 2005). The drought and salinity stresses

are reduced in the arid habitats after rainfall (Abbas, 1995). This coincides with emergence of perennial plants and growth of many ephemeral and annual plants numerous of which are used in traditional medicine (Abbas and Al-Saleh, 2002). These plants are particularly seen in the desert of the central depression. Examples of which are Aizoon canariense L. (Aizoaceae), Spergularia bocconii Asch. & Graebn. (Caryophyllaceae), Koelpinia linearis Pall., Launaea nudicaulis Hook.f., and Sonchus asper Hill (Compositae), Anastatica hierochuntica L. and Savignya parviflora Webb. (Cruciferae) and Asphodelus tenuifolius Cav. (Liliaceae).

MATERIALS AND METHODS

Study Design

A pre-structured questionnaire consisting of 22 questions was designed to obtain information about the general knowledge, attitudes, and practices regarding the use of medicinal plants by the people of Bahrain. The first part of the questionnaire collected demographic data, including age, level of education, monthly income, gender and residential area, i.e. villages and cities. The second part included four questions on general knowledge regarding medicinal herbs including: degree of knowledge, source of knowledge, frequency of use by population, and knowledge of native medicinal herbs. Five questions about attitude included motivation for using medicinal plants, willingness to advise others to use herbal medicine, willingness to treat specific body organs (eye, skin, intestine), and confidence in source of treatment. Eight questions were about practices and use of medicinal plants including whether the respondent uses medicinal plants or not; collection, frequency of use, user population, seriousness of disease for medicinal plant use, source of obtaining herb, nature of herb(raw or packed), and main types of diseases plants are usedto treat. Prior to the distribution of the questionnaire, a pilot testing of the questionnaire was conducted among 40 randomly selected individuals.

Fedback from the pilot testing was used to re-structure the questionnaire and collection of information was based on random sampling (Heath, 1995). A total of 312 questionnaires were randomly distributed with the main three islands of Bahrain, Bahrain Island, Muharraq Island and Sitra Island. All respondents were Arabic-speaking Bahrainis. A team of 15 volunteers were given specific instructions aboutdata collection (including a number of university students), participated in questionnaire distribution and assisted illiterate respondents in filling the questionnaire. Otherwise, respondents filled the questionnaire by themselves. Out of 312 distributed and received questionnaires, 307 (98.4%) responses were valid. The five non-valid responses were mainly from people who either did not fill the questionnaire because of unawareness of medicinal plants, or those who answered the questions despite their unawareness. More than 40% of the respondents were 40 years of age and older. Out of 307 valid responses, 297 answered the question on gender, i.e. male or female. Based on those who answered the gender question, males represented 53% (157 responses 53% of which are 40 years old and over) and females represented 47% (140 responses 40% of which are 40 years old and over). The study lasted for six months (from September 2006 to February 2007).

Verification of Plant Names

The respondents provided the vernacular names for plants commonly used in isolation in herbal medicine (not prepared, mixed drugs) which are widely known locally. No plant specimens were collected by the authors in this study. The official plants vernacular names at the herbarium were used for cross referencing with names provided by the respondents. Herbarium specimens, including vernacular names of local plants, are based on previous works and studies by researchers at the University of Bahrain (El-Oqlah and Abbas, 1994). At time of the survey, matching of vernacular names and scientific names were matched by showing local people and plant collectors photographs and specimens.

Field trips with highly knowledgeable local people also provided opportunities to think vernacular names with scientific names. Plant specimens deposited in the University of Bahrain Herbarium were identified and given voucher

numbers after verification was carried out by taxonomists at Kew Gardens, UK.

Data Analysis

Data was analyzed using SPSS statistical software. Demographic data, including age group, level of education, monthly income and residential area, in addition to 17 questions on knowledge, attitudes, and practices regarding the use of medicinal plants were tested for the comparison of males and females using the chi-square test. Spearman's non-parametric correlation test was used to measure the relationship between the use of herbal medicine and age, income and education. Spearman's test was used also to measure the relationship between the serious nature of the disease as it affected certain body organs with willingness to use herbal medication. Values of $p \leq 0.05$ were considered as significant differences for both tests.

In addition, the potential impact of socio-demographic variables in regards to the use of medicinal plants between genders was examined by using univariate and multivariate analysis of variance (MANOVA)which creates a new summary (combined) dependent variable based on the original dependent variable, then compares groups using the newly generated variable. Two independent variables were tested; namely gender and use of herbal medicine against the combined variable to include all socio-demographic variables, though only age and monthly income showed significant differences between genders according to ANOVA and univariate analysis (Table 2). MANOVA was performed according to Tabachnick and Fidell (1996). Bonferroni adjustment was used in calculating the α value.

