COMPLEMENTARY PRACTICES OF HERBALISTS IN THE KINGDOM OF BAHRAIN

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ABSTRACT:

Background: The aim of the present study was to assess the general knowledge and practice of local herbalists regarding the use of medicinal plants for the treatment of various ailments.

Methods: The study utilized a pre-structured questionnaire to collect data. The sample consisted of 41 well-known, established and active herbalists in Bahrain.

Results: The majority of herbalists were male (95.1%) with a high school education. Almost half the respondents obtained their knowledge and training from parents and grandparents. The herbalists combine heritage, religious and cultural values in their profession. The majority (95.1%) of herbalists deal with manageable diseases despite the high confidence of patients in herbal medicine. The main ailments treated are diabetes, gastrointestinal problems, and hypertension.

Conclusions: Study findings indicate that most herbalists (95.1%) perceive their role to be one of providing complementary health care. The herbal profession in Bahrain needs to be preserved and developed based on a scientific methodology among the younger generations.

Keywords: Bahrain herbalists; Folk medicine; Medicinal plants

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INTRODUCTION

Plants have been used in traditional medicine since the origins of humanity by indigenous cultures for the treatment, control and management of many diseases [1]. The use of herbal remedies has dramatically increased worldwide during the past three decades. Simultaneously the need for ethno-botanical investigations has become ever more relevant for facilitating better and effective treatment. According to the World Health Organization (WHO), approximately 80% of the world's populations in developing countries depend on medicinal plants for their primary health care needs [2]. The widespread use of herbal medicine is mainly due to its cultural acceptability, availability and economic affordability.

The Kingdom of Bahrain is an archipelago composed of 33 islands located between Saudi Arabia and Qatar in the southwestern Arabian Gulf with a total area of 710 km^2. Throughout history, Bahrain due to its strategic location in the region has been a vital transit route connecting the Arabian Peninsula with Mesopotamia, Persia and the Indian subcontinent. Despite its small geographic area, Bahrain has a comparatively rich cultural and ethnic diversity; and it is known for its plant diversity with about 323 plant species [3]. From these plants, approximately 25% have been used in folk medicine to treat various human ailments. In fact, Bahrain is known for a long time as a main distribution center for herbal medicine among neighboring countries in the Arab Gulf region. Traditional medicine in Bahrain is based on herbal remedies; and it is faith-based, governed by the Islamic principles of Sharia. It is widely practiced by the local Hawaj (Bahraini herbalist) in herbal remedy shops scattered throughout the country [4]. Historically, traditional herbalists have operated in close proximity and association with the community members to treat

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various kinds of ailments. Accordingly, a number of previous studies [4-7] have attempted to preserve and maintain knowledge about medicinal uses of available plant resources in Bahrain.

In spite of the previous work reported on medicinal plants in Bahrain, further ethnobotanical investigations are needed to better understand and to fully document medicinal folk knowledge. This study therefore attempts to explore for the first time, to our knowledge, the traditional knowledge, attitude and behavior of local herbalists about the use of medicinal plants and herbal medicines for the treatment of various ailments in Bahrain.

METHODS

An extensive survey was performed on two scales with the purpose of identifying both male and female herbalists in the Kingdom of Bahrain. Firstly, researcher searched herbalist shops in different parts of the country via official records and phone directory that represented the registered herbalists. The majority of herbalists were male. The extensive search resulted in locating only 34 male herbalists, while no records of an officially registered female herbalist were noted in this study. Secondly, a database from the survey search, in addition to personal communication with local knowledgeable elders, was created containing the addresses of the home-based herbalists. It identified an additional five male and two female herbalists.

A pilot test of the questionnaire was performed on a random sample of ten individuals. Based on the feedback from the pilot testing, the questionnaire was revised and updated. Prior to the distribution of the questionnaire to those non-Arabic speaker herbalists, a simple test was conducted to evaluate their awareness of medicinal plants, diagnosis and treatments, practice and knowledge of herbal profession. The questionnaire was written in Arabic; and it had multiple choices from which to select. A total of 41 questionnaires were distributed to a selected sample of well known, established and active herbalists covering the different regions, cities, and villages of Bahrain. All of the respondents were Arabic-speaking with different dialects. Some were of old traditional life style, while others especially the young were more affected by modern Western lifestyle. A trained female student participated in the distribution of the questionnaire and assisted the illiterate respondents in filling the questionnaire in the form of an interview. Otherwise, the respondents filled the questionnaire by themselves. Moreover, the student was of immense help in distributing the questioner to home-based female herbalists, which could not be performed by a male student. A total of 41 valid responses were received and processed. Ten respondents were non-Bahraini; however, they can communicate well in Arabic. The herbal shops were owned and managed by Bahraini proprietors.

