Ethnopharmacy of Selected Medicinal Plants in a Group of Infants of Educated and Employed Mothers in Amman City

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Abstract: *Background*: Employed mothers have little time for infant care and doctor visit. They resemble other women who prefer using medicinal plants to treat minor and self-limited medical problems.

Objective: To investigate the frequency of using selected medicinal plant among infants of educated and employed mothers and the indications of use for these medicinal plants in Jordan.

Methods: Observational study was conducted on employed mothers of 100 infants (50 males; 50 females) aged between 2-12 months in Jordan. Infants were divided according to gender into males and females and they were further subdivided into < 6 months and ≥6 months according to age. Infants' mothers were interviewed and asked about the usage and indications of the selected medicinal plants. The health and socio-demographic data were collected by the principal investigator through a valid and reliable questionnaire.

Results: Employed mothers frequently used medicinal plants to treat infantile colic, constipation, coughing or inability to sleep. The most frequently used medicinal plant among employed mothers was anise, *Pimpinella anisum* (44%) especially for infants aged <6 months which was negatively correlated with infantile colic and positively correlated with induce sleep indication. *Thymus vulgaris* was commonly used to treat cough (40%) followed by both chamomile, *Matricaria aurea* and anise, *Pimpinella anisum* (30%) while, sage, *Salvia triloba* was the most frequently used medicinal plants to treat infantile colic (35.71%).

Conclusion: Employed and well-educated mothers frequently used medicinal plants among their infants. The safety of using medicinal plants among infants is questionable.

Keywords: Employed mothers, Ethnopharmacy, Infants, Medicinal plants.

1. INTRODUCTION

Employed mothers aim to improve the socio-economic status of their infants and the whole family [1, 3]. The impact of maternal work on infant's health and well-being have been investigated by many studies [1-4]. Infants of working mothers frequently suffer from medical problem; as the employed mothers have little time for infant care and doctor visit [2,5-6]. They are just like other women who prefer using medicinal plants to treat minor and self-limited medical problems based on previous self-experience or recommendation by family members or friends [7]. Mothers, even employed ones, are still the major caregiver despite of alternatives such as nursery. It has been demonstrated that their awareness and education about the use of medicinal plants plays a crucial role in infants and child care [8]. The reasons why employed mothers use medicinal plants among their infants are not yet understood; due to lack of studies; however, it may be because they want to have active responsibility in their infant's healthcare through the use of what they believed natural, safe and effective as medicinal plants [9]. Other reasons include the dissatisfaction and fear of conventional therapy side effects [10-11] especially those which interfere with infant's growth and development [12] whereas enhancing the effect of conventional therapy is another reason for the use of medicinal plants [13]. The worldwide prevalence of medicinal plant use is on the rise and may reach up to 61 percent among adults [14]. In developing countries, about 4000 million people regularly use medicinal plants and believe in their efficacy [15-16]. However, the effects of medicinal plants use on infant's growth and development are unknown, giving that infancy is a critical period of phenomenal growth and development with considerable age related differences in pharmacokinetics and pharmacodynamics between infants and adult [8]. Jordan (29°11 N 33°22 E) is a small country with distinguished geographical position at the meeting point for three continents: Asia, Africa and Europe, in addition to the special climate that is influenced by moderating Mediterranean factor and drying factor of the desert [17]. This strategic zone is plentiful with diverse types of wild plants with a total of 2000 plant species, belonging to 700 genera [18]. It is estimated that more than 49 plant families having excess of 120 plant species used in Jordanian traditional medicine [19]. The current study aimed to investigate the frequency of selected medicinal plant

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use among infants of educated and employed mothers and the indications of use for these medicinal plants in Amman, Jordan.

2. METHODS

2.1. Study Population and Design

A cross-sectional observational study was conducted on employed mothers of 100 infants (50 males; 50 females) aged between 2-12 months and randomly recruited from nurseries in Amman, Jordan. Infant's mothers who agree to participate were interviewed and asked about the usage and indications of medicinal plants among their infants. The utilization of the following medicinal plants were evaluated: anise, *Pimpinella anisum*; chamomile, *Matricaria aurea*; peppermint, *Mentha piperita*; sage, *Salvia triloba* and thyme, *Thymus vulgaris*. For each medicinal plant common and *scientific* (Family) names were used. The selected medicinal plants indications were to treat colic, cough, constipation and to induce sleep. Infants were divided according to gender into males and females and they were further subdivided into < 6 months and ≥6 months according to age. The infant was excluded if she or he aged more than 12 or less than 2 months or they were a non- user of medicinal plants and if his or her mother's refused to participate in this study. Also, infants with acute or chronic medical illness. The health and socio-demographic data were collected by the principal investigator through a valid and reliable questionnaire. This study was conducted according to the Declaration of Helsinki (2008, including 2013 amendments) and an informed consent form was obtained from each infant's mother who agreed to participate in the study.

