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Research Article

# Resident Pediatrician's Knowledge and Practice Toward Infantile Colic: A Cross-Sectional Survey

**Ghassan Yousif Ahmed[1], Muaath Ahmed Mohammed[1,2]*, Zeinab Mohamed Ibrahim[3], and Fathia Ahmed Abdelmagid[4]**

[1]Pediatric Council, Sudan Medical Specialization Board, Khartoum, Khartoum State, Sudan
[2]Department of Physiology, Faculty of Medicine, Ibnsina University, Khartoum, Khartoum State, Sudan
[3]Department of General Pediatrics, Ahmed Gasim Pediatric Teaching Hospital, Khartoum North, Khartoum State, Sudan
[4]Department of General Pediatrics, Mohammed Alamin Hamid Pediatric Teaching Hospital, Omdurman, Khartoum State, Sudan

## Abstract

**Background:** Although infantile colic is believed to be a benign and self-limiting condition, it can cause anxiety in both caregivers and infants. Thus, this study aimed to ascertain what pediatric residents know and do regarding this condition.

**Methods:** A cross-sectional facility-based survey was carried out on 113 pediatric residents enrolled in the 4th-year pediatric residence training program. The researchers developed a structured, pretested, and validated questionnaire to gather the data. SPSS version 25 was used for the data analysis. The qualitative data are expressed as frequencies (N) and percentages (%). The quantitative data are expressed as ranges, means, standard deviations, medians, and interquartile ranges (IQRs).

**Results:** The respondent's mean age was 30.32 ± 3.04 years. Less than half of the participants can identify the clinical criteria for diagnosing infantile colic. Although 97 (85.8%) of the residents suspected infantile colic when examining infants screaming or irritable for no obvious reason, 83 (73.4%) believed that additional laboratory testing was required to confirm the diagnosis. Although 111 (98.2%) of the residents agreed that parent education on the condition's benign and self-limiting nature is the cornerstone of treatment, most were unsure about alternative treatment approaches. The majority of residents do not always give medications and/or remedies, nor do they promote nonpharmacological treatments for colic. If the infants do not improve with conservative or medical therapy and their parents return them, 64 (56.6%) of the residents will undertake a medical assessment, while 50 (44.2%) would request more investigations. In addition, 70 (61.9%) will continue to provide parental counseling and comfort.

**Conclusion:** The findings of this study highlight the need for substantial efforts to improve resident's knowledge and practice of infantile colic management. Such research findings are critical for allocating resources, planning, and implementing successful healthcare initiatives and policies.

**Keywords:** infantile colic, pediatric residents, pediatricians, perspectives, knowledge, practice

**Corresponding Author**:
Muaath Ahmed Mohammed
**Email**: mwawssi0@gmail.com

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## 1. Introduction

Although infantile colic is thought to be a benign and self-limiting disorder, it can be a stressful issue for both parents and infants [1–3]. Furthermore, parents' emotions of inadequacy and anger may prevent them and their children from forming a healthy attachment, which increases the child's risk of abuse and behavioral issues as they age [4–7].

In the first 4-5 months of life, prolonged spells of crying and/or harsh soothing behavior have been characterized as infantile colic [8]. Crying mostly occurs at night and has no apparent explanation, which is one of the main factors that worry caregivers. Previously, Wessel's criteria, which included crying or fussing for more than 3 hr a day or more than 3 days a week, were used to diagnose infantile colic [9]. It is now described as recurrent and prolonged periods of infant crying, fussing, or irritability reported by caregivers that occur without obvious cause and cannot be prevented or resolved under the recently revised Rome IV criteria [10]. Prolonged weeping tends to subside by 3 to 4 months of age or 3 to 4 months after term in the case of prematurely born infants. It more commonly occurs during the afternoon or evening. Crying typically peaks between 4 and 6 weeks, gradually declining over the next 12 weeks. There is no evidence that weeping in colic cases is caused by discomfort in the infant's belly or anywhere else on their body; instead, the majority of colic cases likely represent the higher end of the typical developmental crying curve of healthy infants [11]. However, many caretakers often believe that crying is due to gastrointestinal pain in the abdomen. Although there is no evidence linking functional gastrointestinal disturbances to newborn colic, pediatric gastroenterologists are frequently consulted for colic cases. Understanding infant colic is extremely vital for supporting families and preventing misdiagnoses and treatment errors [11].

