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Research Article
Management of Milk-Feeding Baby Mild Gastrointestinal Conditions Using Plant Supplements: Survey Conducted in Al-Kharj, Saudi Arabia

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Abstract

Background and Objective: The use of plant supplements to treat several disease conditions are common in Saudi Arabia. The aim this study was to investigate the use of plant supplements to manage the mild gastrointestinal tract (GIT) problems of milk-feeding baby in Al-Kharj region of Saudi Arabia. **Material and Methods:** The plant supplements were explored using questionnaire-based survey among the breastfeeding-mothers visiting to different primary healthcare centre (PHC) and University hospital in Al-Kharj, Saudi Arabia. A survey was conducted in 2018, among mothers (n = 450) aged 18-45 years having an infant less than 12 months and SPSS statistical software was used for data analysis. **Results:** Approximately 87% (n = 395) respondent mothers revealed the use of at least one plants supplement in self-medication to manage GIT problems in their infant. At least one medicinal plant was used to treat infantile colic by more than 66% (n = 298) mothers, followed by flatulence (50.4%, n = 227). Among the plant supplements, anise (50.6%, n = 151), cumin (17.4%, n = 52) and mint (14.1%, n = 42) were the most used for the management of infantile colic. Almost the same plant supplements, anise (45.81%, n = 104), cumin (18.94%, n = 43) and mint (16.3%, n = 37) were used for the management of infantile flatulence conditions. Constipation (13.1%, n = 59) and diarrhoea (6.2%, n = 28) were less commonly treated by plant supplements. **Conclusion:** Plant supplements commonly used to treat milk-feeding baby colic and flatulence conditions need to investigation clinical evidence regarding their safety and efficiency.

Key words: Plant-supplements, milk-feeding baby, colic, flatulence, constipation, diarrhoea

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

The use of complementary alternative medicines (CAMs) has considerably increased worldwide[1]. Medicinal plants are a part of CAMs and have been widely used in Asia and Africa because of their easy availability, reasonable price and ethnic implication. According to the World Health Organisation (WHO), approximately 80% of the global population directly or indirectly consumes some form of medicinal plants for the alternative management of various health conditions. Additionally, herbal medicine as a CAMs has been widely used in many developed countries and is becoming a mainstream treatment in the United States of America, United Kingdom, Europe and Australia. An ethnopharmacological study reported that the alternative treatments using medicinal plants vary from country to country, region to region or society to society. It is generally transferred orally from generation to generation without any written documents[2]. Alternative treatments are common in Saudi Arabia. Several ethnopharmacological studies have demonstrated that herbal medicine users believed them to be more effective and safer than conventional treatments[3-6]. Infantile colic is a common complaint in milk-feeding infants, characterised by unexplained excessive crying lasting for more than 3 hrs/day, usually starting from the first few weeks and continuing up to 5 months. The possible aetiology for infantile colic includes several factors such as food allergy or hypersensitivity, gut dysmotility, maternal anxiety, mother-infant interaction, alterations of the hormones and gut microflora[7]. Although none of the aetiologies have yet been proven, treatment using agents such as anticholinergic drugs (dicyclomine and cimetropium), defoaming agents (simethicone), probiotics (containing *Lactobacillus*) or herbal tea is highly recommended for infantile colic[8]. Flatulence, characterised by large amount of gas formation, bloating and abdominal fullness, is commonly observed in milk-feeding infants and affects 15%-30% of American and 15%-23% of Asian milk-feeding infants[9].It may occur because of several complications such as functional gastrointestinal (GIT) complications, Irritable Bowel Syndrome (IBS), psychosomatic disorders or aerophagia. Defoaming agents (simethicone) or herbal supplements are generally used for the management of flatulence in such infants[10]. According to WHO, diarrhoea is characterised by the passage of liquid stools more than thrice daily or more frequently than the normal for each individual[1]. Several cases of diarrhoea are due to infection, food intolerance, bowel conditions, malabsorption, surgery and use of certain medicines such as antibiotics and antacids. Infectious diarrhoea is self-limiting and does not need specific treatment. It is usually ameliorated on its own in a couple of days but if it persists beyond a week, medical assistance is required. Agents such as loperamide, bismuth subsalicylate, racecadotril, rotavirus immunisation and herbal supplements are generally used for the management of diarrhoea[11]. Constipation is a common complaint in milk-feeding infants and 16-40% of infants (<6 months old) experience symptoms of constipation. Approximately 90% of infants have no specific organic cause. Osmotic agents, laxatives, stool softeners, daily fibre and fluid intake are usually employed for the management of constipation[12]. Several worldwide studies have reported the use of medicinal plants in childhood conditions in developed countries such as Germany, Netherlands, Singapore, Canada and USA[13,14]. The use of medicinal plants for common diseases in children has also been reported in Saudi Arabia[15]. Additionally, ethnobotanical data focusing on herbal medicine for the management of common ailments in children have been documented in several developing countries too. Al-Faris, reported that approximately 8.7% of patients used medicinal plants for the GIT pain in IBS[16]. Alqethami *et al.*[17], conducted an ethnobotanical study in the Makkah region of Saudi Arabia and reported the use of medicinal plants for GIT complaints such as diarrhoea, flatulence and dysentery. To the best of our knowledge, no report has yet been published regarding herbal medicines used to treat GIT complaints in breastfeeding infants in Saudi Arabia and no such study was conducted in the Al-Kharj region or other parts of Saudi Arabia. Several reports on the use of herbal supplements in child and maternal health have focussed on their use during pregnancy and maintenance of the overall health of children and women[15,18]. The present study aimed to investigate the prevalence and use of medicinal plants among the mothers visiting a Primary Health Care (PHC) centre in the Al-Kharj region of Saudi Arabia to treat the GIT problems in their milk-feeding infants.