A pre-structured questionnaire consisting of 60 questions was designed to obtain information about the general knowledge, practice of medicinal plants, and attitude of local traditional herbalists in Bahrain. The first part of the questionnaire was about demographic data. This part included level of education, age group, monthly income, nationality, gender, and residential area. The second part included eight questions about general knowledge regarding herbalism as a profession including the degree of knowledge, source of knowledge, who uses herbal medication most, interest to train or pass on this career, and knowledge about native herbal plants. 12 questions were about the health care comprising the gender, nationality, age, level of education, monthly income of patient/referrals, as well as frequency of visits, compare the role of herbalists as an alternate to usual doctor visit, percentile of patients with chronic or modern diseases like AIDS, and cases of an authentic advise to patient for referral to doctor. 16 questions were about practice and use of plants including the use of herbal plants, composition, frequency of use, for whom the plant is used, degree of disease seriousness for which the herbal medicine is used, source of herb, nature of herb if raw or packed, and for what diseases it is used, newly developed preparations, side effects of some preparations and frequency of common and incurable diseases. 8 questions were about shipping and storage of herbs including number, weight, source type of medicinal plant shipment, quality of the shipment on arrival and storage protocol, if available. Three additional questionnaire questions (statements) were about the economy of the profession like number of referrals, time intensity of the year, and the monthly income of this profession. The quantitative data was coded and analyzed using SPSS statistical software (version 22.0).

RESULTS AND DISCUSSION

The demographic characteristics of the study sample of the 41 herbalists in Bahrain are presented in Table 1. The majority (68.3%) of respondents

Table 1 Demographic characteristics of herbalists in Bahrain (N=41)

Demography	N (%)
Age groups (years)	
20 - 39	2 (4.9)
40 - 59	28 (68.3)
60 and above	11 (26.8)
Gender	
Male	39(95.1)
Female	2(4.9)
Educational status	
Uneducated	7 (17.1)
Below secondary	13 (31.7)
Secondary school	21 (51.2)
Nationality	
Bahraini	31 (75.6)
Non-Bahraini	10 (24.4)
Place of work	
Manama	11 (26.8)
Muharraq	8 (19.5)
Riffa	7 (17.1)
Tubli	3 (7.3)
Jidhafs	2 (4.9)
Jid Ali	2 (4.9)
Others	8 (19.5)

were between 40 and 59 years. These results are very similar to that reported by Oran and Al-Eisawi [8] for local herbal shop owners of the high mountains region of northern Jordan. According to the authors, the dominance of this age category is most probably due to the fact that they are considered to have a good knowledge of using medicinal plants in traditional folk medicine [8]. The vast majority of the respondents (95.1%) were male; and more than 73% were less than 60 years old. This finding is consistent with other studies showing that trade in medicinal plants is traditionally a male dominated profession in Arab countries [7, 9]. Moreover, the surveyed female herbalists were home-based who had obtained the herbs from male-owned herbal shops. In agreement with previous studies [9,10], the level of education ranged from none (17.1 %) to having completed secondary school education (51.2 %). Most herbalists were Bahraini (75.6%); and they practiced their trade in shops scattered across the country with the majority (43.9%) of them located in the Capital Governorate (Table 1).