Infantile colic is usually a temporary condition that resolves on its own, but it can be misdiagnosed as an organic disease. As a result, parents may start expensive nonpharmacological treatments such as self-medication, multiple dietary adjustments, and other treatments early on, either on their own initiative or in response to advice from friends, family, or community pharmacists [12, 13]. Like in Sudan, most colicky babies in Nigeria and Brazil are treated with self-medication, with very few seeking medical attention [13, 14].

It is common knowledge in popular Sudanese culture that a prescription for medicine or other treatments follows a doctor's consultation. This is why a parent's reassurance might not be sufficient on its own. Medical professionals, particularly pediatric residents, are frequently pressured and compelled to prescribe drugs that lack scientific validation and may have unfavorable side effects. Also, pediatric residents do not always provide appropriate medical care for infantile colic patients. Therefore, this study aimed to ascertain what pediatric residents in Sudan currently know and do regarding infantile colic to help training bodies guide the future education and training of young pediatricians.

## 2. Materials and Methods

### 2.1. Study Design, Duration, and Setting

This cross-sectional facility-based survey was conducted between May and June 2021 at the Pediatric Council, Sudan Medical Specialization Board (SMSB). The SMSB is the only governmental postgraduate medical training facility in the Republic of Sudan. The Pediatric Council is one of the numerous specialty councils within the SMSB. Upon fulfillment of the clinical medical doctorate (MD) degree requirements, the graduate received a certificate from the pediatric council. The doctor's license holder is qualified to practice general pediatrics as a specialist.

### 2.2. Study Population and Eligibility Criteria

A list of the 736 residents participating in the 4th Year Residence Training Program (R1-R4) was acquired from the secretary's office of the Pediatric Council. Most of the residents were employed in the Khartoum state, the capital of Sudan. Residents from Sudan who were in practice during the study and had not finished their clinical rotation were included. Residents on their yearly vacation, sick leave, or maternity leave or not in practice at the time of the study were excluded.

### 2.3. Sample Size Determination and Sampling Technique

A total of 113 pediatric residents out of 736 residents enrolled in the residency program were included. This sample size was determined with the help of the following statistical formula: $N = z^2pq/e^2$, where $N =$ the required sample size, $z =$ the confidence level, adopted as 1.96, $p =$ the anticipated percentage (frequency of occurrence of an event), adopted as 0.92 from a similar study [1], $q$ (frequency of nonoccurrence of an event), adopted as $1 - p$, and $e =$ the absolute precision needed, adopted as 0.05 [15]. Simple random sampling was used to select the study participants, who were proportionally allocated based on their seniority.

### 2.4. Data Collection Tool and Procedure

The questionnaire was structured specifically for this study by the researchers. Two medical educators and pediatricians validated the questionnaire after testing it on 10 pediatric residents who were not included in the sample size calculation. The questionnaire's 36 questions are organized into three categories: sociodemographic data (6 items), knowledge domain (15 items), and practice domain (15 items). The items are constructed in multiple-choice, Likert scale, and open-ended formats. These items cover clinical

presentations, diagnosis, and treatment of infantile colic. The survey was distributed via emails and various social media platforms as a Google form in English.

### 2.5. Data Management and Analysis

Version 25.0 of the IBM SPSS software program (IBM Corp., 2017) was used to analyze the data. The normality of the distribution was checked using the Shapiro–Wilk test. The qualitative data are expressed as frequencies (N) and percentages (%). The quantitative data are expressed as ranges (minimums and maximums), means, standard deviations, medians, and interquartile ranges (IQRs).

### 2.6. Operational Definitions

Junior residents are trainees/registrars in pediatrics who were in their 1st and 2nd years of the residency training program.

Senior residents are trainees/registrars in pediatrics who were in their 3rd and 4th years of Residency training program.

## 3. Results

This study was carried out on 113 registrars with a 100% response rate.

### 3.1. Demographic Data

The age ranged from 25 to 40 years, with a mean of 30.32 ± 3.04 years. Women made up the bulk of them. Seniors comprised approximately half of the participants. The majority of residents live and work in Khartoum State (Table **1**).

