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Maternal knowledge and practices regarding infantile colic in Palestine: a need for enhanced education and awareness

Asma Radwan^{1*}, Naser Shraim¹, Murad Abualhasan¹, Louseen Salim¹, Raghad Nazzal¹ and Yaqoot AbuAbaid¹

Abstract

Background Infantile colic is a common condition affecting healthy infants, characterized by excessive crying and fussiness, causing discomfort for the child and psychological distress for their caregivers, particularly mothers. While the exact cause remains unknown, understanding maternal knowledge and practices regarding colic is crucial for effective management and support. This study aimed to assess Palestinian mothers' knowledge and practices regarding infantile colic, focusing on their understanding of the etiology and management strategies.

Methods This cross-sectional study involved 450 mothers of infants diagnosed with colic attending pediatric clinics. A face-to-face questionnaire assessed maternal knowledge of the etiology, management strategies, and information sources. Data analysis was conducted using SPSS version 20. Chi-square tests identified any significant associations.

Results The study revealed a wide range of maternal knowledge regarding infantile colic, with a significant proportion of mothers (55.6%) claiming prior understanding of this condition. Mothers relied heavily on family friends (40.2%) and personal experience (35.3%) for information about colic, with less reliance on healthcare professionals (13.3%). Cow's milk allergy (33.8%) and bottle feeding (29.6%) were perceived as risk factors while burping (50.4%) and keeping warm (25.6%) were seen as preventive measures. Surprisingly, few mothers linked maternal anxiety or diet (6.4%) to colic. Popular management strategies included massage (77.3%), wrapping (58.7%), and herbal remedies (53.4%). Notably, only 18.9% of mothers sought professional advice.

Conclusion The study findings revealed a limited understanding of infantile colic among Palestinian mothers. This highlights the need for educational interventions. Healthcare providers should be more active in educating mothers and addressing the knowledge gaps.

Keywords Maternal knowledge, Practices, Infantile colic, Palestine

*Correspondence:

Asma Radwan
asma.radwan@najah.edu

¹Department of Pharmacy, College of Medicine and Health Sciences, An-Najah National University, P.O. Box 7, Nablus, Palestine



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Background

Infantile colic (IC) is a common digestive condition affecting many otherwise healthy infants. It is characterized by excessive crying, distress, and irritability *for lasting* more than three hours a day, three or more days a week, for at least three weeks. It typically affects around 10–30% of births worldwide. The disease usually begins in the second or third week of life, peaks in the sixth week, and generally disappears by four months of age. Crying episodes can last for hours, usually in the late afternoon or evening, and may be accompanied by irritability, restlessness, flushing, clenched fists, and physical discomfort [1, 2].

The exact cause of infantile colic remains unknown, but it is believed to be multifactorial, involving a combination of physiological and behavioral factors. Potential contributing factors include inflammation of the nervous and digestive systems, food allergies or intolerances, particularly to cow's milk protein, gastrointestinal issues such as gas, constipation, and gastroesophageal reflux disease (GERD), an immature digestive system, infant temperament, while behavioral factors include smoke exposure, inadequate mother-baby contact and maternal anxiety [1, 3, 4].

Despite the lack of a definitive cure, various management strategies may help alleviate colic symptoms. Dietary changes were helpful, like eliminating cow's milk protein from the mother's diet or switching to a hypoallergenic formula. Pharmacologic medications such as dicyclomine and simethicone may reduce intestinal spasms. Moreover, alternative therapies, probiotics, and herbal remedies may improve gut health. Behavior modification and soothing techniques, such as massage, hugging, swaddling, rocking, singing, and using a pacifier, can offer comfort and soothe crying spells [4–7].

IC is a benign condition that resolves on its own without long-term effects, however, it can be a very distressing experience for both infants and their families. The constant crying can cause parental stress, anxiety, and sleep deprivation, and may even lead to feelings of helplessness and isolation [8].