MATERIALS AND METHODS

In the present study, a questionnaire-based survey was distributed among breastfeeding women residing in Al-Kharj (Saudi Arabia) and visiting the different PHC centres, maternity and children hospital and Prince Sattam Bin Abdulaziz University (PSAU) hospital between January, 2019 and April, 2019. A cross-sectional study was conducted among mothers aged 18-45 years, an infant less than 12 months old and getting care from the PHC centre, Al-Kharj. Written consent was obtained from all participants before conducting the study.

The survey was prepared in English, based on literature on the use of herb or plant extracts among breastfeeding infants for the treatment of common GIT problems such as colic, flatulence, diarrhoea and constipation[17-19]. The questionnaire comprised the following points:

- **Points 1-7:** Socio-demographic profile (age, nationality, education, country of graduation, annual income, number of children and gender of the child), familiarity with infantile colic, flatulence, diarrhoea and constipation and first action taken when any GIT problem was noticed
- **Point 8:** The use of any alternative treatment without seeking a physician's advice. If yes, whether (i) alternative treatments (excluding medicinal plants), (ii) alternative treatments (medicinal plants) or (iii) pharmaceutical formulations were used
- **Point 9:** Recommendations for the use of alternative medicines
- **Point 10:** The information sources about alternative treatment using medicinal plants
- **Points 11:** Source for obtaining or purchasing medicinal plants

In the present study, plants were included and vitamins or nutraceutical products were excluded. The questionnaire was prepared in English and translated it into Arabic (native language of Saudi Arabia) with the help of a professional from the PSAU, Al-Kharj. Before commencing the survey, questionnaires in both the languages were validated by experts from the department of pharmacology, clinical pharmacy and pharmacognosy, PSAU. The questionnaire was distributed to 10 lactating mothers as a pilot study before finalising it and results from the pilot study were omitted in the final analysis. Minor changes in the final questionnaire were made based on the feedback received from the pilot study. Two students were employed from the final year of pharmacy to assist in the data collection.