**Table 1**: Study participant's sociodemographic characteristics.

| Items | Studied participants (N = 113) | |
|---|---|---|
| | No | % |
| **Age** | | |
| Mean ± SD | 30.32 ± 3.04 | |
| Median (IQR) | 30 (28-32) | |
| Range | 25-40 | |
| ≤30 years | 69 | 61.1% |
| >30 years | 44 | 38.9% |
| **Gender** | | |
| Female | 93 | 82.3% |
| Male | 20 | 17.7% |

**Table 1**: Continued.

| Items | Studied participants (N = 113) | |
|---|---|---|
| | **No** | **%** |
| **Residency level** | | |
| Junior | 54 | 47.8% |
| Senior | 59 | 52.2% |
| **State** | | |
| Khartoum | 61 | 54.0% |
| Others | 52 | 46.0% |

## 3.2. Perception of Knowledge Domain

When a baby is < 3 months old and often exhibits symptoms at night, more than half of the residents think that infantile colic is suspected or diagnosed. Slightly more than one-third of the residents said that the colic lasted for 2 weeks and that the symptoms persisted for 3 hr or more each day. It also recurred three times a week. When evaluating infants who were crying or irritable for no apparent reason, the majority of the residents suspected infantile colic. However, they felt that further laboratory tests were necessary to make the diagnosis. Although, more than three-quarters of the residents believe that the key to treating infantile colic is to educate parents about its benign and self-limited nature, majority of them were not sure about the use of alternative treatment approaches, such as the use of probiotic *Lactobacillus reuteri*, removal of allergens from the diet of breastfeeding mothers and conversion of infant's formula to hydrolyzed formula to relive the colic symptoms Table **2**. Abdominal distension accompanied by flatulence, legs folded over the abdomen, and inconsolable wailing are commonly regarded by residents as potential or diagnostic indications of infantile colic Figure **1**. A majority of the residents reported infantile colic, inadequate feeding, intussusceptions, and infections on the top of the list while they were evaluating unexplained crying/irritability in infants Figure **2**.

**Table 2**: Study participant's distribution according to their knowledge perspectives toward the infantile colic.

| Item | | Frequency (N) | Percentage (%) |
|---|---|---|---|
| **At which age of a crying infant you most likely suspect/diagnose?** | > 5 months | 4 | 3.5% |
| | < 1 month | 5 | 4.4% |
| | < 2 months | 16 | 14.2% |
| | < 3 months | 61 | 54.0% |
| | < or equal to 5 months | 27 | 23.9% |
| **At which time of day the symptoms occur most likely?** | Morning | 5 | 4.4% |
| | Afternoon | 13 | 11.5% |
| | Evening | 29 | 25.7% |
| | Night | 66 | 58.4% |

**Table 2**: Continued.

| Item | | Frequency (N) | Percentage (%) |
|---|---|---|---|
| **How much duration of symptoms per day you suspect?** | < 1 hr | 37 | 32.7% |
| | < 2 hr | 25 | 22.1% |
| | < 3 hr | 18 | 15.9% |
| | 3 or more hours | 33 | 29.2% |
| **How much recurrence of symptoms per week you suspect?** | 5 days or more | 36 | 31.9% |
| | 4 days or more | 13 | 11.5% |
| | 2 days or more | 9 | 8.0% |
| | 3 days or more | 55 | 48.7% |
| **For how long weekly recurrence of symptoms you suspect?** | 6 weeks or more | 17 | 15.0% |
| | 4 weeks or more | 16 | 14.2% |
| | 2 weeks or more | 45 | 39.8% |
| | 3 weeks or more | 35 | 31.0% |
| **Are laboratory investigations necessary for diagnosing of crying/irritable infant?** | Very important | 15 | 13.3% |
| | Moderately important | 31 | 27.4% |
| | Important | 37 | 32.7% |
| | Slightly not important | 16 | 14.2% |
| | Unimportant | 14 | 12.4% |
| **How often do you advice/counsel parents about the benign and self-limited nature of infantile colic?** | Never | 0 | 0.0% |
| | Rarely | 0 | 0.0% |
| | Sometimes | 3 | 2.7% |
| | Often | 16 | 14.2% |
| | Always | 94 | 83.2% |
| **Do you agree that parent's reassurance throughout counseling/education about the benign and self-limited nature of infantile colic is the cornerstone of management?** | Strongly disagree | 0 | 0.0% |
| | Disagree | 0 | 0.0% |
| | Not sure/do not know | 2 | 1.76% |
| | Agree | 26 | 23% |
| | Strongly agree | 85 | 75.2% |
| **Do you agree that probiotic *L. reuteri* may reduce crying in breastfeeding infants with infantile colic?** | Strongly disagree | 1 | 0.9% |
| | Disagree | 3 | 2.7% |
| | Not sure/do not know | 69 | 61.1% |
| | Agree | 33 | 29.2% |
| | Strongly agree | 7 | 6.2% |
| **Do you agree that probiotic *L. reuteri* should not be given to formula-fed infants with infantile colic?** | Strongly disagree | 1 | 0.0% |
| | Disagree | 10 | 9.7% |
| | Not sure/do not know | 88 | 77.9% |
| | Agree | 13 | 11.5% |
| | Strongly agree | 1 | 0.9% |
| **Do you agree that eliminating allergens (e.g., cow's milk, eggs, fish, peanuts, soy, tree nuts, and wheat) from the diet of breastfeeding mothers may relieve colic symptoms?** | Strongly disagree | 4 | 3.5% |
| | Disagree | 18 | 15.9% |
| | Not sure/do not know | 45 | 39.8% |
| | Agree | 35 | 31.0% |
| | Strongly agree | 11 | 9.7% |