Parental awareness of IC causes and management strategies plays a crucial role in navigating this stressful period. Several studies have been conducted to assess maternal knowledge of IC. These studies reported varying levels of expertise: Some mothers demonstrated a good understanding of common causes like gastrointestinal issues. However, awareness of other potential causes, such as immature nervous system development or psychological factors, was less prevalent. Management strategies were focused on soothing techniques like swaddling and massaging, while dietary modifications or potential medical interventions were limited. Factors like educational background, breastfeeding practices, access

to healthcare, and previous experience with colic were shown to influence knowledge levels [9–13].

Enhanced maternal knowledge could help mothers make informed decisions when facing this challenging condition. This study, with its clear goal of assessing the extent of knowledge about IC causes and management strategies among Palestinian mothers, and identifying any associations with sociodemographic factors, is focused on providing valuable insights.

Methods

Study design

This descriptive cross-sectional study was conducted between October and February 2023 to assess maternal knowledge and practices regarding IC in the northern area of Palestine.

Participants

The study targeted mothers with healthy infants aged less than 24 months who were diagnosed as having IC. A total of 450 mothers who attended the pediatric clinics with infants who had IC in the past were eligible to participate. Mothers *with* children with a history of health problems in the postnatal period were excluded from the study. Mothers were approached as they entered the clinic and invited to participate in the study. Verbal informed consent was obtained from all participants, and they were assured of the confidentiality of their responses.

Sample size

The required sample size was calculated using the Rao-software sample size calculator program. The calculation employed a 95% confidence interval, a 5% margin of error, and the total population of mothers in Palestine based on data from the Palestinian Central Bureau of Statistics. The estimated sample size was determined to be 383 but was adjusted to 450 to account for a potential 10% non-response rate. Given the lack of specific data on the prevalence of high knowledge levels about infantile colic among Palestinian mothers, a conservative estimate of 50% was used in the calculations. This approach ensures that the sample size is adequate to detect even a relatively rare occurrence of the characteristic.

Data collection

Based on previous reports, a structured face-to-face questionnaire was developed to assess maternal knowledge about IC [9]. The questionnaire, originally developed in English, was subsequently translated by a bilingual translator into Arabic, the primary language spoken by the study population. This ensured that participants could fully understand and respond to the questions accurately. Content validity was rigorously evaluated by three faculty pharmacy researchers from

An-Najah National University. Their extensive expertise in maternal and child health and familiarity with the study topic qualified them to evaluate the questionnaire's content. The panel's feedback was incorporated into the questionnaire to refine its relevance and alignment with the study objectives. To ensure reliability, a pilot study was conducted on a small sample of mothers ($n=30$) to identify potential issues and assess the questionnaire's clarity and reliability. Based on the pilot results, minor adjustments were made to improve clarity and comprehensiveness.

The questionnaire included three sections: The first was about the maternal and infant demographic characteristics. This section collected information about mothers' age, marital status, educational level, occupation, number of children in the family, and baby data such as gestational age, delivery type, colic history, infant feeding practices, and birth order.

The second section assessed maternal knowledge of IC, its potential causes, and the sources of mothers' knowledge. Mothers' perceived knowledge of IC was tested by asking them: 'Based on your understanding of infant colic, would you rate your knowledge level as High or Low?' This was followed by a series of questions assessing their understanding of causes.

The third section of the questionnaire employed 21 inquiries focusing on mothers' practices for managing IC episodes. This section was further subdivided into four distinct subsections:

- Soothing and Sedative Techniques: This subsection (nine questions) evaluates mothers' utilization of behavioral methods like massage, swaddling, bathing, or baby wrapping to calm their infants.

- Dietary Modification: This sub-section employed two questions to investigate mothers' practices related to modifying their own or their infants' diets in response to colic symptoms.
- Pharmacological medications: This subsection (four questions) focused on mothers' use of prescription or over-the-counter drugs to manage their infants' colic.
- Complementary and alternative herbal remedies: This subsection evaluated mothers' use of traditional herbal remedies for managing their infants' colic.