The subjects were interviewed face-to-face in Arabic. Along with the consent form, a hard copy of the questionnaire was distributed to all participants. An agreement to participate in the study was indicated by signing the consent form and the participants were guaranteed their privacy. The completed copy of the questionnaire was collected from each subject and stored safely. Later, the collected data were entered and saved in an excel sheet. A specialist confirmed the names and classification of all the plants mentioned by the respondents.

Statistical analysis: The data were analysed using Statistical Package for Social Sciences (SPSS, Version 23, Chicago Inc.). The data were compared and p values 0.05 were considered statistically significant using the chi-square test. Before the commencement of the present study, an ethical approval was obtained from the ethics committee of the Ministry of Health (MOH)-PSAU.

RESULTS

Demographic conditions of the participants: A total of 450 breastfeeding-mothers were selected based on conversation about the knowledge of infantile GIT complications, use of herbal medicine and willingness to participate in the study. Among the selected mothers, 50% mothers were >31 years of age and approximately 94% mothers were Saudi Arabian. Among the participants, over 50% had completed their graduation and their total annual household income was comparatively high. More than 51% of mothers had 3-5 children. The socio-demographic profiles of mothers who used herbal medicines for their infant during breastfeeding period were summarized in Table 1.

Common infant GIT problems recognised by milk-feeding mothers: The common infant GIT problems recognised by breastfeeding mothers were presented in Fig. 1. Over 66% (n = 298/450) of breastfeeding mothers used plant supplements to treat infantile colic and more than 50%

Table 1: Socio-demographic profile of breast feeding mother participated in present study (n = 450, p<0.05)

Characteristics	Value	Frequency (n)	Percentage
Age	18-22	36	8.0
	23-30	181	40.2
	31-above	225	50.0
	No answer	8	1.8
Nationality	Saudi	425	94.4
	Others	16	3.6
	No answer	9	2.0
Education	Doctorate	7	1.6
	Master	33	7.3
	Bachelors	211	46.9
	Others	199	44.2
Country graduation	Saudi	409	90.9
	Others	21	4.7
	No answer	20	4.4
Annual family income	<100K SR	123	27.3
	100K SR	319	70.9
	No answer	8	1.8
Number of children	1-2 children	158	35.1
	3-5 children	232	51.6
	6 and above	49	10.9
	No answer	11	2.4
Child gender	Male	236	52.4
	Female	202	44.9
	No answer	12	2.7