The results of this study revealed that the majority (73%) of respondents work full-time as herbalists (Table 2). Experience wise most of the herbalists had been in practice for 11 years or more (51.2%). This indicates that the profession plays a pivotal role in the community-based health care system recognized by the ongoing traditional dependence of the indigenous Bahraini population on folk medicine [7]. As for the issue of training and knowledge acquisition, nearly half the respondents (46.3%) had acquired their knowledge and training through vertical transmission from parents and grandparents. Similarly, 41% of herbalists in northern Algeria obtained their knowledge from parents and grandparents [9]. Only a small percentage (14.6%) of respondents learned the trade by apprenticeship from other herbalists. This low percentage could be partly explained by the fact that limited exchange of information or the know-how takes place between the practitioners of Arabic traditional medicine [2]. Furthermore, the present study indicated that religious teachings (46.4%) and heritage (43.9%) were reported to be major sources of herbal medicine practice. This could be explained by the deep rooted cultural and religious heritage underpinning for herbal medicine use in Bahrain and other Arab countries. When asked about the occupational aspirations they held for their children, the majority of respondents (87.8%) indicated that they wanted their children to follow in their footsteps (Table 2). At the same time, nearly half (46.3%) of respondents expressed the willingness to convey their knowledge to potential trainee herbalists. The preference to pass on the herbal profession to their children rather than others is not surprising, as most businesses in the Arab Gulf region are family-based; as such children are traditionally expected to carry on the family business.

In accordance with Lev and Amar [11], this study found that the medicinal plants sold in herbalist shops were mainly imported from Dubai (41.5%), India (26.8%), and Iran (12.2%) as shown in Table 3. Dubai being the main source of medicinal plants came as no surprise; as the emirate is the third most important re-export center in the world [12]. Nevertheless, respondents imported most of their herbs from abroad, despite the country's rich diversity of medicinal plants. It suggested the possible adverse effects of urbanization and unsustainable harvesting practices. Contrary to a previous study by Afifi and Abu-Irmaileh [13], all respondents in our study indicated awareness of the negative effects of storage time on the potency of medicinal plants in treating diseases. Storage conditions however varied with respondents citing plastic bags (70.7%), plastic containers (14.6%), cloth bags (29.3%), and wooden boxes (4.9%) as

Table 2 Knowledge of herbalists in Bahrain about herbal medicine (N=41)

Herbalist profile	N (%)
Years of experience	
1 - 5	7 (17.1)
6 - 10	13 (31.7)
11 - 20	8 (19.5)
21 - 30	7 (17.1)
31 - 40	4 (9.7)
41 - 50 and above	2 (4.9)
Source of knowledge	
Parents and grandparents	19 (46.3)
Family and indigenous knowledge	1 (2.4)
Self-education	16 (39)
Others	5 (12.2)
Herbalist's training	
Parents and grandparents	19 (46.3)
Family and indigenous knowledge	1 (2.4)
Study	12 (29.3)
Other herbalist	8 (14.6)
Others	3 (7.3)
Reliance on heritage resources for herbal medicine practice	
Always	8 (19.5)
Usually	10 (24.4)
Sometimes	8 (19.5)
Rarely	4 (9.8)
Never	11 (26.8)
Reliance on religious resources for herbal medicine practice	
Always	9 (22)
Usually	10 (24.4)
Sometimes	7 (17.1)
Rarely	4 (9.8)
Never	11 (26.8)
Additional occupation of herbalist	
Yes	11 (26.8)
No	30 (73.2)
Desirability for own child to practice herbal medicine	=
High	32 (78)
Moderate	4 (9.8)
Neutral	1 (2.4)
Low	2 (4.9)
No desire	2 (4.9)
Training others to become a herbalist	
Yes	19 (46.3)
No	21 (51.2)
Not applicable	1 (2.4)

appropriate methods of storing and preserving herbal plant parts. It was surprised that all the respondents indicated that they had stored their medicinal plants and herbal mixtures in poorly ventilated storage areas (78%) or in the herbal shop in direct sunlight (22%). Under such poor conditions the assurance of safety, quality and subsequent efficacy of the medicinal plants and herbal products, this can become a matter for concern.

Most herbalists (87.8%) indicated that the majority of their patients were Bahraini with moderate incomes of more than $1320 a month and mostly in the age range of 21-40 years old (Table 4). This is in agreement with our previous findings where we reported a relatively high percentage use of herbal medicinal plants among young Bahrainis [7]. No gender difference was reported in patients seeking herbal treatment by the majority of respondents (87.8%). This finding is inconsistent with a number of previous studies that have reported

Table 3 Herbalists' practice with regard to storage and shipment of medicinal plants (N=41)