Data analysis

Data was analyzed using IBM SPSS Statistics version 20 software. Descriptive statistics were used to summarize the data, including means, standard deviations, and percentages. The chi-square test was used to assess the association between maternal demographics and IC knowledge level. Statistical significance was set at $p < 0.05$.

Ethical considerations

The study protocol was approved by the Institutional Review Board (IRB) of An Najah National University [IRB reference number: Pharm.D Feb. 2023/24]. Mothers were informed verbally and in writing about the study's objectives and procedures, and their participation was voluntary. All participants gave informed verbal consent, and their responses were kept confidential. All study procedures were performed with the Declaration of Helsinki.

Results

Demographic characteristics of mother and health profile of infants

A total of 450 mothers were invited to participate in the study to assess their knowledge of the IC condition, including its causes and calming techniques. The demographic characteristics of the mothers and their infants are given in Tables 1 and 2. The mean mother age in this study was 30.9 ± 7.5 years old. The vast majority (95.3%) were married. The study reflected a diverse range of educational backgrounds, with most mothers holding a university bachelor's degree (59.3%). Family size ranges from mothers with only one child (19.6%) to those with six or more children, with the majority having 2–5 children (69.3%).

Regarding baby feeding patterns, half of the babies received a combination of breast milk and formula (50.0%). Breastfeeding alone was the next most common option (27.6%), followed by formula-only feeding (13.8%). Most babies used to feed bottles (73.3%), while a (26.7%) breastfed directly.

The majority of mothers (65.8%) delivered vaginally, and (87.8%) delivered at term (36–41 weeks). Most infants were healthy and did not require hospital

Table 1 The socio-demographic characteristics of the mother

Variable	Subcategory	Total Frequency <i>n</i> (%)	<i>P</i> value
Marital status	Single	2 (0.4)	0.000
	Married	429 (95.3)	
	Divorced	11 (2.4)	
	Widowed	8 (1.8)	
Education	Primary Education	29 (6.4)	0.533
	High school	154 (34.2)	
	University	267 (59.3)	
The working status of the mother	Yes	158 (35.1)	0.158
	No	292 (64.9)	
Smoking	Yes	96 (21.3)	0.006
	No	354 (78.7)	
Number of children	1	88 (19.6)	0.008*
	2–3	192 (42.7)	
	4–5	120 (26.7)	
	Six and more	50 (11.1)	

* Statically significant

Table 2 Maternal and infant demographic characteristics associated with infantile colic

Variable	Subcategory	Total Frequency n (%)
Gestational week	< 36	53 (11.8)
	36–41	395 (87.8)
	> 41	2 (0.4)
Type of delivery	Normal spontaneous delivery	296 (65.8)
	Cesarean	154 (34.2)
<i>Child's condition after birth</i>	Healthy no hospital admission	340 (75.5)
	Healthy with hospital admission	84 (18.7)
	Suffering from diseases	26 (5.8)
The age of onset of infantile colic	1–2 week	147 (32.7)
	3–4 week	200 (44.4)
	5–6 week	50 (11.1)
	7–8 week	14 (3.1)
	9–10 week	25 (5.6)
	11–12 week	14 (3.1)
The time of colic during the day	Morning	65 (14.4)
	Evening	174 (38.7)
	Night	211 (46.9)
The frequency of colic per day	1–2	197 (43.8)
	3–4	202 (44.9)
	Five and more	51 (11.3)
Nutritional status	Only breast milk	124 (27.6)
	Formula only	62 (13.8)
	Breast milk and formula	225 (50.0)
	Breast milk/formula + nutritional supplement	39 (8.7)
Feeding bottle use	Yes	330 (73.3)
	No	120 (26.7)

admission (75.5%), although (18.7%) required hospital admission for observation or minor health concerns. The onset of IC varied among babies. Over a third (32.7%) experienced it within the first two weeks. At the same time, nearly half (44.4%) showed symptoms during weeks 3–4. Colic primarily reported to be occurred at night (46.9%), and evening (38.7%).