2.2. Statistical Analysis

All statistical analysis was performed using SPSS version 16.0 (SPSS Inc., Illinois, US). Collected data were entered twice in data sheets, checked and analyzed. Descriptive statistics were performed using. Chi-square (χ^2) and Fisher's exact tests were applied to assess the associations among dichotomous and categorical variables such as gender, age groups and indications. The correlation between each medicinal plants and indications were obtained and p-value $\leq$ 0.05 or $\leq$ 0.01 were considered significant.

3. RESULTS

In the study sample, 100% of employed mothers have used at least one medicinal plant for their infants to treat some mild symptom of colic, constipation, cough or inability to sleep. All of them took the responsibility of using the medicinal plant based on traditions or previous experience from others. They believed in the efficacy and safety of these plants which were commonly used in surrounding community. The employed mothers in this study were notably educated; about 91% of them have finished diploma or bachelor degree whereas the remaining have completed high school level education.

The frequency of medicinal plant use among infant (2-12) months according to gender are shown in Table **1**. The use of medicinal plants was not significantly different (p>0.05) among male and female infants. In the total sample, the most frequently used medicinal plant was Anise, *Pimpinella anisum* (44%) followed by Chamomile, *Matricaria aurea* (20%) and Peppermint, *Mentha piperita* (16%) whereas, the use of Sage, *Salvia triloba* and Thyme, *Thymus vulgaris* were less frequent (12% and 8% respectively).

The frequency of medicinal plant use among infant (2-12) months according to age are given in Table **2**. The use of Anise, *Pimpinella anisum* in infants aged less than 6 months was significantly ($p \leq 0.05$) higher (58.3%) than infants aged 6 months and more (30.7%) and the use of Chamomile, *Matricaria aurea* was

Table 1: The Frequency of Medicinal Plant Use among Infants (2-12) Months According to Gender[1]

Medicinal plants scientific name (Family)	Common names	Females (N=50)	Males (N=50)	Total sample (N=100)	P-value
		N (%)	N (%)	N (%)	
Matricaria aurea (Compositae)	Chamomile	12 (24.0%)	8 (16.0%)	20 (20.0%)	0.480
Mentha piperita (Lamiaceae)	Peppermint	4 (8.0%)	12 (24.0%)	16 (16.0%)	0.247
Pimpinella anisum (Umbelliferae)	Anise	26 (52.0%)	18 (36.0%)	44 (44.0%)	0.254
Salvia triloba (Labiatae)	Sage	5 (10.0%)	7 (14.0%)	12 (12.0%)	0.209
Thymus vulgaris (Labiatae)	Thyme	6 (12.0%)	2 (4.0%)	8 (8.0%)	0.305

[1]The use of medicinal plants was not significantly different (p>0.05) according to gender.

Table 2: The Frequency of Medicinal Plant Use among Infants (2-12) Months According to Age[1]

Medicinal plants scientific name (Family)	Common names	< 6 months (N=48)	≥6 months (N=52)	Total sample (N=100)	P-value
		N (%)	N (%)	N (%)	
Matricaria aurea (Compositae)	Chamomile	6 (12.5%)	14 (26.9%)	20 (20.0%)	0.047
Mentha piperita (Lamiaceae)	Peppermint	6 (12.5%)	10 (19.2%)	16 (16.0%)	0.399
Pimpinella anisum (Umbelliferae)	Anise	28 (58.3%)	16 (30.7%)	44 (44.0%)	0.050
Salvia triloba (Labiatae)	Sage	6 (12.5%)	6 (11.5%)	12 (12.0%)	0.453
Thymus vulgaris (Labiatae)	Thyme	2 (4.16%)	6 (11.5%)	8 (8.0%)	0.336

[1](*) The Chi-square statistic is significant at the $p \leq 0.05$ level.

significantly ($p \leq 0.05$) higher in infants aged 6 months and more comparing with those aged less than 6 months (12.5% vs. 26.9%). The use of Peppermint, *Mentha piperita* (12.5% vs. 19.2%), Sage, *Salvia triloba* (12.5% vs.11.5%) and Thyme, *Thymus vulgaris* (4.16% vs.11.5%) were not significantly higher ($p > 0.05$) among older infants (aged ≥ 6) compared with younger infants (aged < 6) respectively.