Item	N (%)
Number of shipments received annually	
Between 1 and 5	5 (12.2)
Between 6 and 10	8 (19.5)
> 10	28 (68.3)
Main importers of medicinal plants	
Dubai	17 (41.5)
India	11 (26.8)
Iran	5 (12.2)
Saudi Arabia	2 (4.9)
Syria	1 (2.4)
Others	5 (12.2)
Package type of imported plants shipment	
Wooden boxes	1 (2.6)
Paper bags	1 (2.6)
Cloth bags	37* (94.9)
Inspection of shipment on delivery to ensure quality	
Always	39* (100)
Storage place for medicinal plants or herbal mixtures	
Refrigerator	-
Herbal shop	9 (22)
Steam or pantry	39 (78)
Method of storing medicinal plants or herbal mixtures	
Plastic containers	6 (14.6)
Wooden boxes	2 (4.9)
Plastic bags	29 (70.7)
Cloth bags	4 (9.8)
Efficacy of medicinal plants decreases with time	
Yes	41 (100)
No	-

* Two respondents did not indicate their practice

Table 4 Herbalists' opinion on patients' perception about health care in Bahrain (N=41)

Herbalist-patient perception	N (%)
Majority of patients	
Male	3 (7.3)
Female	2 (4.9)
Both	36 (87.8)
Nationality of patients	
All Bahraini	5 (12.2)
Majority Bahraini	36 (87.8)
Majority non-Bahraini	-
Age groups of patients seeking herbal medicine treatment (years)	
< 10	-
Between 11 and 20	1 (2.4)
Between 21 and 40	40 (97.6)
> 40	-
Social status majority of patients seeking treatment from herbalists	-
High income (≥ $2630 pcm)	41 (100)
Moderate income (≥ $1320 pcm)	-
Low income (≤ $650 pcm)	
Majority of the patients' health as described by the herbalists	
Serious health issues	1 (2.4)
Mainly chronic diseases	1 (2.4)
Mainly simple diseases	39 (95.1)

Table 4 Herbalists' opinion on patients' perception about health care in Bahrain (N=41) (cont.)

Herbalist-patient perception	N (%)
Confidence of patients in herbalists	
High	28 (68.3)
Moderate	13(31.7)
Low	-
Self-treatment or refer to physician during illness	
Self-treatment	6 (14.6)
Refer to physician	-
Both	35 (85.4)
Role of herbalist in supporting patient's general state of health	
Primary	1 (2.4)
Secondary	1 (2.4)
Complementary	39 (95.1)
Inquiry about patients seeing a physician	
Always	40 (97.6)
Usually	1 (2.4)
Extent of patients treated by herbalists without consulting a physician	
High	1 (2.4)
Moderate	28 (68.3)
Low	12 (29.3)
Extent of patients treated by herbalists and physicians in the same period	
High	2 (4.9)
Moderate	37 (90.2)
Low	2 (4.9)
Extent of patients consulting herbalists for intractable diseases, such as HIV/AIDS	
High	3 (7.3)
Moderate	17 (41.5)
Low	20 (48.8)
Do not know	1 (2.4)
Herbalist prescribing treatment for patients with intractable diseases	
Always	15 (36.6)
Usually	17 (41.5)
Sometimes	1 (2.4)
Rarely	4 (9.8)
Never	4 (9.8)
Extent of required patient treatments needing several visits to the herbalist	
High	2 (4.9)
Moderate	33 (80.5)
Low	6 (14.6)
Reasons for patient referrals to physicians	
Inability to diagnose the disease	39 (95.1)
Exhausted herbal treatment	1 (2.4)
Severe intractable diseases	1 (2.4)
Incidence of disease in a specific area in Bahrain	
Yes	3 (7.3)
No	38 (92.7)

the predominance of women users of alternative medicine in a number of societies [14, 15]. A possible explanation could be due to the fact that Bahraini men and women are equally well educated. Still another explanation is that women and children are traditionally treated by home-based female herbalists.