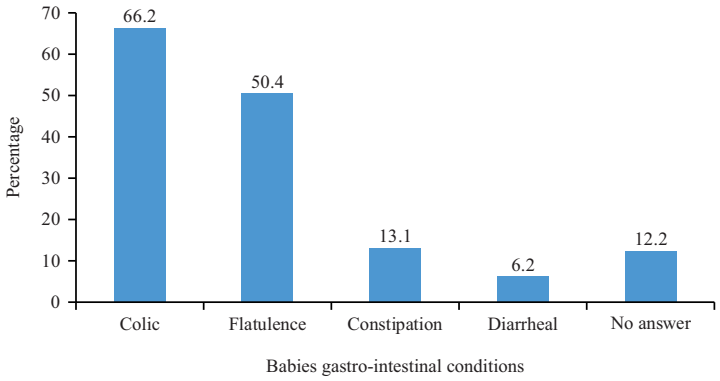

Fig. 1: Common milk feeding gastro-intestinal conditions

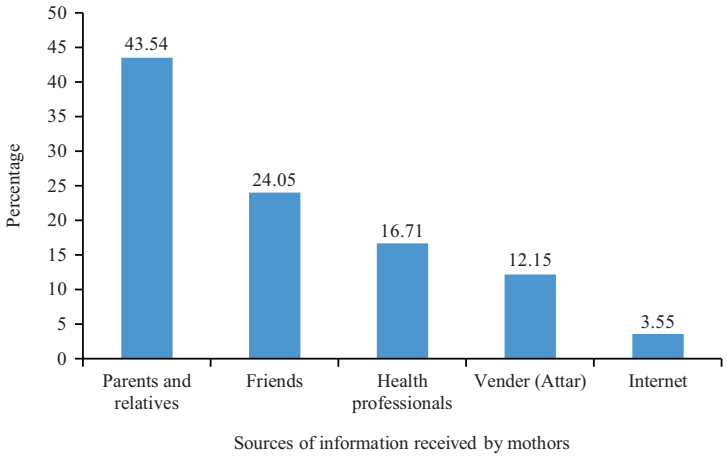

Fig. 2: Sources information of plant supplements

(n = 227/450) mothers used it to treat flatulence. However, only few of them used it to treat constipation (13.1%) and diarrhoea (6.2%).

Information source of plant supplements: The information sources regarding plant supplements were presented in Fig. 2. Approximately 43.54% of the mothers used herbal medicine recommended by parents and relatives, whereas over 24, 16, 12 and 3% mothers used herbal medicine recommended by their friends, healthcare professionals, vendors and internet, respectively. All of the users considered that plant supplements are highly effective to treat mild GIT condition of her baby. Table 2, illustrated the most common plants supplements used by mothers to manage common GIT complication in milk-feeding infants. Milk-feeding mothers in present study cited 22 plants or its products.

Plant supplements used for the management colic and flatulence: The results illustrated that out of 22 plants or its products, about 11 plants (Fig. 3) and 9 plants (Fig. 4) frequently used by mothers to manage infantile colic and flatulence, respectively in breastfeeding infants. Among the plants supplement users, approximately 75% (n = 298/395) mothers used to managing infantile colic. The most common herb used during infantile colic was anise 50.67% (n = 151/298), followed by cumin 17.45% (n = 52/298) and peppermint 14.1% (n = 42/298), fennel 8.05% (n = 24/298), chamomile 7.04% (n = 21/298) and caraway 3.02% (n = 9/298). Additionally, plants such as *Phoenix dactylifera* (dates), fenugreek, basil, myrrh and asafoetida were used to treat infantile colic by <1% of the mothers. Similarly, approximately 57.5% (n = 227/395) mothers used plant supplements for the treatment of infant flatulence condition. The most commonly used plant was anise 45.81% (n = 104/227), followed by cumin 18.94% (n = 43/227), peppermint 16.3% (n = 37/227), chamomile 9.7% (n = 22/227), fennel 7.9% (n = 18/227) and caraway 2.21% (n = 5/227). Additionally, plants such as myrrh, dates and basil were also used to manage flatulence by <1% of mothers.

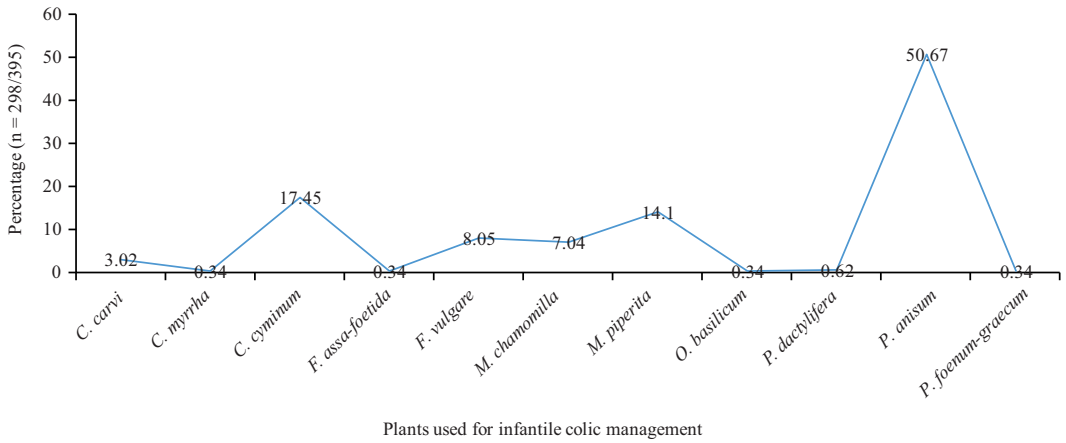

Fig. 3: Plants supplements used to treat infantile colic conditions of milk-feeding baby