Table 2. Demographical data of respondents

Demography	Category	Male N (%)	Female N (%)	Both Genders N (%)	P-Value
Age Group N = 277	Under 40 years	68 (46.6)	92 (70.2)	160 (57.8)	0.000*
	41-60 years	68 (46.6)	31 (23.7)	99 (35.7)	
	61 and above	10 (6.8)	8 (6.1)	18 (6.5)	
Level of Education N = 297	Postgraduate	9 (5.7)	6 (4.3)	15 (5)	0.341
	Bachelors›	78 (49.7)	82 (58.6)	160 (53.9)	
	SecondarySchool	52 (33.1)	34 (24.3)	86 (28.9)	
	Middle School	10 (6.4)	7 (5)	17 (5.8)	
	Illiterate	8 (5.1)	11 (7.8)	19 (6.4)	
Monthly Income (BD) N = 239	Under 200	18 (13)	32 (31.7)	50 (20.9)	0.000*
	200-500	48 (34.8)	41 (40.6)	89 (37.3)	
	500-1000	62 (44.9)	25 (24.7)	87 (36.3)	
	Over1000	10 (7.3)	3 (3)	13 (5.5)	
Residential Area N = 301	Village	69 (43.4)	61 (43.)	130 (43.2)	0.892
	Urban	49 (30.8)	47 (33.1)	96 (31.9)	
	Unknown	41 (25.8)	34 (23.9)	75 (24.9)	

* Significant difference at P = 0.05 level

RESULTS AND DISCUSSION

General Perception of Medicinal Plant Use

Data shows that 95% of 287 respondents use herbs in herbal medicine. Table (1) shows a list of native plants reported by respondents as resources for herbal medicine. This list includes scientific names, vernacular names, and parts used. These plants are mainly drought escaping herbs or drought tolerant. The percentage of people using medicinal plants reported in this study is relatively high compared to western societies. Population surveys from the USA (Eisenberg, *et al.* 1998), UK (Thomas, *et al.* 2001), and Australia (MacLennon, *et al.* 2002) show that at least 50% of those surveyed use complementary and alternative medicine, including herbal medicine. The high percentage of users in our study is particularly interesting in a developing educated society with low illiteracy

rate of 10 % (UNESCO, 2009). It seems that the small area of the country, the unclear boundaries between villages and cities, as well as its being an island in a a crossroads between East and West, a place where many ethnic groups live, providesa situation for a wide medicinal plants use among inhabitants. In situations where there with geographical separation or long distances between communities, clear differences in the use of medicinal plants were observed. In such cases, communities which are distant from urbanization and cities use herbal medication more frequently than those in cities or closer to urbanization (Monteiro, *et al.* 2006; Roosita, *et al.* 2008; Zheng and Xing, 2009).

Table 1. List of native medicinal plants reported by the respondents as a source for herbal medication

Scientific Name	Vernacular Name	Part Used
Suaeda aegyptiaca	Golluman, Rejlah	Leaves
Ocimum basilicum	Mashmoom	Leaves
Anastatica heirochuntica	Chaf Maryam	Stems
Alhagi maurorum	Agool, Heej	Stems
Phoenix dactylifera	Nakhla	Seeds, Spathe,Spadix
Tecrium polium	Negdha, Jaad	Leaves
Ziziphus spina-christi	Seder	Leaves
Calendula officinalis	Aqhawan	Flowers
Melilotus alba	Handagoog	Leaves
Glossonema varians	Shakhdab	Fruit
Portulaca oleracea	Barbeer	Leaves
Heliotropium crispum	Ramram	Leaves
Launaea nudicaulis	Huwa	Leaves
Medicago sativa	Gat	Leaves
Trigonella foenum-graecum	Helba	Leaves
Trigonella stellata	Nafil	Leaves
Rumex vesicarius	Humaidh	Leaves
Aizoon canariense	Di'daa	Leaves
Lycium shawii	Awsaj	Leaves
Malva parviflora	Khubaiza	Leaves
Calotropis procera	Osher	Leaves
Citrullus colocynthis	Handhal	Fruit
Artemisia inculata	Sheeh	Leaves
Salvadora persica	Arak	Stems
Amaranthus viridis	Sendar	Leaves
Datura fastusa	Benj	Fruit
Asphodelus tenuifolius	Ansel Bensel	Leaves, stems
Avicennia marina	Gurm	Bark
Cassia italica	Ishrig	Leaves
Peganum harmala	Harmal	Leaves
Prosopis farcta	Yanboot	Leaves
Seidlitzia rosmarinus	Ashnan	Leaves
Herniaria hemistemon	Halleeb	Leaves
Cressa cretica	Shuwail	Leaves
Symphytum officinale	Fotan	Leaves
Gymnarrhena micranth	Ein bareen	Leaves
Beta vulgaris var. cicla	Salag	Leaves
Allium porrum	Bagil	Leaves
Anagallis arvensis	Ain Sannora	Leaves