It is interesting to note that the majority of respondents (68.3%) believed that patients had a high level of confidence in herbalists. This is not surprising knowing that more than three quarters of the indigenous population in Bahrain rely on herbalists to provide them with medicinal plants [4]. One the other hand, most respondents (95%) indicated that they normally refer the patient to a physician for a medical diagnosis (Table 4). These

Table 5 Herbalists' perspective on the economics of herbalism in Bahrain (N=41)

Item	N (%)
Average daily number of patients seeking herbalists for treatment	
< 5	1 (2.4)
Between 5 and 10	2 (4.9)
Between 11 and 20	3 (7.3)
> 20	35 (85.4)
Peak seasons for patients seeking herbalists for treatment*	
Summer	30 (73.2)
Winter	10 (24.4)
Muharram	5 (12.2)
Safar	5 (12.2)
Ramadan	30 (73.2)
Off-peak seasons for patients seeking herbalists for treatment*	
Summer	10 (24.4)
Winter	10 (24.4)
Muharram	22 (53.7)
Safar	29 (70.7)
Ramadan	4 (9.8)
Average monthly income [Bahraini Dinar (1 USD = 0.38 BD)]	
< 200	2 (4.9)
Between 200 and 500	5 (12.2)
Between 500 and 1000	8 (19.5)
> 1000	26 (63.4)

* Percentages do not add up to 100% because of multiple responses.

results are very similar to that reported by Casey et al. [16] for professional herbalists in Australia. They found that the majority (93%) of respondents had regularly referred patients to medical practitioners; and 86% of herbalists did not perceive their role to be one of primary diagnosis of medical conditions [16]. Nevertheless, the herbalists (95.1%) acknowledged their complementary rather than primary role in supporting the general health state of patients. This implies that there is an awareness of the importance of orthodox medicine. This is clearly evident that the vast majority (95.1%) of respondents have indicated treating patients with minor, as opposed to chronic and severe, conditions (Table 4). When asked about the extent to which patients with serious illnesses such as cancer or viral infection consulted them, 48.8% said they represented a high to moderate percentage; 48.8% said they represented a low percentage; and 9.8% had seldom or never been consulted. This could be explained partly by the high confidence in traditional medicine as a natural source of treatment and personal experience among the indigenous population of Bahrain [4]; and partly by the fact that patients with advanced illness turn to herbalists and other forms of traditional medicine for hope after conventional treatment fails.

The majority (90.2%) of respondents believed to a moderate extent that patients taking herbal remedies as alternative medication were simultaneously being treated by physicians (Table 4). This is in agreement with a number of previous studies reporting the concomitant use of herbal agents and conventional medications [17, 18]. Interestingly, the practice of combining conventional medicine and non-orthodox treatment was acknowledged by the majority (85.4%) of herbalists in managing their own illnesses. Contrary to previous studies which have found that physicians often fail to ask their patients about their use of herbal or alternative therapy [19-21]. Nearly all respondents (97.6%) routinely asked patients whether they were receiving orthodox treatment (Table 4).

The majority of respondents (63.4%) stated they earned more than BD 1000; and 19.5% earned between BD 500 and BD 1000 (Table 5). With an average income of BD 513 ($1350) a month for Bahrainis [22], traditional medicine represents an important source of income for many of the respondents. Moreover, the relatively high monthly income reported in this study might be attributed to the fact that demand for herbal medicine in Bahrain is exceptionally high; furthermore, the herbalist is the primary source of medicinal plants for the majority of Bahrainis [4]. Lev and Amar [11] further

Table 6 Herbalists' practice with regard to herbal remedies in Bahrain (N=41)

Item	N (%)
Inquiry about the patient's history of disease	
Always	38 (92.7)
Usually	3 (7.3)
Physical examination of patient to determine the correct diagnosis	
Always	2 (4.9)
Usually	1 (2.4)
Sometimes	1 (2.4)
Rarely	1 (2.4)
Never	36 (87.8)
Majority of herbal remedies prescribed (i.e. preparation method)	
Ready-made	29 (70.7)
Prepared in the shop	7 (17.1)
Prepared by patient him/herself	5 (12.2)
Majority of ready-made herbal remedies	
Self-prepared	37 (90.2)
Purchased-prepared	4 (9.8)
Majority of herbal remedies prescribed (i.e. component)	
Single	27 (65.9)
Compound	14 (24.1)
Majority of herbal remedies prescribed (i.e. nature)	
Dry	39 (95.1)
Liquid	2 (4.9)
Resources used to prepare herbal remedies	
Memory	41 (100)
Notebooks	-
Heritage books	-
Religious books	-
Existence of rare herbal remedies	
Yes	36 (87.8)
No	5 (12.2)
Resources used to prepare unfamiliar/specific herbal remedies	
Search in books	14 (31.4)
Consult fellow herbalist	24 (58.5)
Others	2 (4.9)
Not applicable	1 (2.4)
Innovation in developing new herbal remedies	
Always	23 (56.1)
Usually	7 (17.1)
Sometimes	6 (14.6)
Rarely	-
Never	5 (12.2)
Experienced cases of incurable illnesses	
Yes	41 (100)
No	-
Potential side effects of some herbal remedies	
Yes	39 (95.1)
No	2 (4.9)
Patients clearly informed of possible side effects	
Yes	41 (100)
No	-
Origin of ready-made remedies	
Bahrain	36 (87.8)
Outside Bahrain	5 (12.2)