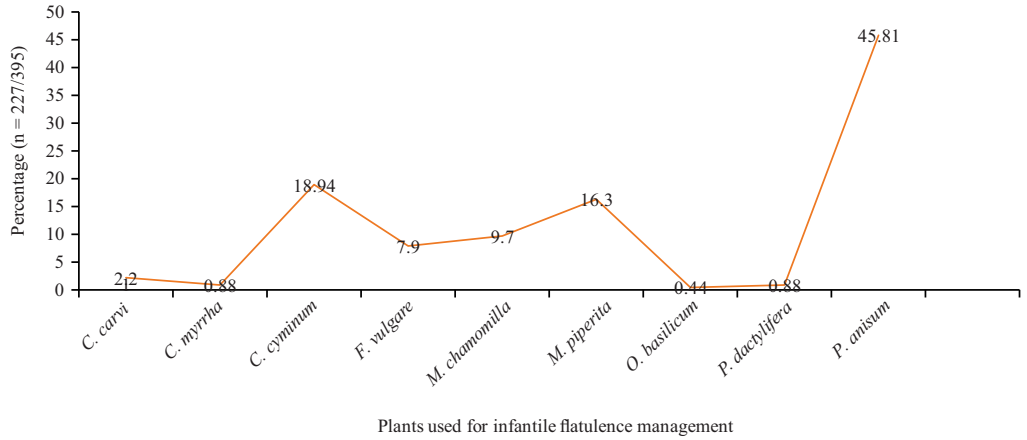

Fig. 4: Plants supplements used to treat infantile flatulence conditions

Table 2: List of medicinal herbs and its products used by mothers to treat common GIT complications of milk feeding baby

Medicinal plants	English name	Arabic name	Parts	Family
Allium sativum	Garlic	Thawm/garlic	Bulb	Amaryllidaceae
Astragalus propinquus	Astragalus	Astragalus	Root	Fabaceae
Astragalus sarcocolla	Sarcocolla	Anzarut	Root	Fabaceae
Camellia sinensis	Tea	Shay	Leaves	Theaceae
Carum carvi	Caraway	Al-karawya	Seeds	Apiaceae
Commiphora myrrha	Myrrh	Mur	Gum	Burseraceae
Cuminum cyminum	Cumin	Kammōn	Seeds	Apiaceae
Ferula assa-foetida	Asafoetida	Haltit	Resin	Apiaceae
Foeniculum vulgare	Fennel	Ash-shamir	Seeds	Apiaceae
Lepidium sativum	Cress	Rashad	Herbs	Brassicaceae
Malus domestica	Apple	Tuffahh	Juice	Rosaceae
Mangifera indica	Mango	Manjo	Fruits	Anacardiaceae
Matricaria chamomilla	Chamomile	Babounej	Herbs	Asteraceae
Mentha piperita	Peppermint	Naana	Leaves	Lamiaceae
Musa species	Banana	Mauz	Fruits	Musaceae
Ocimum basilicum	Basil	Al-raihan	Leaves	Lamiaceae
Oryza sativa	Rice water	Arz	Seeds	Poaceae
Phoenix dactylifera	Dates	Nakhl	Fruits	Arecaceae
Pimpinella anisum	Anise	Anesun	Seeds	Apiaceae
Solanum tuberosum	Potato	Batata/starch	Stem	Solanaceae
Starch	Starch (rice, potato)	Nasha	-	Poaceae
Trigonella foenum-graecum	Fenugreek	Hilba	Seeds	Fabaceae

