

## Effective Interventions of Mothers in Colicky and Non-colicky Infants

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### Abstract

**Background:** According to Wessel, infantile colic is defined as excessive crying which lasts more than three hours a day for more than three days a week for at least three weeks in an otherwise healthy baby. Prevalence of infantile colic has been reported to vary within the 10-40% range in different studies depending on data collection, study design and definition of colic. Despite 50 years of research about infantile colic its etiology is unknown. Some causes are mother's stress under pregnancy, postpartum depression, social factors like mother's occupation and fulltime education and other factors such as lactose intolerance, cow's milk allergy, gut contraction and parents-infant relationship.

**Aim:** To compare the effective interventions of mothers in colicky and non-colicky infants

**Method:** In this cross-sectional study, 400 infants under 3 months whom had been brought to a health center for vaccination and growth monitoring were enrolled. The criteria which were taken into consideration to recognize instances of colicky infants were: the age of the infant had to be less than 3 months, colic in infants had to be diagnosed by pediatrics and infants had to be healthy otherwise. Diarrhea, vomiting, constant abdominal distention and failure to thrive were excluded as non-colic problems. Cluster sampling and then convenience sampling methods were used to gather data. A researcher-made questionnaire was also used.

**Result:** Among all of the neonates 49% were colic and 51% were non-colic. 52.5% were boys and 47.5% were girls. Formula fed infants were more colicky than breastfed infants (62.2% vs. 53%).

**Conclusion:** Mothers in this study used three kinds of behavioral, nutritional and medicinal interventions (either herbal remedies or chemical drugs) to control colic. In the non-colic group, mothers used more behavioral and nutritional interventions while in the colic group both herbal and chemical drugs were used more.

**Keywords:** Colic infants; Non-colic infants; Behavioral interventions; Nutritional interventions; Medicinal interventions

### Introduction

Infantile colic is a common condition worldwide: about one in five infants younger than three months develops colic. Although infantile colic is considered to be a self-limiting and benign affection, it is often a stressful problem for parents and a frequent and wrongly undervalued cause for pediatric consultation [1].

Infantile colic is defined as episodes of inconsolable crying in an otherwise healthy infant younger than three months of age that lasts at least three hours a day and occurs at least three days per week over the course of at least three weeks in a month, a definition first proposed by Wessel [2]. According to a more recent definition by Hyman, colicky infants cry constantly during the evening at about the same time each day for at least one week, but they are otherwise healthy [3]. Estimations of colic's prevalence range from 5% to 40%, depending on the definition and methods used [4]. The cause of infantile colic is unclear. It may be part of the normal distribution of crying. One

hypothesis has suggested that infantile colic is caused by the impact of abnormal gastrointestinal motility and pain signals from sensitized pathways in the gut viscera. Another hypothesis is that inadequate amounts of lactobacilli and increased amounts of coli form bacteria in the intestinal micro biota influences gut motor function and gas production, which subsequently contributes to the condition. Other possible explanations are painful gut contractions, lactose intolerance or parental misinterpretation of normal crying. More controversially, behavioral issues such as family tension, parental anxiety, or inadequate parent-infant interaction have also been explored as causative factors for infantile colic. In addition, little is known about concomitant risk factors; however, maternal smoking, increased maternal age, and First Born status are thought to be associated with the development of infantile colic. One large survey found that the social factors that influenced reporting of infantile colic included the age at which the woman had her first child, the time she had spent in full time education, and her occupation. Older women who had spent the longest time for full time education and not in any manual occupations were the most likely to report infantile colic [5]. One randomized controlled trial (RCT) (in breast and formula fed infants)