Table 6 Herbalists' practice with regard to herbal remedies in Bahrain (N=41) (cont.)

Item	N (%)
Collaboration with other herbalists outside Bahrain to treat some diseases	
Always	10 (24.4)
Usually	18 (43.9)
Sometimes	4 (9.8)
Rarely	2 (4.9)
Never	7 (17.1)

noted the flourishing trade of herbal medicines in Jordon. Most respondents (85.4%) reported seeing more than 20 patients daily, while only 4.9% and 2.4% reported being visited by 5-10 patients daily and less than five patients per day, respectively. This reflects the higher trade in traditional medicinal herbs in urban areas than in rural settings. When asked about the time of the year during which demand for herbal treatment is highest, most respondents (73.2%) cited the holy month of Ramadan with a similar percentage reporting the summer months as being periods of high patient loads (Table 5). It is well known that during the fasting month of Ramadan, dietary patterns are changed such that the intake of meat and traditional sweets is increased. This, in turn, may have a negative impact on health and well-being [23]. Moreover, the common practice of ingesting large amounts of foods rich in carbohydrates at the sunset meal during Ramadan could cause gastrointestinal disturbances and flatulence.

Most herbalists (92.7%) indicated that they routinely ask patients about their medical history (Table 6). On the other hand, the majority of respondents (87.7%) did not integrate physical examination into their consultation activities. This finding fits with previous surveys in other Arab countries; in which it revealed the lack of formal education in the field of medicine and pharmacy among the majority of practitioners of herbal medicine [2,10]. Further evidence is the fact that all the participants acknowledged their inability to provide treatments for certain diseases. However, the result of this study is not in agreement with Casey et al. [16] who reported that the majority of trained and certified professional herbalists in Australia carried out physical examinations to facilitate diagnosis. The majority (70.7%) of herbal remedies prescribed by the practitioners were ready-made, as opposed to only 17.1% being prepared in the shop. Furthermore, most of the ready-made herbal remedies (87.8%) prescribed by the herbalists were prepared locally.

Almost all (95.1%) of the remedies prescribed were in the dried form. This is not surprising, especially since dried plant material is the most popular form of herbal medicine; as it offers the advantage of increased shelf life [24]. Herbal remedies prescribed by the majority of participants (65.9%) were mainly based on preparations made from a single plant; and 24.1% were prepared from multiple plant species (Table 6). Similar findings were reported by other studies [25,26]. While all the respondents relied on memory to prepare familiar remedies, 58.5% had asked other herbal practitioners and 31.4% referred to books as facilitating resources for the preparation of unfamiliar or specific herbal remedies. Azaizeh et al. [2] similarly reported the use of Arabic traditional medicine texts by practitioners in the Middle East to complement their experiential knowledge.

When asked whether they developed new herbal remedies, 56% indicated they always included new herbal products; 17% usually included new products; and 12% stated they did not include new products in their shop (Table 6). This is in an agreement with Mati and Boer [27], who reported that herbalists in the Kurdish region of Iraq were keen to innovate and add new medicinal products to their inventories. The views of the respondents on the potential side effects from herbal remedies showed that 95.1% believed some herbal remedies had possible side effects; whereas, 4.9% did not believe herbal products had any side effects. This belief is in line with previous studies showing the different side effects of herbal medicines [28,29]. With regard to informing patients about medication side effects, all the respondents acknowledged that patients were informed about the possible side effects of herbal medication. In terms of exchange of information between the respondents and other herbalists at the regional level, the findings of this study showed that the majority of respondents (78.1%) had indicated a positive collaboration with other herbalists outside Bahrain; as compared to 21.9% of the herbalists who indicated very little or