**Table 2**: Continued.

| Item | | Frequency (N) | Percentage (%) |
|---|---|---|---|
| **Do you agree that switching formula-fed infants to a hydrolyzed formula may improve colic symptoms?** | Strongly disagree | 2 | 1.8% |
| | Disagree | 15 | 13.3% |
| | Not sure/do not know | 55 | 48.7% |
| | Agree | 37 | 32.7% |
| | Strongly agree | 4 | 3.5% |

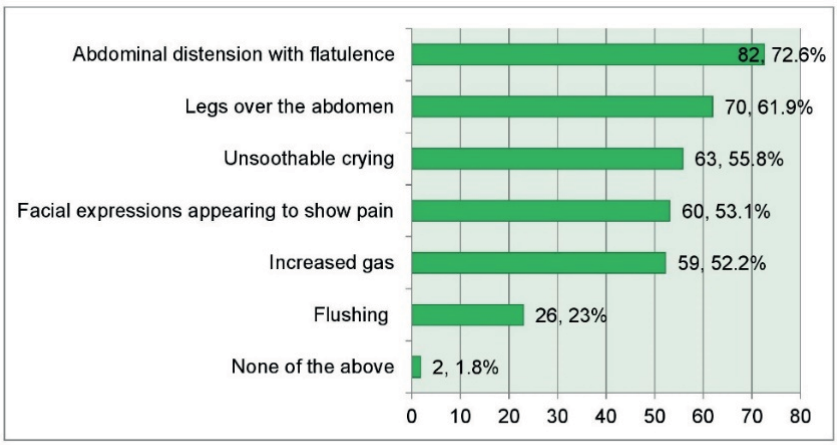


**Figure 1**: Accompanying behaviors/signs considered by the residents suggestive of/diagnostic for infantile colic.

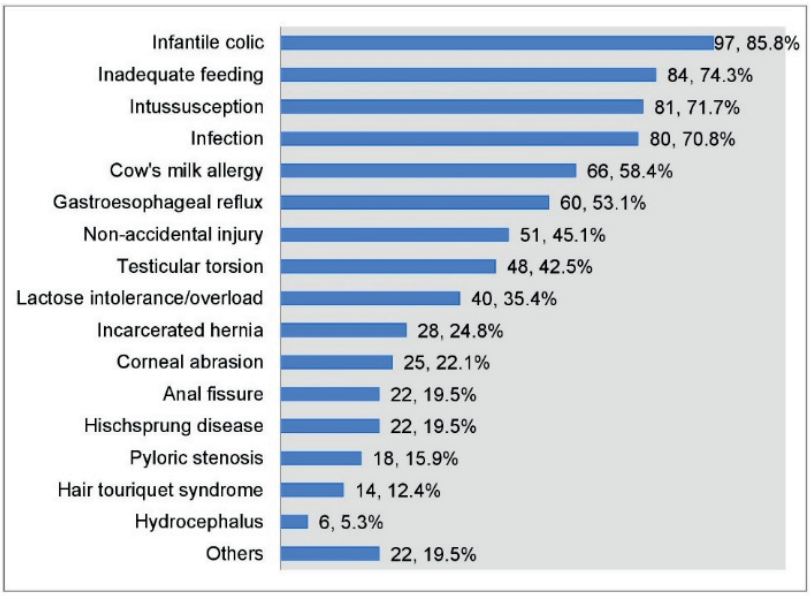


**Figure 2**: Conditions suspected by the residents in the evaluation of unexplained crying/irritability in infants.

## 3.3. Perception of Practice Domain

Most residents will ask parents about the age of their fussy or crying infant, the time of day when the baby cries most, when the baby cries again, and any other behaviors or symptoms related to the child's crying. When an infant screams, the majority of the residents inspect them physically, assess their growth, and look into potential further conditions; however, they did not request further laboratory or radiological tests. The majority of the residents do not always prescribe medications and/or remedies nor recommend nonpharmacological measures for colic treatment. In the event that parents return and there is no improvement, then the majority of the residents will perform medical assessment and ask for further laboratory or radiological tests, and continue to provide parental counseling and reassurance Table **3**. The majority of the residents prescribe antispasmodics, herbal mixtures, and other medications and recommend a hypoallergenic diet for breastfeeding mothers, hydrolyzed formula, and other nonpharmacological measures for colic treatment (Figures **3** and **4**).

**Table 3**: Study participant's distribution according to their practice toward the infantile colic.

| Item | | Frequency (N) | Percentage (%) |
|---|---|---|---|
| **How do you ask parents about the age of their crying or irritable infant?** | Always | 89 | 78.8% |
| | Often | 11 | 9.7% |
| | Sometimes | 9 | 8.0% |
| | Rarely | 2 | 1.8% |
| | Never | 2 | 1.8% |
| **How do you ask parents about the time of the day when crying/irritability mostly occurs?** | Always | 64 | 56.6% |
| | Often | 29 | 25.7% |
| | Sometimes | 12 | 10.6% |
| | Rarely | 7 | 6.2% |
| | Never | 1 | 0.9% |
| **How do you ask parents about the duration of crying/irritability (when they start and stop)?** | Always | 56 | 49.6% |