found that, at two weeks of age, the incidence of crying more than three hours a day was 43% in formula fed infants and 16% in breastfed infants. The incidence at six weeks was 31% and 12% in formula fed and breast fed infants, respectively. Some separate studies have highlighted that anxiety and stress during pregnancy; smoking, first offspring and cesarean section delivery are among the risk factors for having colicky infants [6]. There are some strategies ranging from craniofacial osteopathic manipulation to car ride simulation offered for dealing with infantile colic. Although none of these treatments has been validated in rigorous studies, the available evidence offers tentative support for three strategies: (1) a trial of a hypoallergenic (protein hydrolysis) formula (for formula fed infants), (2) a low-allergen maternal diet (for breastfeeding mothers), and (3) reduced stimulation of the infant [7]. The American Academy of Family Physicians does not make any specific formula or diet adjustment recommendations on its familydoctor.org website. The website lists some techniques (e.g. massage or warm compress of abdomen, swing or car rides) which are not supported by the available evidence [8]. A more recent trial suggests that a one week low allergen diet among exclusively breastfed infants with colic who are six weeks old will reduce the risk of colic symptoms by 37%. This indicates that low allergen maternal diets may play a more significant role than previous trials have suggested. These results suggest that using herbal medicine may be an ineffective treatment. Commentators have expressed concern that the intake of herbal drugs may reduce the intake of milk and consequently compromise an infant's nutritional intake. There is inadequate evidence to conclude that herbal remedies are harmful, but several case studies showed that high consumption of herbal medicine mixtures can cause toxic effects in the breast-fed infant. Furthermore, herbal drugs containing glyquorice (Glycyrrhizaglabra) are not recommended for breast-feeding women. A type of herbal tea containing chamomile, vervain, liquorice, fennel, and balm-mint has been compared to a placebo tea as a treatment for colicky infants. Infants were given the tea, up to three times a day, on commencement of an episode of colic. The infants given the herbal tea showed marked improvements after seven days. Anticholinergic drugs (dicyclomine/dicycloverine) are used to relax the muscle in the wall of the gut to prevent spasms. Despite some findings of improvement in symptoms of colic, adverse effects were reported for a small number of infants treated with these drugs. Drowsiness, diarrhea and constipation were the side effects most commonly reported, but severe adverse effects such as apnea, seizures and coma have been published elsewhere in case reports [8]. In this study we compare the effective interventions of mothers in colic and non-colic infants.

## Materials and Methods

Approval for this cross-sectional study was received from Kerman medical university. A total of 400 infants under three months that had been brought to health centers for vaccination and growth monitoring were enrolled. The criteria used for the inclusion of the infants in the sample were: the infant's age had to be less than three months and the healthy infant had to have been diagnosed as a colicky infant by a pediatric. Exclusion criteria were the existence of vomiting, diarrhea, consistent abdominal distention and failure to thrive. Both breastfed and formula fed infants could enter this study and the questionnaire used was filled in by the researchers. Data was gathered via cluster sampling among five centers (North, South, West, East and Center of Kerman health centers) and then through convenience sampling. The data gathering instrument was a researcher-made questionnaire which consisted of four parts (demographic information, feeding pattern, colic symptom assessment, and mother's interventions to control infantile colic). Content validity was used and CVI was 0.78. To ensure the reliability of the study, Cronbach's  $\alpha$  was measured to be 0.85. SPSS15 was used for data analysis and these results were reached at: CI (0.95) and  $\alpha$  (0.05).  $\chi^2$  was also used for analysis. Participants' informed consent was received.

## Results

From the total of 400 infants, 181 were male and 173 were female. The mothers' age was ( $27 \pm 5$ ), the infants' age was ( $9 \pm 3$  weeks) and the infants' birth weight was ( $3100 \pm 480$  grams). 83% of the mothers were housewives and 17% of them were clerks. 39% of the mothers had an educational degree under diploma, 45.5% of them had a diploma and 35% had high university education. 34% of the families had a previous family history of colic and 65.8% of them did not. 48.5% of the mothers had had normal vaginal delivery (NVD) and 51.5% of them had delivered their babies through cesarean section. 92.5% of the mothers had received breastfeeding training in the hospital and 5.8% of them had had more than one teaching source. 196 infants (49%) were colicky and 204 infants (51%) were non-colicky. Among the breastfed infants, 53% were non-colic and 47% were colic and among the formula fed infants, 62% were colicky and 38% were non-colic. The mothers' interventions to control infantile colic were behavioral, nutritional or medicinal (including herbal and chemical drugs) types of intervention. Using the  $\chi^2$  test, these interventions were compared between the two groups. The results are presented in Table 1.

Approaches	Mother's interventions	Colic group	Non-colic group	$\chi^2$ test P-value
Behavioral approaches	1-Responding to the crying baby by feeding him/her immediately	169 (86%)	171 (85%)	0/9
	2-responding to the crying baby by hugging and carrying him/her	193 (99%)	199 (97%)	0/05
	3- Responding to the crying baby with rhythmic motion	192 (97/9%)	193 (95%)	0/2
	4- swaddling the baby	3 (1/5)	4 (2%)	0/4
	5-baby massage in a continuous, flowing movement from head to foot	74 (38/3%)	92 (45/6%)	0/03*