Table 7 Medicinal herbs and herbal water commonly prescribed by herbalists in Bahrain (N=41) for treatment of diseases, ranked by prevalence

Scientific name	Arabic name (Common English name)	Family	Frequency (%)	Part used	Medicinal uses
Thymus vulgaris L.	Zaatar (Thyme)	Lamiaceae	33 (80.5)	Leaves	Antitussive, Antihypertensive, Bronchitis, Colic, Gastralgia, Carminative
Trigonella foenum-graceum L.	Helba (Fenugreek)	Fabaceae	27 (65.9)	Seeds	Diuretic, Antidiabetic, Oxytocic, Emmenagogue, Antirheumatic
Peganum harmala L.	Harmal (Wild Rue)	Zygophyllaceae	13 (31.7)	Leaves	Anthelmintic, Galactogenic, Odontalgia
Matricaria chamomilla L.	Babong (Chamomile)	Asteraceae	11 (26.8)	Flowers	Dyspepsia, Antispasmodic, Carminative, Bronchitis
Nigella sativa L.	Habba Souda (Black Seed)	Ranunculaceae	8 (19.5)	Seeds	Carminative, Antidiabetic, Spasmolytic, Analgesics Antihypertensive, Nephro- and Hepato-protective Anti-inflammatory
Hibiscus sabdariffa L.	Karkade (Hibiscus)	Malvaceae	7 (17.1)	Calyces	Antihypertensive, Nephro- and Hepato-protective
Alhagi maurorum Medik.	Heej (Camelthorn)	Fabaceae	6 (14.6)	Stems	Antidiabetic, Jaundice, Nephro- and Hepato-protective
Pimpinella anisum L.	Yansoon (Anise)	Apiaceae	6 (14.6)	Seeds	Antitussive, Bronchitis, Halitosis, Colic, Analgesic
Lepidium aucheri Boiss.	Rashad (Cress)	Brassicaceae	6 (14.6)	Seeds	Antihypertensive, Laxative, Analgesic, Antirheumatic, Hypoglycemic
Teucrium polium L.	Ja'dah (Felty Germander)	Lamiaceae	6 (14.6)	Leaves	Antidiabetic, Anthelmintic, Carminative, Emmenagogue
Cassia fistula L.	Khiyar Shambar (Golden Shower)	Fabaceae	6 (14.6)	Fruits	Purgative, Antipyretic, Antiulcer, Anti- inflammatory
Origanum vulgare L.	Margadoosh (Oregano)	Lamiaceae	6 (14.6)	Leaves	Colic, Gastritis
Terminalia bellirica (Gaertn.) Roxb.	Beliledj (Beleric)	Combretaceae	5 (12.2)	Seeds	Antidiabetic, Antidiarrheal, Aperient
Commiphora myrrha L.	Murrah (Myrrh)	Burseraceae	4 (9.8)	Resins	Colic, Gastralgia, Anthelmintic
Senna alexandrina L.	Ishrig (Senna)	Fabaceae	3 (7.3)	Leaves	Laxative, Purgative
Cinnamomum zeylanicum L.	Darseen (Cinnamon)	Lauraceae	2 (4.9)	Bark	Antidiabetic, Metrorrhagia, Dyspeptic, Anti-inflammatory
Foeniculum vulgare L	Hilwah (Fennel)	Apiaceae	1 (2.4)	Seeds	Hepatoprotective, Aperient, Carminative, Dyspepsia, Antithrombotic
Cichorium endivia L.	Hendban (Wild Endive)	Asteraceae	1 (2.4)	Leaves	Antidiabetic, Jaundice, Analgesic, Choleretic
Phoenix dactylifera L.	Maa Al-laqah (Date Palm)	Arecaceae	1 (2.4)	Spathe	Aphrodisiac, Calmative, Coolant, Oxytocic
Trachyspermum ammi L.	Maa Zamootah (Ajwain)	Apiaceae	1 (2.4)	Seeds	Ureterolithiasis, Metrorrhagia, Carminative, Aperient
Ricinus communis L.	Kharwaa (Castor)	Euphorbiaceae	1 (2.4)	Seeds	Laxative, Galactogenic

no regional collaboration (Table 6).