* Significant difference at p = 0.05 level

Use of Medicinal Plants in Relation to Age, Education and Income

Results of statistical analysis using Pearson's correlation test show a significant negative correlation between age and use of medicinal plants (-0.119 at p = 0.05). This is in accordance with results of numerousstudies which indicate that elderly people know more uses for plants as medicne (Monteiro, *et al.* 2006; Aburjai, *et al.* 2007; Srithi, *et al.* 2009; Tilahun, 2009).

Similarly, the statistical analysis demonstrates a significant negative correlation between level of education and use of medicinal plants (-0.124 at p = 0.05). Again, as shown by other studies, communities such as rural and remote areas or villages with less-educated people use medicinal plants more than communities of cities and urban areas (Monteiro, *et al.* 2006; Srithi, *et al.*2009). Results based on Pearson's test show no significant correlation between the whole sample (genders) use with income.

Knowledge, Attitudes, and Practices in Relation to Gender

Demographic Data

Table (2) shows the demographical data of the respondents. A comparison between males and females about monthly income showed a significant difference. However, no significant difference was indicated between the two genders when their level of education was considered. It should be noted that 58.9% of the sample had university or postgraduate degrees, indicating a higher education level of the respondents.

General Knowledge about Herbs used as Medicine

Table (3) shows the results of respondents general knowledge. Data showS that 49.4% of males and 58.4% of females have good and very good knowledge regarding the use of medicinal plants. Only 3.1% of males and 1.4% of females indicated that they did no knowledge about herbal Medicinal plants. There was no statistically significant difference between males and females in that respect. However, in a study by Hudaib, *et al.* (2008) in Jordan, it was reported that females were the primary gatherers and the predominant healers. When the percentage of both genders with good and very good knowledge (53.6%) is compared to the percentage of those who use herbal medicine, (95.3%) a large and discrepancy is noticed between the two values. This discrepancy is used to reflect loss of knowledge which is particularly related to age (El-Hilaly, *et al.*2003; Aburjai, *et al.* 2007; Hudaib, *et al.* 2008) Srithi, *et al.* (2009) reported that knowledge of medicinal plant use was negatively correlated with levels of informant education and age in northern Thailand. In an ethnopharmacological survey carried out among 102 informants living in the West Bank region of the Middle East it was indicated that indigenous medicine within the area is diminishing and may disappear (Ali-Shatayeh, *et al.* 2000). Furthermore, there was no significant difference regarding the source of knowledge about herbs used as medicine between males and females. Grandparents, parents and other relatives were the main source of knowledge for both genders (57.4%) which indicates that family ties and social relationships are strongly reflected in the accumulation and passage of knowledge from one generation to another.

This also shows that the traditional values still play a major role in the transfer of knowledge despite Bahrain being an educated society. Statistical analysis of the results shows a significant difference between males and females related to frequent whether men, women, or children are the most users of medicinal plants. Both males (75%) and females (82.7%) believe that women are the most frequent users of medicinal plants. This is in line with traditional belief and practices in many parts of the world, and particularly in the eastern societies that women are more affiliated to house activities which extend from cooking and cleaning to raising and caring for children including health care for herself and others (Mandeel and Allaith, 2007). In this regard,women may be considered as home-based herbalists. This role sometimes extends beyond the home to the practice of herbal medicine on a professional level (Hudaib, *et al.* 2008). In Bahrain, there are reports of women who practice herbal medicine in villages and cities whose reputation has extended beyond Bahrain (Abbas and Al-Saleh, 2002). The role of women as herbalists and as major users of herbal plants

was reported in different geographical regions of the world (Bakker, 1992; Wenzel Geissler, *et al.* 2002; Adams, *et al.*, 2007; De-la-Cruz, *et al.* 2007). There was a significant difference between males and females with reference to the knowledge about of the presence of native medicinal plants in Bahrain. The majority of both genders (66.2% of males and 57.9% of females) responded positively that they know that medicinal plants grow in Bahrain. The higher percentage of males was anticipated since males are more knowledgeable than females in this area and explorer wild and harsh environments more frequently than females. As an example, it is common to find hundreds males camping in the desert of Bahrain in tents during cold winter to spring season.