The frequency of medicinal plants utilization in infants according to given indications are shown in Table **3**. In the total sample, the indications of Medicinal plants use were 28% to treat colic, 20% for cough, 30% to induce sleep and 22% to treat constipation. The most frequently used medicinal plant to treat infant colic was Sage, *Salvia triloba* (35.71%) and colic was the most common indication for its use ($p > 0.05$). The use of Anise, *Pimpinella anisum* in infants was notably high ($p \leq 0.01$) to induce sleep (73.33%) however, the least frequent indication ($p \leq 0.01$) for its use was to treat colic (7.14%). The commonly used medicinal plant ($p \leq 0.01$) to treat cough was Thyme, *Thymus vulgaris* (40.0%) followed by both Chamomile, *Matricaria aurea* and Anise, *Pimpinella anisum* (30.0%). The later was also commonly used to treat constipation. The indication to use Peppermint, *Mentha piperita* ($p > 0.05$) was to treat infant colic and constipation (28.57% and 27.27%) respectively.

The correlation coefficient between medicinal plants and indications of use among infants are shown in Table **4**. Sage, *Salvia triloba* was positively correlated ($r = 0.418$, $p \leq 0.01$) with colic treatment and it was negatively correlated with other indications ($p > 0.05$). While thyme, *Thymus vulgaris* was positively correlated ($r = 0.590$, $p \leq 0.01$) with cough treatment and it was negatively correlated with other indications ($p > 0.05$). Chamomile, *Matricaria aurea* was positively correlated ($p > 0.05$) with colic treatment ($r = 0.160$) and cough ($r = 0.125$) and it was negatively correlated ($p > 0.05$) with induce sleep ($r = -0.145$) and constipation treatments ($r = -0.089$). Whereas, Anise, *Pimpinella anisum* was negatively correlated with colic treatments ($r = -0.434$, $p \leq 0.01$) and cough ($r = -0.141$, $p > 0.05$) and positively correlated with induce sleep ($r = 0.434$, $p \leq 0.01$) and constipation treatments ($r = 0.210$, $p > 0.05$). The indication to use Peppermint, *Mentha piperita* was positively correlated ($p > 0.05$) with colic ($r = 0.239$) and constipation treatment ($r = 0.163$) and it was negatively correlated ($p > 0.05$) with induce sleep ($r = -0.151$) and cough treatments ($r = -0.218$).

Table 3: The Frequency of Medicinal Plants Utilization in Infants According to given Indications[1]

Medicinal plants scientific name (Family)	Common names	Colic	Coughing	Induce sleep	Constipation
		N (%)	N (%)	N (%)	N (%)
Matricaria aurea (Compositae)	Chamomile	8 (28.57%)	6 (30.0%)	4 (13.33%)	2 (9.09%)
Mentha piperita (Lamiaceae)	Peppermint	8 (28.57%)	0 (0.00%)	2 (6.67%)	6 (27.27%)
Pimpinella anisum (Umbelliferae)	Anise	2 (7.14%) **	6 (30.0%)	22 (73.33%) **	14 (63.64%)
Salvia triloba (Labiatae)	Sage	10 (35.71%)*	0 (0.00%)	2 (6.67%)	0 (0.00%)
Thymus vulgaris (Labiatae)	Thyme	0 (0.00%)	8 (40.0%) **	0 (0.00%)	0 (0.00%)
Totals N=100	-	28 (28%)	20 (20%)	30 (30%)	22 (22%)

[1](*) The Chi-square statistic is significant at the $p \leq 0.05$ level and (**) the Chi-square statistic is significant at the $p \leq 0.01$ level among indications for each medicinal plant.

Table 4: The Correlation Coefficient between Medicinal Plants and Indications of Use among Infants[1]

Medicinal plants scientific name (Family)	Common names	Indication			
		Colic	Coughing	Induce sleep	Constipation
Matricaria aurea (Compositae)	Chamomile	0.160	0.125	-0.089	-0.145
Mentha piperita (Lamiaceae)	Peppermint	0.239	-0.218	-0.151	0.163
Pimpinella anisum (Umbelliferae)	Anise	-0.434**	-0.141	0.434**	0.210
Salvia triloba (Labiatae)	Sage	0.418**	-0.202	-0.123	-0.075
Thymus vulgaris (Labiatae)	Thyme	-0.175	0.590**	-0.184	-0.157

[1](**) The Chi-square statistic is significant at the p≤ 0.01 level.

4. DISCUSSION

In this study 100% of employed mothers are well educated and have used at least one medicinal plant for their infants. Similarly, it has been shown that women preferred using medicinal plants to treat minor and self-limited medical problems [7]. Probably because they want to have an active responsibility in their infant's healthcare through what they believe safe and effective approaches compared with synthetic drugs [9]. In a Nigerian study by Nwaiwu and Oyelade, which aimed to document the herbal medicines used for common ailments in neonates and infants less than six months, 72% of the mothers agreed they used medicinal plants in neonates and infants, while 100% of the mothers perceived the effectiveness of them [8]. However, the same study has shown that about 40% of mothers were primary or not educated [8], these differences in education level may be because of the study population; as all of our study sample were employed mothers and from Jordan, which is a country with strong education system that provides free education for all primary and secondary school students, and compulsory for all Jordanian children to the age of fifteen [20].