| | Often | 20 | 17.7% |
| | Sometimes | 24 | 21.2% |
| | Rarely | 9 | 8.0% |
| | Never | 4 | 3.5% |
| **How do you ask parents about the recurrence of crying/irritability?** | Always | 63 | 55.8% |
| | Often | 24 | 21.2% |
| | Sometimes | 22 | 19.5% |
| | Rarely | 3 | 2.7% |
| | Never | 1 | 0.9% |
| **How do you ask parents about other behaviors/symptoms associated with crying/irritability of their infant?** | Always | 71 | 62.8% |
| | Often | 25 | 22.1% |
| | Sometimes | 11 | 9.7% |
| | Rarely | 5 | 4.4% |
| | Never | 1 | 0.9% |

**Table 3**: Continued.

| Item | | Frequency (N) | Percentage (%) |
|---|---|---|---|
| **How do you consider other conditions in evaluation of an infant with unexplained crying/irritability?** | Always | 56 | 49.6% |
| | Often | 27 | 23.9% |
| | Sometimes | 26 | 23.0% |
| | Rarely | 4 | 3.5% |
| **How do you perform physical examination on a crying/irritable infant?** | Always | 95 | 84.1% |
| | Often | 14 | 12.4% |
| | Sometimes | 4 | 3.5% |
| **How often do you ask about/examine the growth of a crying/irritable infant?** | Always | 62 | 54.9% |
| | Often | 28 | 24.8% |
| | Sometimes | 15 | 13.3% |
| | Rarely | 4 | 3.5% |
| | Never | 4 | 3.5% |
| **How do you request laboratory tests for a crying/irritable infant?** | Always | 14 | 12.4% |
| | Often | 27 | 23.9% |
| | Sometimes | 49 | 43.4% |
| | Rarely | 20 | 17.7% |
| | Never | 3 | 2.7% |
| **How do you request radiological tests for a crying/irritable infant?** | Always | 7 | 6.2% |
| | Often | 13 | 11.5% |
| | Sometimes | 42 | 37.2% |
| | Rarely | 42 | 37.2% |
| | Never | 9 | 8.0% |
| **How do you prescribe medications and/or remedies for colic treatment?** | Always | 14 | 12.4% |
| | Often | 20 | 17.7% |
| | Sometimes | 39 | 34.5% |
| | Rarely | 26 | 23.0% |
| | Never | 14 | 12.4% |
| **How do you advise/recommend nonpharmacological measures?** | Always | 41 | 36.3% |
| | Often | 15 | 13.3% |
| | Sometimes | 24 | 21.2% |
| | Rarely | 10 | 8.8% |
| | Never | 23 | 20.4% |
| **What do you do when parents return because of no improvement in colic symptoms?** | Undertake medical assessment | 64 | 56.6% |
| | Request further investigations | 50 | 44.2% |
| | Prescribe medications/remedies | 15 | 13.3% |
| | Prescribe probiotics for breast-feeding infants | 20 | 17.7% |
| | Consider transition to hydrolyzed formula for bottle-fed infants | 19 | 16.8% |
| | Continued parental counseling and reassurance | 70 | 61.9% |