Table 3. General knowledge about medicinal plants among respondents in relation to gender.

Knowledge Attributed	Category	Male N (%)	Female N (%)	Both Genders N (%)	P-Value
Knowledge N = 302	Very Good	18 (11.3)	32 (22.5)	50 (16.6)	0.051
	Good	61 (38.1)	51 (35.9)	112 (37.0)	
	Somewhat	76 (47.5)	57 (40.2)	133 (44.0)	
	Do not know	5 (3.1)	2 (1.4)	7 (2.4)	
Source of Knowledge N = 298	Parents and Grandparents	48 (30.2)	54 (38.9)	102 (34.2)	0.054
	Relatives	38 (23.9)	31 (22.3)	69 (23.2)	
	Media	9 (5.7)	6 (4.3)	15 (5)	
	Self-education	13 (8.2)	17 (12.2)	30 (10.1)	
	Others	8 (5.0)	0 (0)	8 (2.7)	
	More than one source	43 (27.)	31 (22.3)	74 (24.8)	
Most Users N = 281	Men	31 (20.9)	11 (8.3)	42 (14.9)	0.005*
	Women	111 (75)	110 (82.7)	221 (78.7)	
	Children	6 (4.1)	12 (9.0)	18 (6.4)	
Native Plants N = 278	Yes	96 (66.2)	77 (57.9)	173 (61.9)	0.028*
	No	31 (21.4)	23 (17.3)	54 (19.6)	
	Do not know	18 (12.4)	33 (24.8)	51 (18.5)	

* Significant difference at P = 0.05 level

Attitude

Table (4) illustrates the results of respondents to questions related to attitudes and willingness to use medicinal plants. The results of this study reveal no significant difference between males and females in reference to all aspects of their attitudes and willingness to use herbal medicine. The results also show both male and female main motivation to use medicinal plants is as a natural source of treatment (26.1% of males and 27.1% of females) and because of personal experience (26.8% of males and 22.5% of females). As Table 4 depicts, the low price of medicinal plants is not a decisive factor in the motivation to use mredicinal plants, nor in seeking medical advice. This latter point could be explained on the basis that it is expected medical physicians not to normally recommend herbal plant remedies, especially with the lack of alternative medicine specialists, despite the fact that the vast majority of respondents (95% males and 97% females) would voluntarily advise other people to use herbal plants for medication. This indicates a high confidence in treatments using herbal plants for the type of treatments normally practiced.

Table 4. Attitude and willingness in using medicinal plants among respondents in relation to gender.

Attitude	Category	Male N (%)	Female N (%)	Both Genders N (%)	P-Value
Motivation N = 271	Tradition	16 (11.6)	23 (17.3)	39 (14.4)	0.606
	Low Price	1 (0.7)	2 (1.5)	3 (1.1)	
	Personal Experience	37 (26.8)	30 (22.5)	67 (24.7)	
	Natural	36 (26.1)	36 (27.1)	72 (26.6)	
	Medical Advice	10 (7.2)	7 (5.3)	17 (6.3)	
	Convenience	2 (1.5)	0 (0)	2 (0.7)	
	Others	4 (2.9)	2 (1.5)	6 (2.2)	
	More than One Option	32 (23.2)	33 (24.8)	65 (24)	
Advice to Others N = 272	Yes	133 (95)	128 (97.0)	261 (96)	0.410
	No	7 (5)	4 (3.0)	11 (4)	
Willingness to treat eyes N = 232	Accept	31 (26.0)	28 (24.8)	59 (25.5)	0.860
	Do not accept	59 (49.6)	60 (53.1)	119 (51.2)	
	Not sure	29 (24.4)	25 (22.1)	54 (23.3)	
Willingness to treat skin N = 239	Accept	83 (68.0)	71 (60.7)	154 (64.5)	0.064
	Do not accept	23 (18.9)	17 (14.5)	40 (16.7)	
	Not sure	16 (13.1)	29 (24.8)	45 (18.8)	
Willingness to treat intestines N = 275	Accept	123 (84.8)	112 (86.2)	235 (85.4)	0.495
	Do not accept	10 (6.9)	5 (3.8)	15 (5.5)	
	Not sure	12 (8.3)	13 (10)	25 (9.1)	