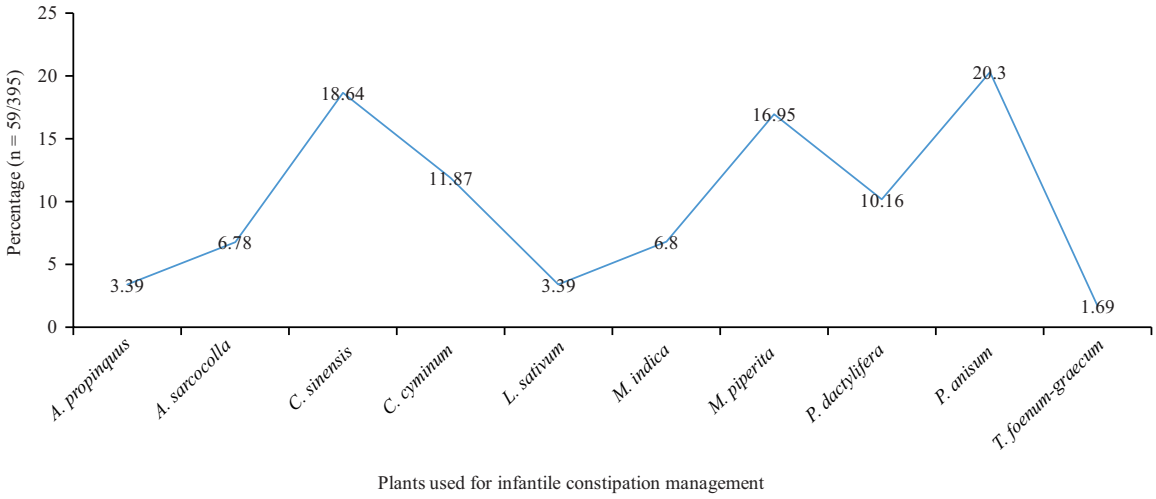

Fig. 5: Plants supplements used to treat infantile constipation conditions

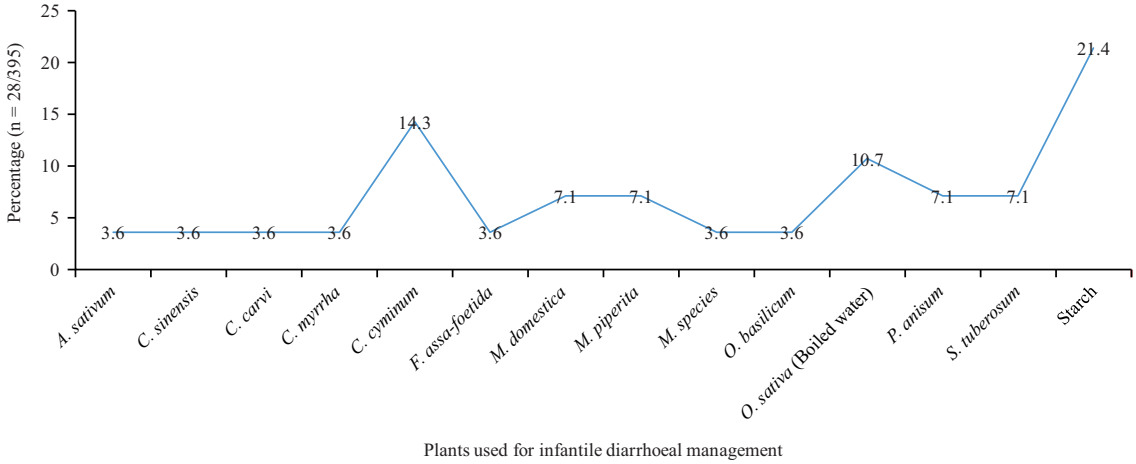

Fig. 6: Plants supplements used to treat infantile diarrhoeal conditions

Plant supplements used for the management constipation and diarrhoea: The results illustrated about 10 plants (Fig. 5) and 14 plants (Fig. 6) supplements used by mothers to manage constipation and diarrhoea respectively in breastfeeding infants. Among the plants supplement users, only about 15% (n = 59/395) mothers used to management constipation in infants. The most common treatments were using *P. anisum* 20.3% (n = 12/59) and *C. sinensis* 18.64% (n = 11/59), followed by *M. piperita* 16.95% (n = 10), *C. cyminum* 11.87% (n = 7), *P. dactylifera* 10.16% (n-6). Only 7.1% (n = 28/395) of the participating mothers used plants supplements for the management of diarrhoea in infants. The most common treatment was starch 21.4% (n = 6/28), followed by *C. cyminum* 14.8% (n = 4/28), boiled *O. sativa* water 10.72% (n = 3/28).

DISCUSSION

To the best of our knowledge, the present study provides the first empirical evidence of plant supplements use to manage common mild GIT problems in breastfeeding infants in Saudi Arabia. Several studies have reported the medicinal plants used to manage GIT problems in breastfeeding infants worldwide[20]. Studies have observed that some medicinal plants are effective in managing colic or other GIT complications in milk-feeding infants. Reports on the use of medicinal plants to manage GIT complications, such as colic, flatulence, constipation and diarrhoea, in milk-feeding infants in Saudi Arabia are scarce. Infantile colic is linked with early cessation of breastfeeding, maternal depression and child abuse. Although availability of effective treatment for infantile