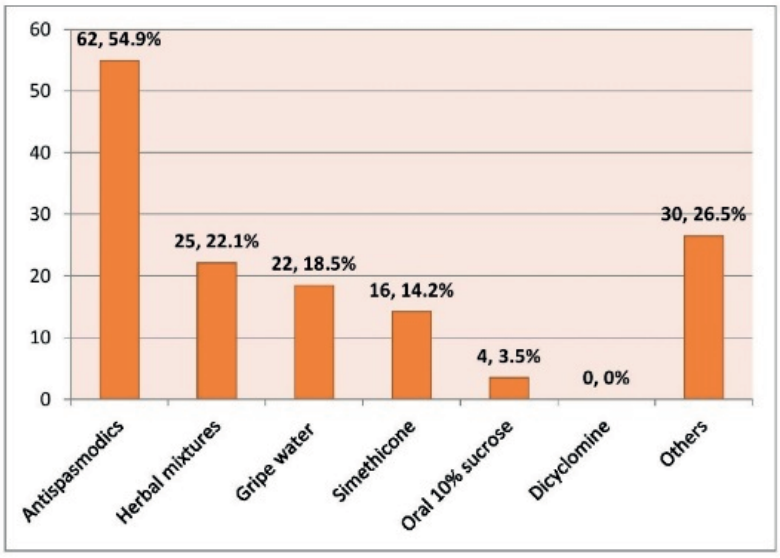


**Figure 3**: Medications/remedies usually prescribed by the residents for treatment of infantile colic.

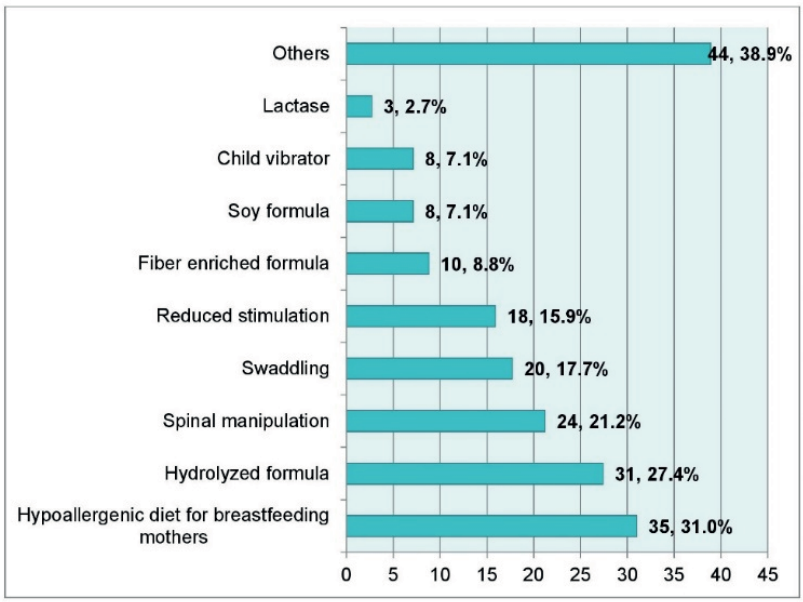


**Figure 4**: Nonmedication measures usually recommended by the residents for treatment of infant colic.

## 4. Discussion

Infantile colic accounts for up to 20% of all pediatric doctors clinic visits during the first 4 months of life, although many pediatricians do not view it as a significant issue [16]. This study represents the initial attempt to examine pediatric residents understanding and approach to the diagnosis and treatment of infantile colic in Sudan.