In this study, the employed mothers took the responsibility of medicinal plants utilization for their infants. Many studies, all of which were at the local level, have been conducted worldwide to understand the effect of gender on medicinal plant knowledge [21, 27]. However, the results were not conclusive [28]. In consistence with this study, some studies demonstrate that females in general were more interconnected to medicinal plants usage [21-22] while, other studies have reported higher male knowledge and usage of medicinal plants [23-24]. Similar usage and knowledge of medicinal plants among females and males were also indicated by several studies [25-27]. Employed women may want to have a more active responsibility in their infant's healthcare through the use of what they believed natural, safe and effective as medicinal plants [9] because they need to compensate the time spent in work instead of taking care of their infants.

In this study, the most frequently used medicinal plant was Anise, *Pimpinella anisum* (44%) followed by Chamomile, *Matricaria aurea* (20%) which was positively correlated with treatments of colic and cough indications (p>0.05). In coincide with these results, Abu-Irmaileh and Afifi in a study to know the commonly used medicinal plants in Jordan have reported Anise, *Pimpinella anisum* and Chamomile, *Matricaria aurea* among the most common used herbs in Jordan [29]. However, in the same study, Sage, *Salvia triloba* and Thyme, *Thymus vulgaris* were reported as most common and commonly used herbs respectively, which oppose with the current study as the use of both medicinal plants among infants were not frequent (12% and 8% respectively).

The current study showed that Sage, *Salvia triloba* was the most frequently used medicinal plants (p≤0.01) to treat infantile colic. In coincide with these results, Aburjai *et al*. in a study about ethnopharmacology of medicinal plants in the north of Jordan (Ajloun Heights), have reported a frequent use of Sage, *Salvia triloba* as antispasmodic [30] same results were also found in Tafila region in the south of Jordan [31]. Despite of common use of Sage, *Salvia triloba* in Jordan [29-31]; the use of this medicinal plant is not recommended among infants because of the toxic effect of some bioactive compounds such as camphor and terpene ketones [32-33].

The present study showed that Anise, *Pimpinella anisum* was used more frequently among infant aged < 6 months and it was also negatively correlated (p≤0.01) with infantile colic treatments and positively correlated (p≤0.01) with induce sleep indication. Previous studies on traditional use of Anise, *Pimpinella anisum* have

reported a popular use of this plant extract to treat number of indications as antispasmodic and sedative effects [34-36] in Jordan [29], Lebanon [37], Morocco [38] and India [39]. Employed mothers may want to take rest at home after long working hours as a result, they frequently used medicinal plant such as Anise, *Pimpinella anisum* to induce their infant sleep and treat colic based on traditional thought and previous experience of relatives or friends. However, opposing with the present study results of frequent use of Anise, *Pimpinella anisum* among infants especially those < 6 months of age, which is contraindicated in infants and children below the age of 12 years as no available data about safety and proper usage of it [34]. Furthermore, studies have demonstrated some inverse effects of Anise, *Pimpinella anisum* on infant's health such as reports of *Salmonella agona* outbreak from contaminated aniseed among infants in Germany [40] and generalized tonic-clonic seizures in a 12-day-old infant, who had received multiple doses of undiluted aniseed oil to treat colic [41]. Add on, the reports of anethole (an alcoholic extract from anise, *Pimpinella anisum*) toxicity in infants [42-43].

According to this study, thyme, *Thymus vulgaris* was commonly used medicinal plant ($p \leq 0.01$) to treat coughing followed by both chamomile, *Matricaria aurea* and anise, *Pimpinella anisum*. Many studies have demonstrated common use of Thyme, *Thymus vulgaris* as anti-tissue and expectorant [29, 31] due to the polymorphic variation in monoterpene production in this plants. Both Chamomile, *Matricaria aurea* [29-30] and Anise, *Pimpinella anisum* [29, 34] were also documented to treat cough in previous studies.

CONCLUSION

In this study, although most of employed mothers were well educated, they tend to frequently use medicinal plants among their infants based on traditional thought, believes or previous experience of relatives and friends without seeking the health-care professional advise because they think that medicinal plants are safe and effective. Nevertheless, the safety of medicinal plants use among infants is still questionable. This study put in the spotlight the need for national strategy to educate and improve the awareness of mothers including employed mothers. However, the current study has some limitations such as small sample size and observational cross-sectional study design.

AUTHOR CONTRIBUTION

The author Safaa A. Al-Zeidaneen contributed to overall responsibility of conception, design, analysis, interpretation, data collection and writing the article.

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CONFLICT OF INTEREST

None declared.

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