Maternal knowledge of infantile colic causes and calming techniques

The second part of the questionnaire evaluated mothers' knowledge of the IC condition, including its causes and calming techniques.

Of the total 450 participants, 250 (55.6%) believed had a good understanding of IC. The main source of knowledge was the information received from relatives and friends (40.2%) dealing with colic. Mothers learned about colic based on their experience with previous children (35.3%).

Table 3 “Maternal-reported risk factors for infantile colic”

Variable	Total Frequency n (%)
The food the mother eats	76 (16.9)
Cow's Milk allergy	152 (33.8)
Feeding bottle use	133 (29.6)
Hunger	50 (11.1)
Not burping the baby after feeding	227 (50.4)
Smoking	20 (4.4)
Maternal anxiety and Depression	29 (6.4)
Mother not keeping herself warm (getting cold)	115 (25.6)
I don't know	9 (2.0)

Media and healthcare professionals played a smaller role in informing them (11.1% and 13.3% respectively).

Potential causes of infantile colic

While the exact cause of IC remains elusive, mothers' perspectives on the potential causes of IC varied considerably (Table 3). A significant majority (81%) of respondents indicated no gender disparity in the incidence of infantile colic. Interestingly, half of the mothers (50.4%) believed that not burping the baby after feeding is a potential cause of IC. Milk protein allergy (33.8%) and feeding bottle use (29.6%) were also perceived as possible causes.

Interestingly, 115 mothers (25.6%) believed that keeping themselves warm could prevent colic attacks, suggesting a possible connection between maternal temperature and infant comfort. Surprisingly, a large majority (83.1%) rejected the idea that a mother's diet may contribute to their child's colic episodes. Maternal factors such as smoking (4.4%), anxiety, and depression could potentially influence infant colic. Only 6.4% of the women acknowledged the possible role of maternal depression and anxiety on colic. However, some new respondents ($n=9$, 2.0%) remained unsure of the cause of their baby's colic.

Management strategies for the infantile colic episode

Several strategies were employed by mothers to manage the IC episode and soothe their babies. The results are shown in Table 4.

Among behavioral and soothing methods, baby massage emerged as the most popular, practiced by 77.3% of mothers. Other common techniques included rapping the baby (58.7%), warming towels (42.2%), and bathing (30.2%). Less frequently used methods were playing soothing sounds and offering pacifiers.

Some mothers also implemented dietary changes, with nearly 30% modifying their diets while continuing breastfeeding. Switching to formula milk was a less common option, chosen by only 7% of mothers.

Pharmacological and probiotic remedies were utilized by a significant portion of mothers, with herbal drops

Table 4 Mothers practice to reduce colic attacks: management strategies for infantile colic

Practice	Variable	Total Frequency n (%)
Behavioral and sedative Methods	Massaging the abdomen	348 (77.3)
	Bathing the baby	136 (30.2)
	Putting a warmed towel on the baby's stomach	190 (42.2)
	Wrapping the baby	264 (58.7)
	Taking the baby around by car	45 (10.0)
	Swinging (Standing or in the baby bouncer)	114 (25.3)
	Play the baby light, repetitive sounds	22 (4.9)
	Play Music	14 (3.1)
	Give pacifier	9 (2.0)
Dietary modifications	Continue <i>breastfeeding</i> with changing mother diet	134 (29.8)
	Change to formula milk	33 (7.3)
Pharmacological and probiotics Drops	probiotics	18 (5.0)
	simethicone	60 (16.6)
	herbal drops	130 (36.0)
	probiotics + simethicone	100 (27.7)
Herbal remedies	I don't remember	52 (14.4)
	Anise	213 (47.3)
	Fennel	39 (8.7)
	Cumin	29 (26.4)
	Chamomile tea	132 (29.3)
	Mint herb	17 (3.8)
	Sage herb	11 (2.4)
Consulting doctor	Yes	85 (18.9)

(36%) being the most popular choice, while probiotic use was shown to be less prevalent (5%).