## 4.1. Knowledge Responses Toward the Diagnosis of Infantile Colic

In recent years, the clinical definition of the Rome IV diagnostic criteria has been used to diagnose infantile colic in many cases [10]. Most of the participants 109 (96.4%) stated that the onset and disappearance of colic will occur in infants younger than 5 months old. This is similar to the typical age at which patients are less than 5 months according to the Rome VI criteria. While prolonged crying is more likely to occur in the afternoon or evening [10], more than one-third of the residents correctly identified these times as the afternoon and evening hours and the rest incorrectly identified the morning and night as the times of day when symptoms are more likely to manifest. Over two-thirds of the residents erroneously reported a varied duration of < 3 hr per day for infant crying or discomfort. This contrasts with the duration of the Rome VI criteria of ≥3 hr per day, which is accurately reported by 33 (29.2%) of the respondents. Rome VI was defined as a recurrence of colicky symptoms occurring 3 or more days out of 7 days, 55 (48.7%) of the participants accurately reported this. The correct response for the duration of recurrent colicky symptoms, needed to diagnose infantile colic was provided by nearly one-third of the residents. This finding is similar to the one published by Wessel et al., who first established diagnostic criteria for infantile colic [9]. Approximately two-thirds of the participants stated that diagnostic tests are necessary to diagnose infantile colic. This finding contrasts with the results of Indrio et al., where the majority of doctors stated that clinical examinations are the primary methods used to diagnose colic [1]. The aforementioned results show that the participant's responses to the diagnosis of infantile colic varied. These findings indicate that to increase their knowledge, extra effort (professional development activities) is needed. While the clinical criteria of the Rome IV criteria are used to diagnose infantile colic, our study revealed that other symptoms that may be present include legs over the abdomen, abdominal distension with flatulence, changed facial expressions, and increased gas. These symptoms resemble those that other people have described [17–19].

## 4.2. Knowledge Responses Toward the Treatment of Infantile Colic

A vicious cycle of crying more often results from parental anxiety. Consequently, the cornerstone of colic treatment is parental assurance along with clear guidance [20]. The majority of survey participants agreed that providing comfort to parents is crucial to treating infantile colic, and they will advise or counsel parents about the benign and self-limiting nature of the condition. Approximately one-third of the participants correctly identified the use of *L. reuteri* as a probiotic in breastfed infants; however, a smaller percentage correctly described not using *L. reuteri* as a prebiotic in formula-fed infants. This finding is consistent with Shwe et al., who showed that only 2.4% of healthcare professionals were aware that probiotics can treat infantile colic [21]. Less than 50% of the participants thought that removing allergens from a nursing mother's diet could help with colic. This finding is consistent with the findings of Sommermeyer et al., who showed that only 18% of Polish physicians thought that altering the mother's diet would help with colic

[22]. Few participants thought about changing from a formula-fed to a hydrolyzed formula to relieve colic in infants. This is consistent with Indrio et al., who revealed that only 12.2% of the pediatricians surveyed thought about converting a formula-fed infant to a hydrolyzed formula [1]. In addition to parents comfort, our findings showed that residents understanding of additional infantile colic treatment options was lacking. Although the mainstay of treatment for infantile colic should still be parental reassurance, there has been increasing evidence over the past 10 years regarding the efficacy of supplemental probiotics and *L. reuteri* in treating this condition. These findings may be taken into consideration to offer these infants adjuvant therapeutic relief [23–26].

## 4.3. Practice Responses Toward the Diagnosis of Infantile Colic

When asked about age, length of symptoms during the day, and frequency of recurrence, the majority of the pediatric residents reported positive rates. These results match the Rome IV diagnostic criteria for the diagnosis of infantile colic [10]. Most of the residents said that when performing their evaluation, they considered conditions other than infantile colic and inquired about any more related behaviors or symptoms. This finding is similar to what Indrio et al., and Marcon et al., reported about the concomitant behaviors/signs suggestive of infantile colic and other conditions suspected in the assessment of infants unexplainable crying/irritability, respectively [1, 27]. The colic diagnosis was excluded after a thorough history and physical examination to rule out any cause of concern. The majority of respondents stated that they checked infants physically and inquired about their growth. These results indicate that participants could make accurate differential diagnoses. When an infant is crying or agitated, the majority of participants will request laboratory and/or radiographic testing. Despite the clinical diagnosis of colic, a large percentage of participants ordered a workup, which may be related to the need to rule out other illnesses and parental pressure to seek additional testing.