The most frequent diseases treated by the respondents were diabetes, gastrointestinal problems, and hypertension. All of which have a connection to unhealthy dietary patterns (Table 7). Recent statistics showed that endocrine, nutritional and metabolic diseases (e.g. diabetes) are the second leading causes of death in Bahrain after cardiovascular diseases [30]. Furthermore, according to the most recent figures released by the International Diabetes Federation, Bahrain is ranked 12th worldwide for the prevalence of diabetes (in adults aged 20 to 79 years) with 15.6% [31]. Obesity, lack of physical activity, unsound food habits, and change in social conditions have all been associated with the progressive increase of diabetes in Bahrain and other Arab countries [23, 32]. It is therefore not surprising to find that diabetes was cited by the majority of respondents as the most frequently treated disease. Other less frequently mentioned illnesses were: genitourinary disorders, skin problems, asthma and nonspecific symptoms (e.g., headache, fatigue, and fever).

The medicinal plants prescribed by the herbalists in this study correlated to the most common treated diseases (Table 7). For example, diabetes was reportedly treated by *Trigonella foenum-graecum* (65.9%), *Nigella savita* (19.5%), *Alhagi maurorum* (14.6%), and *Teucrium polium* (14.6%); hypertension was treated by *Thymus vulgaris* (80.5%), *Hibiscus sabdariffa* (17.1%) and *Lepidium aucheri* (14.6%). Gastrointestinal problems were alleviated by *Matricaria chamomilla* (26.8%), *Pimpinella anisum* (14.6%), and *Origanum vulgare* (14.6%); flatulence was treated by *Matricaria chamomilla* (26.8%), and *Teucrium polium* (14.6%). These results are consistent with those previously reported by others [7,10].

All the respondents dealt with well-known safe medicinal herbs. The most frequently used plants included *Thymus vulgaris*, *Trigonella foenum-graceum*, *Peganum harmala*, *Matricaria chamomilla*, and *Nigella sativa*. These plant species are well known for their medicinal properties and widely used in traditional medicine in many Arab countries [5, 7, 13]. With regard to herbal medicinal water, very few respondents indicated that they would prescribe the natural remedy for the treatment of different diseases. This is rather surprising considering the fact that Bahrain is well known for producing and exporting herbal water to neighboring Arab Gulf countries where consumer demand is high [33]. One possible explanation could be that the herbalists promote and sell their own herbal remedies unlike herbal water, which is largely produced by family-owned factories; and it is readily available over the counter in supermarkets and other retail outlets.

It is worth mentioning that many indigenous medicinal plants known to be used traditionally for the treatment of a wide range of ailments; in Bahrain were not cited by the herbalists. Well documented examples include *Capparis spinosa*, *Suaeda vermiculata*, *Asphodelus tenuifolius*, and *Aizoon canariense* [5, 7]. This observation undoubtedly highlights a concern that much of the ethnopharmacological knowledge of traditional medicine in Bahrain is in danger of disappearing. Notably, the accelerated loss of indigenous knowledge on medicinal plants is not limited to a specific country or region. As several surveys from different countries have shown a similar trend [34, 35].

The limitations of this study mainly stem from the limited number of female respondents. Finding a female experienced herbalist proved to be a difficult task due to the elderly age factor and the conservative nature of this profession. Another limitation was that the study did not explore the role of religion, culture or tradition as the possible main reason for consulting the local herbalist. Moreover, it is noted that herbalists have not taken appropriate measures to store their herbal remedies.

CONCLUSIONS

The preservation of traditional herbal knowledge is essential for ensuring continuity and transmission of the rich heritage in folk medicine, which risks being lost. This study has shown that religion and heritage continue to play a vital role in the herbalist profession. The surveyed herbalists did not have a sufficient scientific basis for diagnosis and rely primarily, in their method of treatment, on vertical transmission of knowledge passed down from generation to generation. However, the herbal practice is in danger of dying out if members of the younger generation do no become engaged. It is therefore encouraged that local herbalists engage in discussion forums, meetings and attend workshops to help develop and modernize the profession. Such development should be based on solid scientific foundations, thereby allowing herbalists to make evidence-based treatment recommendations for the treatment of patients. More importantly, storage

conditions must be improved. Herbalists should consider the safety aspect of the processed medicinal plant materials. Prompted by the findings of this study, the concerned government authorities should support and sustain the herbalists and their knowledge to maintain the rich heritage in herbal medicinal practices of the country.

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