colic is still lacking, treatments such as use of cimetropium bromide, fennel oil, homeopathic 'gripe water' and chiropractic adjustment (spinal manipulation) are practiced[8,21]. Although several studies have investigated medicinal plants used in Saudi Arabia by the general population[4-6], no study has focussed particularly on the use of herbal medicines to manage GIT complaints in breastfeeding infants. In this study, the traditional use of medicinal plants to manage GIT problems in milk-feeding infants in Saudi Arabia was assessed. Among the plants user, total of 75% mothers used plants supplements for infantile colic. Approximately 50% of mothers used anise seeds to manage this complication, followed by cumin, peppermint, fennel, chamomile, caraway and bay tea. The study conducted on Italian population for the management of infantile colic, focusing on side effects of medicinal plants containing chamomile, fennel and lemon balm, the results showed that colic in milk-feeding infants ameliorates within 1 week[7]. A study conducted by Oshikoya and co-worker on Nigerian infants with colic exhibited that 67.7% of the breastfeeding infants were self-medicated by mothers. Among these, approximately 51% of the cases were managed by herbal medicine[22]. Practitioners in several countries such as USA, Asia, Africa, Australia etc, frequently recommend alternative treatments such as herbal medicine, massage therapy or acupuncture for the management of the infantile colic condition. Moreover, there is no evidence that massage or acupuncture improves infant colic. Several studies demonstrated the efficacy of herbal supplements such as extracts of fennel, chamomile, lemon balm and herbal tea (ColiMil) compared with placebo and proved that these supplements were safe. However, because of unproven safety and efficacy in infants, unidentified biological effects and lack of fixed dosage, herbal treatments are generally not recommended as first-line treatment in infantile colic[23].