Herbal remedies, including anise, fennel, cumin, and chamomile, were frequently used by mothers seeking natural solutions. Anise (47.3%) and chamomile tea (29.3%) were parents' favorite herbal drinks to alleviate baby discomfort.

Discussion

Infant colic, characterized by excessive crying in otherwise healthy infants, can be a source of anxiety and psychological distress for parents. Adequate knowledge about IC's nature and management strategies can help mothers implement effective interventions, potentially reducing infant crying episodes and distress. Moreover, it can contribute to enhanced maternal mental health by alleviating the stress and the risk of postpartum depression.

This study investigated maternal knowledge and practices regarding IC in the Northern area of Palestine. The findings revealed a diverse spectrum of knowledge among mothers, ranging from limited understanding

to a more comprehensive grasp of the condition. This variability was evident in their responses to questions about IC causes, management strategies, and sources of information.

For instance, the spectrum of mothers' understanding of common causes like gastrointestinal issues was wide, with some demonstrating a comprehensive grasp while others had limited awareness of potential factors such as immature nervous system development or psychological factors. This variability extended to their knowledge of effective management strategies, with some favoring behavioral techniques and others exploring dietary changes or pharmacological interventions. The diverse sources of information they relied on, from healthcare professionals to family, friends, or personal experience, further underscored the need for a more personalized approach in healthcare.

While a significant proportion of mothers (55.6%) reported prior knowledge of IC episodes, this percentage is lower than the 75.4% reported in a previous Saudi study by M. Mustafa et al. (2023) [12]. It is important to note that both studies relied on self-reported data, which can be subject to recall bias and other limitations. This discrepancy could be attributed to several factors, including differences in cultural contexts, healthcare access, and the specific population studied.

Interestingly, mothers in this study relied heavily on their relatives and friends as the primary source of knowledge, followed by their own experiences with previous children. These findings agree with previous studies conducted in Iraq and Saudi Arabia (where the majority of Iraqis (76.2%) and Saudi mothers (36.5%) reported their source of knowledge being from their family and friends [10, 12]. Notably, these results contrast with a Turkish study that found mothers most frequently sought information from healthcare professionals, followed by online resources [11]. In this study, mothers were less likely to turn to physicians for guidance about IC, suggesting a potential gap in communication and education within the healthcare system. This finding highlights the need for healthcare involvement in educating mothers and families facing this challenging condition.

Mothers with more than one child were better informed about colic pain. Our analysis revealed a statistically significant association ($p=0.008$) between the number of children and maternal knowledge about infantile colic (IC). This suggests that mothers with more than one child are likely to have *higher expertise*, possibly due to their previous experience with their first child.

The majority of mothers believed in the multifactorial nature of the condition, attributing it to a combination of factors, including: lactose intolerance, gastroesophageal reflux, feeding reflux, and behavioral issues. Mothers

(81.6%) held the belief that gender plays no role in the cause of IC. These results, along with most previous studies [9, 10], reveal no significant gender bias in colic presentation.

Formula feeding emerged as a contributing factor to the development of colic in infants. In this study, 30% of mothers identified bottle feeding as a triggering factor for IC, highlighting a potential link between feeding methods and IC. Similarly, another study conducted in Saudi Arabia found that nearly half (49.8%) of mothers agreed that bottle feeding could lead to colic [12].

Despite the evidence from previous reports suggesting an elevated risk of IC among babies exposed to maternal smoking, the majority of surveyed mothers (95.6%) dismiss a direct link between colic and smoking. These findings are in contrast to Reijneveld's (2000) study, which demonstrated an association between smoking during pregnancy and a higher prevalence of infant colic [14].