	6- paying attention to the baby with toys and music	49 (25/2%)	64 (31/4%)	0/01*
	7-using a baby carrier	16 (8/3%)	10 (5%)	0/2
	8-Offering the breast, a finger or a pacifier	65 (33/7%)	82 (40%)	0/1
	9- Making the baby sleep	133 (68/9%)	143 (70/1%)	0/9
	10-putting the baby to other people due to mother's stress	26 (13/5%)	31 (15/2%)	0/2
Nutritional approaches	1-grains avoidance	85 (43/8%)	95 (46/6%)	0/1
	2-cereals avoidance	3 (0/5)	0 (0%)	0/3
	3-dairy avoidance	46 (23/7%)	61 (29/9%)	0/07
	4-vegetables avoidance	41 (21/11%)	34 (16/7%)	0/2
	5-meat avoidance	4 (2%)	5 (2/5%)	0/7
Herbal tea	Mother's consumption of herbal tea	144 (73/4%)	126 (61/8%)	0/04*
	Infant's administration of herbal tea	94 (48/2%)	96 (47/1%)	0/1
	Both mother and infant herbal tea consumption	74 (38/4%)	80 (40%)	0/6
Chemical drugs	Mother's chemical drugs consumption	3 (1/5)	1 (0/5)	0/5
	Infant chemical drugs administration	180 (92/3%)	172 (84/3%)	0/02*

\*Significant difference between two groups

**Table 1:** Comparison of mothers' approaches to intervention in colicky and non-colicky infants.

According to our analysis in behavioral interventions, a significant difference was seen between the two groups just due to family income and mother's education ( $\chi^2$ ,  $p=0/004$  and  $p=0/04$ , respectively). In nutritional interventions we found a significant difference between the two groups in their avoidance of particular kinds of food in accordance with the type of feeding ( $\chi^2$ ,  $p<0/000$ ). The mothers who breastfed their infants did more nutritional interventions. There was no significant difference between the two groups in herbal medicine consumption according to family income, mother's education level, previous family history of colic, infant sex, type of feeding, breastfeeding training and mother's job.

According to the table above, in the non-colic group both mother and infant herbal medicine consumption was more than that in the colic group. The results were similar for infant herbal drug administration but herbal tea consumption by mothers in the colic group was higher than that in the other group. In the consumption of chemical drugs, significant differences between the two groups were found as a result of family income, mother's education, infant's birth order, mother's age and previous breastfeeding training. The results are shown in Table 2.

Approaches	Variables	$\chi^2$ test P-value
Behavioral approaches	Family income	0/004
Nutritional approaches	Milk type	0/000
Herbal tea	Nothing	Nothing
Chemical drugs	Family income	0/004
	Mother education level	0/04
	Birth order	0/001
	Breastfeeding training	0/04

**Table 2:** Significant differences between mothers' interventions in the two groups based on some demographic variables.

To explain the differences between the two groups according to the table above, mothers with higher income and education level, did more behavioral interventions and a significant difference was seen. In nutritional interventions, mothers who breastfed infants, avoided some food like grains and dairy products more and a significant difference was found. In herbal tea consumption, no significant difference was seen in different demographic variables. In chemical drugs consumption, mothers with higher family income and education level as well as mothers with first order baby gave chemical drugs to their infants more than the others and a significant difference was seen.

## Discussion

In this study we compared mothers' interventions in colic and non-colic infants. Mothers did three types of interventions to control infantile colic. These interventions were behavioral interventions, nutritional interventions and medicinal interventions (herbal remedies and chemical drugs). Mothers in the colic group did some behavioral interventions like responding to the crying baby by feeding him/her immediately, hugging and carrying him/her with rhythmic motion and using a baby carrier more than mothers in the non-colic group. Garrison et al. reported that carrying a baby in response to his/her crying can reduce infantile colic symptoms [9]. Mothers in the non-colic group performed some behavioral interventions such as massaging the baby in a continuous, flowing movement from head to foot, paying attention to the baby with toys and music, offering him/her the breast, a finger, or a pacifier, making the baby sleep and giving him/her to other people due to mother's stress more than the mothers in the colic group. In behavioral interventions there were significant differences between the two groups just in the items of massage giving and music playing. Rosen found that giving the baby a massage can reduce 48% of infantile colic symptoms [10] and Saleem showed a 50% reduction in the minimum crying time by massaging the infant [11].

In the assessment of nutritional interventions, mother's refusal of grains and dairy in non-colic group was more than that of the colic group. Herbal tea administration to infants in the colic group and consumption by both mothers and infants in the non-colic group was more but a significant difference was not seen. As far as the researchers know, similar findings were not reported in previous studies. In the assessment of chemical drug consumption, administration of chemical drugs in the colic group was more and in this study gripe water used commonly. Wade introduced gripe water as a useful drug to control infantile colic [4]. A significant difference was seen in the behavioral

interventions due to family income and mother education level between the two groups. There were not any studies before this which reported a similar finding. In nutritional interventions, a significant difference was found just in the type of infant's feeding (breastfeeding more than formula feeding) [12]. Hill et al. demonstrated via an RCT that elimination of certain allergenic foods (cow milk, soy, wheat, eggs, peanuts, tree nuts, and fish) was positively associated with a reduction in infantile colic in breastfed infants [13]. In chemical drugs consumption, a significant difference was found between the two groups regarding birth order, milk getting information, family income and mother's education level. The same conclusion was not reached at in any study conducted before.

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