* Significant difference at P = 0.05 level

When it comes to the willingness to treat specific body organs, the majority accepted treating the intestines (84.8% males and 86.2% females), followed by the skin (68% males and 60.7% females), and last was the eye (26% males and 24.8% females). In fact, when these organs were ranked according to their perceived seriousness or importance (eye =1, skin = 2, intestine = 3), a very strong correlation (r =1.000) between the degree of seriousness and the willingness to use medicinal plants to treat these conditions was revealed by Spearman's non-parametric test. A similar attitude in the treatment of diseases is reported elsewhere (Yaniv, *et al.* 1987; Lev and Amar, 2002; Abu-Irmailah and Afifi 2003; Eyob, *et al.* 2008; Lee, *et al.* 2008).

The univariate analysis using the Bonferroni adjustment (p = 0.01) was used to further analyze data in relation to gender. This analysis showed associations between the population using herbal medicines and their monthly income (p = 0.008), but not with other socio-demographics (age, education, gender, and living area). Respondents with the highest income (> BD 1,000, = U$ 2,600) were more likely not to use herbal medicine. Age was not a strong indicator of the usage of herbal medicine at the stringent α value of 0.01 provided by Bonferroni adjustment. However, relaxation of the α to 0.025 revealed that age group may be considered an indicator of the medicine usage with younger respondents (≥ 20 years who were less likely to use herbal medicine.

There was no significant difference between the user and non-user of herbal medicine on the combined dependent variables using MANOVA (Wilk's Lambda = 0.957, F (3, 220) = 1.997, p = 0.081, partial eta squared = 0.043). However, tests between-subjects effects showed that age group to be significantly different (p = 0.013) as in univariate. Further analysis of variance within each group of both sexes revealed no significant differences either gender-basis (female/ male) or both combined.

Practice and Use of Medicinal Plants

Table (5) depicts the results of respondents with regard to practices and uses of medicinal plants between the genders. These results

indicate no significant difference between males and females in reference to the use, collection, frequency of use, for who of plant useage, degree seriousness of illness and which medicinal plant is used and the source of herbs. Although 95.3% of the respondents use plants for herbal medicine, only 9.9% of males and 6.8% of females collect herbal medicinal plants from the local environment (Table 5). This shows that traditional values still play a major role in the practice of using herbal medicine among generations even in a developed society. The low percentage of both males and females collecting plants from the wild seems to reflect a non-nomadic type of life of a society with a high percentage of the population attaining tertiary education (UNESCO, 2009). Also, it reflects an environment with scarce herbal plants that flourish mainly during the wet season when the conditions are more favorable for plant growth (El-Oqlah and Abbas, 1992) with few individuals are seen collecting medicinal plants (Abbas and Al-Saleh, 2002). This correlates with the result shown in Table 5 which indicates that 75.7% of the population obtains medicinal plants from the herbalist (Hawaj).

Table 5. Practice and use of medicinal plants among respondents in relation to gender.

Practice Type	Category	Male N (%)	Female N (%)	Both Genders N (%)	P-Value
Use of Herbal Plants N = 301	Yes	150 (94.3)	137 (96.5)	287 (95.3)	0.397
	No	9 (5.7)	5 (3.5)	14 (4.7)	
Collection N = 273	Yes	14 (9.9)	9 (6.8)	23 (8.4)	0.401
	No	127 (90.1)	123 (93.2)	250 (91.6)	
Frequency of Herbal PlantUse N = 263	Always	11 (8.3)	22 (16.9)	33 (12.6)	0.070
	Frequently	26 (19.5)	33 (25.4)	59 (22.4)	
	Sometimes	75 (56.4)	58 (44.6)	133 (50.5)	
	Rarely	21 (15.8)	17 (13.1)	38 (14.5)	
Population N = 272	Self	51 (36.2)	40 (30.5)	91 (33.5)	0.650
	Family	76 (53.9)	77 (58.8)	153 (56.2)	
	Others	2 (1.4)	1 (0.8)	3 (1.1)	
	Animals	1 (0.7)	0 (0)	1 (0.4)	
	More than One Option	11 (7.8)	13 (9.9)	24 (8.8)	
Degree of Condition Seriousness N = 268	Simple	96 (69.6)	96 (73.9)	192 (71.6)	0.624
	Difficult	14 (10.1)	13 (10)	27 (10.1)	
	Chronic	12 (8.7)	12 (9.2)	24 (9)	
	More than One Option	16 (11.6)	9 (6.9)	25 (9.3)	
Source of Herbs N = 280	Hawaj	112 (76.7)	100 (74.6)	212 (75.7)	0.932
	Commercial outlets	12 (8.2)	11 (8.2)	23 (8.2)	
	Wild	1 (0.7)	0 (0)	1 (0.4)	
	Outside Bahrain	4 (2.7)	4 (3)	8 (2.8)	
	Others	1 (0.7)	1 (0.7)	2 (0.8)	
	More than one source	16 (11)	18 (13.5)	34 (12.1)	
Nature of Herbs N = 272	Raw/ unprocessed	44 (31)	31 (23.3)	75 (27.1)	0.011*
	Ready packed	35 (24.6)	19 (14.3)	54 (19.6)	
	Both	64 (44.4)	83 (62.4)	147 (53.3)	
Disorders Treated N = 364	All cases	72 (40)	58 (31.53)	130 (35.8)	0.401
	ENT	30 (16.6)	51 (27.7)	81 (22.2)	
	Eye	10 (5.6)	9 (4.9)	19 (5.2)	
	Skin	39 (21.7)	42 (22.8)	81 (22.2)	
	Piles	13 (7.2)	8 (4.4)	21 (5.8)	
	Vaginal inflammation	16 (8.9)	16 (8.7)	32 (8.8)	