Several reports have identified mother-infant interaction and maternal anxiety as key factors in colic development. A previous study found that mothers with high anxiety scores were twice as likely to have infants with colic compared to those with low scores [15]. The current study demonstrated a significant knowledge gap regarding the potential influence of maternal mental health on colic, with the majority (93.6%) of mothers surveyed reporting no perceived impact of their mental well-being on their infants' colic episodes. This finding deviates from prior research that has established a positive correlation between maternal anxiety and IC [16].

The mother employed several soothing strategies to manage IC, with baby massage being the most popular technique. In this study, (77.3%) of participating mothers utilized massage therapy to reduce crying episodes, highlighting the popularity and potential effectiveness of this method. Similarly, previous reports have demonstrated a positive impact of massage therapy on infants with colic. The findings align with the Unal et al. (2021) study, where 89.3% of mothers preferred abdomen massage to reduce colic attacks in their babies [11]. Moreover, massage therapy was shown to soothe crying episodes, promote relaxation, improve sleep patterns, and strengthen the bond between parent and child. Other frequently used practices were: avoiding flatulent foods and drinks, experimenting with different positioning, and applying warmth therapy [17, 18].

In the absence of definitive conventional treatment for IC, many mothers turn to alternative herbal medicine (36.0%) and complementary interventions to manage their babies' distress. Anise tea was shown to be the most popular herbal drink. This finding aligns with previous research conducted in Saudi Arabia, where 27.4% of mothers reported using herbal remedies for the same purpose [9]. The participating mothers were less likely

to favor pharmacological medications: the use of probiotics (6%) was minimal despite their demonstrated effectiveness in managing colic. This contrasts with a Turkish study where 36% of mothers reported using probiotic drops for colic [11].

The findings revealed a concerning trend of self-treatment practices, with only 18.9% of mothers seeking medical advice regarding their baby's well-being. This highlights a potential need for increased awareness and education regarding the importance of consulting medical professionals before implementing treatment strategies. The findings suggest the need for healthcare providers to play a more active role in educating mothers about IC.

Parental support is crucial in managing IC. Healthcare providers can offer guidance and advice on management strategies, and support groups can provide a platform for parents to share experiences, connect with others, and receive emotional support.

This study offers valuable insights into maternal knowledge and practices regarding infantile colic in Palestine. As the first investigation of this nature in the region, it fills a crucial gap in the literature and provides valuable perspectives on the unique context of Palestine. The study's substantial sample size provides a robust foundation for the findings. However, it is essential to consider the limitations inherent in self-reported data and the potential for recall bias. Additionally, the focus on specific regions in Palestine might constrain the generalizability of the results nationwide due to potential variations in cultural and socio-demographic factors.

Conclusion

The study highlights the need for further education and awareness programs to improve maternal knowledge of IC, particularly its causes and management strategies. Educational programs should address knowledge gaps, particularly regarding maternal mental health, smoking, and the use of alternative therapies. The findings highlight the importance of seeking professional advice and emphasize the need for healthcare involvement to support parents facing this challenging condition. This could help *reduce* anxiety and improve the overall well-being of both infants and their families.

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Author contributions

The authors confirm contribution to the paper as follows: *Asma Radwan: Study design, data analysis, results interpretation as well as manuscript preparation and writing. *Naser Shraim, Murad Abualhasan: review and editing, *Lussen Salim, Raghad Nazzal and Yaqoot AbuAbaid: Data collection and management. All authors read and approved the final manuscript.

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Data availability

The raw data supporting the findings presented in the current study will be available from the corresponding author [Asma Radwan / E-mail: asma.radwan@najah.edu] upon request.

Declarations

Ethics approval and consent to participate

This study was approved by the institutional research board (IRB) committee of An-Najah National University, Nablus, Palestine. All study procedures were performed in accordance with the ethical standards of the Declaration of Helsinki. The participation was voluntary and an Informed consent was obtained from all subjects.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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