## 4.4. Practice Responses Toward the Treatment of Infantile Colic

It is unknown what specifically causes infantile colic. Certain theories, however, are believed to contain a causal component [18, 19, 28, 29]. In contrast to the established Rome IV diagnostic criteria, no standard management criteria have yet been widely recognized for the treatment of infantile colic. The most effective treatment options are thought to be general guidance on feeding and management as well as parental reassurance [30]. Regarding this aspect of treatment, nearly all of the participants stated that they would advise or counsel parents regarding the benign and self-limiting nature of infantile colic. However, neither in terms of the reassurance content nor in terms of how it was delivered or phrased was a single suitable reassurance message offered by the residents. This calls into doubt both their need for communication skills and their claims regarding this practice. In regard to treating infantile colic cases, the majority of the residents stated that they advised or prescribed nonpharmacological measures

such as hydrolyzed formula, swaddling, breastfeeding mothers' hypoallergenic diet, herbal mixtures, and antispasmodics. However, there is insufficient information to justify the use of either of these practices [31–35]. The results of our study indicate that, in their daily duties, the participants are not appropriately aware of the various forms of treatment for infantile colic. The practice culture in resource-constrained settings, where junior doctors follow their seniors lead without seeking out the best evidence-based practice available, can explain this. Additionally, parent pressure and pharmaceutical advertising can also have a dangerous effect on participants prescribing behaviors. In order to end these malpractice procedures, appropriate measures are required (such as clinical audits and other initiatives).

### 4.5. Practical Implications of the Study Findings

Considering the cost of overdiagnosis (unnecessary investigations) and/or overtreatment of such self-limiting conditions for the family and the national healthcare system, assessment of pediatric resident's knowledge and practice toward diagnosis and management of infantile colic will help in providing useful information for resource allocation, planning and conduction of effective healthcare policies or programs. In England, the cost of treating functional gastrointestinal disorders (infantile colic, regurgitation, and functional constipation) in infants is estimated to be at least £72.3 million per year. The NHS may spend £49.1 million on prescriptions, community care, and hospital treatment, while parents may spend £23.2 million on over-the-counter remedies [36]. Additionally, an Interim assessment of pediatrics resident's perspectives on diagnosing and managing infantile colic is necessary to determine whether the pediatrics training program is performing as expected, and to implement corrections on time rather than after program completion.

### 4.6. Strengths, Limitations and Future Prospects

To the best of our knowledge, this is the first study that sheds light on how pediatric residents in Sudan are handling infantile colic cases in the course of their regular clinical work. However, the study's design is constrained by self-reported data, making it vulnerable to response bias. Future research with appropriate designs and methodologies, including comparison groups of pediatrics specialists, as well as evidence-based recommendations on how to deal with the challenges associated with infantile colic diagnosis and management, could help clinicians manage colicky infants and their parents.

## 5. Conclusions

The findings of this study highlight the need for substantial efforts to improve resident's knowledge and practice of infantile colic management. The diagnostic criteria, related behaviors/symptoms, and

additional conditions in the differential diagnosis of infantile colic are accurately identified by residents. They understood that reassurance was the most important part of treatment, but they did not seem to know enough about other treatment options for infantile colic.

## Acknowledgments

The authors would like to thank all participants whose guardians enthusiastically agreed to participate and who devoted their valuable time to the study.

## Statement of Ethics

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or National Research Committee, and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

## Ethical Approval

The study was approved by the Pediatric Council and Institutional Ethical Committee of the Sudan Medical Specialization Board on (14/1/2021).

## Informed Consent Statement

Following an explanation of the goals and design of the study, informed written consent was obtained from all participants.

## Conflict of Interest

The authors declare that there is no conflict of interest.

## Funding

None.

## Artificial Intelligence (AI) Disclosure Statement

AI-Unassisted Work.

## Author Contributions

Ghassan Y. Ahmed: Contributed to the study design, obtained IRB approval, data collection and analysis, paper preparation, and writing the manuscript. Muaath A. Mohammed: Contributed to the study design, analysis, interpretation, paper preparation, and writing the manuscript. Zeinab M. Ibrahim: Contributed to the study design, data analysis and interpretation, edited the paper, reviewed the scientific context, and supervised the study. Fathia A. Abdelmagid: Contributed to the study design, data analysis and interpretation, edited the paper, reviewed the scientific context, and provided co supervision. All the authors have read and approved the final manuscript.

## Data Sharing Statement

The data generated in this study are available from the corresponding author upon reasonable request with a completed Materials Transfer Agreement, excluding the materials including personally identifiable information.

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