* Significant difference at P = 0.05 level

The results also show that 42.3% of females compared to 27.8% of males use medicinal plants frequently or always. The more frequent use of medicinal plants by females is also found elsewhere. For example, Adams *et al.* (2007), in a study on consultations with naturopaths or herbalists in Australia, and Upchurch and Chyu (2005) in the USA, found that considerable proportions of middle-aged women consult herbalists or naturopaths.

The majority of respondents (90.1% males and 89.3% of females) use the plants for self treatment or for treatment of other members of the family. In such cases, medicinal plants are mostly used to treat simple ailments (69.6% of males and 73.9% of females).

Both genders (76.7% of males and 74.6% of females) obtain herbal remedies from the herbalist (Hawaj) whose outlets are well-scattered throughout Bahrain (Abbas and Al-Saleh, 2002). Despite the fact that new commercial outlets and the therapeutic outlets of other cultures such as Indian and Chinese cultures are increasing, local herbalists are still the major source of herbal remedies. Lev and Amar, (2002) reported that herbalist stores in Jordan represent a source for a large collection of traditional drugs. Significant statistical difference exists between males and females ($p = 0.011$) which was noted when it comes to the nature of medicinal herbs used. A total of 27.1% of respondents use raw, unprocessed herbs, however, a majority of males and females use either raw or ready-packed herbs.

Both males and females use the plants to treat ailments related to different body organs, particularly the skin and the ear, nose, and throat (ENT). However, eye diseases and piles problems were the least prescribed for, 5.6% and 7.2% of males, and 4.9% and 4.4% of females, respectively. It is worth mentioning that the organs which are most generally treated do not reflect the type or seriousness of the disease as much as the organs and the importance to the patient. For example, the eye is much more sensitive and precious and therefore is treated the least by the respondents. Also, a higher percentage of females (27.7%) compared to the males (16.6%) may reflect the role of woman in caring for children who have diseases related to the ear, nose, or throat. The relatively high result (8.9%) of male respondents regarding use of medicinal herbs for treating vaginal diseases was unexpected. However, our explanation is based on the fact that in Eastern Islamic culture gynecological diseases and disorders are a sensitive issue. Therefore, in this particular situation it is expected that the provider of the family is given the responsibility to purchase the remedies from the male herbalist. We have no record of any female herbalist in Bahrain. In Eastern societies, particularly the Middle East where Arabs and Muslims predominant, shyness and bashfulness is still a common socio-cultural phenomenon. The practice manifests the avoidance of direct contact between men and woman in many daily social activities, which explains the refraining of women practicing herbal medicine.

CONCLUSION

The present study demonstrates and confirms the importance of herbal medicine as a traditional medicine, for the treatment of non-serious illnesses in the Kingdom of Bahrain. A very high percentage of respondents (95.3%) use medicinal plants. When the result is considered for the whole sample, irrespective of gender, a negative correlation was found between use on one side and age and level of education on the other side. However, when gender is taken into consideration, monthly income and age group were negatively correlated with the use of medicinal plants. Both genders agreed that women are the prevalent of medicinal herbs, and a majority of both genders use raw or processed plants. No differences were found between males and females in relation to their attitudes and willingness to use medicinal plants.

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