Biagioli *et al.*[24] using different databases reviewed published data (up to May, 2016) on pain relieving agents in infantile colic. The results reported that pain relieving agents such as simethicone, Mentha, dicyclomine, cimetropium, sucrose, glucose and herbal tea, reduce the duration of crying[24]. Tirapelli *et al.*[25] studied the antispasmodic effect of hydroalcoholic extract (with 60% ethanol) of anise in the smooth muscles of rat anococcygeus. The relaxant action of acetylcholine-induced contraction explains its antispasmodic effect[25]. In traditional therapies, cumin and caraway are the prominently considered antispasmodic and carminative agents, thus, they are used to treat mild digestive disorders such as diarrhoea, flatulence and colic[26]. Peppermint, fennel, chamomile, baby colic tea (fennel and chamomile or chamomile alone or mixture of cumin, fennel and dill, etc.), dates, fenugreek, basil, myrrh and asafoetida ameliorate colic in breastfeeding babies principally because of antispasmodic properties[24-26]. Flatulence in breastfeeding infants is a common complaint characterised by passing of excessive amount of gas. Approximately 15-23% of Asian population and 15-30% of American population are affected by flatulence[16]. The participating mothers in our study were found to be using the same plant to treat colic and flatulence, approximately 45% of mothers used anise seeds to manage colic in the baby, followed by cumin, peppermint, chamomile, fennel, baby tea, caraway, myrrh, dates and basil. Larijani *et al.*, stated that plants such as anise, dill, coriander, cumin, basil, thyme, fennel, cumin, ajwain, parsley and caraway are used for the treatment of flatulence in the traditional Persian medicine system[10]. Several other published reports support the claim that plants could be helpful in treating flatulence in milk-feeding babies[22,23].

In Saudi Arabia, the prevalence of constipation is low, approximately 4%, according to a recent survey conducted in between 2018-2019 by Alhassan *et al.*[27] in the Qassim province. They also reported that it is less prevalent in males (20.8%) than females (79.2%). In the present study, only 13.1% (n = 59) of mothers used herbal supplements for constipation in their breastfeeding babies, among them, 18.64% of mothers used *P. anisum* and *C. sinensis* each, followed by peppermint, cumin, dates fruits, Anza-root, honey, Astragalus, fenugreek, mango and baby tea. Several studies have reported that *P. anisum* could be used for constipation. In several ethno pharmacological studies, some plants such as peppermint, cumin, dates, honey, Astragalus, fenugreek, mango have been reported for the management of constipation[28]. Diarrhoea is a serious public health problem in Saudi Arabia. Al-Mazrou *et al.*[29], reported that in Saudi Arabia, the average rate of diarrhoea is 2 episodes/child/year and the incidence rate in children of age 6-23 months was nearly twice compared with that in older children. In addition, they reported that children from rural areas in the southern region had higher incidence rates of diarrhoea than the areas in other regions[29]. In the present study, only 6.2% (n = 28) of mothers used herbal supplements for diarrhoea in milk-feeding babies. Approximately 17.87% of mothers used starch to manage this, followed by cumin, boiled rice water, anise, peppermint, basil, garlic, banana and chamomile. Several ethnopharmacological studies have reported the use of plants such as basil, anise, cumin and fennel for the management of diarrhoea. A few studies reported the potential benefits of using starch to treat diarrhoea[30].

CONCLUSION

The present study exhibited that the use of alternative treatment for the management of GIT complaints in milk-feeding infants is considerably high among Saudi Arabian mothers. Most mothers used one or more plant supplements for the management of GIT problems such as infantile colic, flatulence, constipation and diarrhoea in their milk-feeding babies. Most of them received information regarding the use of plants from their parents and relatives. Alternative treatment using herbs was most frequently used for infantile colic, followed by flatulence, constipation and diarrhoea. In the present study, 22 types of plants or their products were identified for the management of common GIT complications in milk-feeding babies. Thus, healthcare providers must increase the awareness in breastfeeding women regarding the safety, efficacy and toxicity of these medicinal plants. Researchers may further investigate these aspects.

SIGNIFICANCE STATEMENT

In Saudi Arabia, the literature indicates the uses of medicinal plants are very common to manage pregnancy and improve the milk-production related factor. This study identified the use of at least one plant supplements for the management of GIT conditions in milk-feeding baby. Among the GIT conditions, colic is the most frequently manage by plant supplements followed by flatulence, constipation and diarrhea. These findings could help in establishing a proposal for investigation the safety and efficacy studies of cited plants, aiming to prevent the adverse health effects of the milk-feeding baby.

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