

Evaluation of the Infantile Colic Causes in Persian Medicine

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ABSTRACT

Background: Infantile colic is a common condition among neonates; however, its etiology is not fully identified. This study aimed to evaluate this complication and search for treatments by investigating the experiences of Iranian physicians.

Methods: In this review study, the infantile colic was initially studied in modern medicine. To this end, an electronic search was performed in databases, such as Web of Science, Medline (via PubMed), Scopus, EBASE, UpToDate (International databases), Magiran, SID, Irandoc, IranMedex (National databases), and the Google Scholar search engines. Subsequently, this complication was investigated in the original references of Persian medicine. In this regard, the words related to the subject matter of the research were taken from the original books of Iranian medicine, including Al-Mansouri Fi Al-Tibb, Canon, Kholasatol Hekmah, and Kholasat Al-Tajarob.

Results: The results of this study indicated that factors, such as maternal mood during pregnancy, inappropriate maternal nutrition, gastrointestinal problems, and infantile cerebral problems are some of the causes that have been mentioned regarding infantile colic in modern and Persian medicine. Other causes, such as spinal nerve stimulation, insomnia, and sleep apnea are also raised in Persian medicine. Almost all of these causes are due to poor digestion of milk and pneuma in the gastrointestinal tract. Iranian physicians have considered solutions, such as massage with special oils, nutrition modification, and the use of hypnotics to reduce pneuma production in the gastrointestinal tract as well as its side effects. The application of these recommendations together can help better treat infantile colic. In this regard, the data were categorized by reviewing the works of Iranian scholars, as well as combining modern medical findings and Iranian experience. Accordingly, a new definition of colic can be provided and some new treatments are added for infantile colic based on modern and traditional medicine.

Conclusion: Since the positive role of some measures, such as massage and swaddling in modern medicine is confirmed, the investigation and recommendations of Iranian physicians in the field of infantile colic seem to be able to compensate for the gap in identification, prevention, and treatment of this complication.

Keywords: Infantile colic, Infant crying, Persian medicine

Introduction

Infantile colic is a common problem observed among neonates in the first three months of birth. Wessel (1954) first defined this syndrome in modern medicine. According to his definition, colic is severe crying and restlessness along with face flush for at least 3 hours a day, 3 days a week, which continues 3 weeks (1). Possible causes of colic include gastrointestinal, biological, and psychosocial causes (2). Changes in the intestinal microbial flora, intolerance of cow's milk protein or lactose, increased serotonin secretion, as well as external factors, such as stress during pregnancy

and delivery, inappropriate communication with infants, stresses at home, and malnutrition of infants, are some of the factors in this regard (3).

Since the exact cause of colic is unknown, different therapies are common in the treatment of infantile colic; however, none of these methods are completely effective (4). According to the scientific publications, provided evidence indicate the rising trend of the positive effects of some treatments in this field. Diet control, medication therapy, behavioral therapy, and complementary medicine are options to control this complication

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Figure 1. A late Babylonian tablet spelling out a ritual to quiet a crying child

(5). The use of medical experiences in different schools can also be useful. Although the ancients did not have a precise definition of infantile colic, human understanding of this complication is in such a way that the use of *Papaver somniferum* (poppy) was stated by Egyptians to stop the continuous crying of the infant in Ebers Papyrus (1600 BC) (6). Moreover, lullabies, religious songs, and sacred soil were being used to stop crying infants in the second half of the first millennium BC in Mesopotamian civilization. Moreover, the Babylonian tablet discovered in the south of Baghdad confirms this issue (Figure 1) (7).

Greek physicians, such as Galen (Claudius Galenus) (129-210 AD), also prescribed opium for sedating infants who were crying repeatedly (8). There are also ways to prevent and treat infantile colic in Iranian medical schools. Evaluation of these methods may lead to finding an appropriate treatment for infantile colic.

Although some studies were conducted on the treatment and prevention of colic using the perspective of traditional Iranian medicine, they investigated case-by-case and had a limited basis only concerning some treatment methods (2, 3). However, in traditional Iranian medicine, there are many strategies for the treatment of this complication, and it seems that by examining and combining them with modern medicine, it is possible to take more effective steps regarding the prevention and treatment of neonatal colic.

Methods

The present review attempted to find an answer to the main question of the study whether there is a definition of neonatal colic in traditional medicine and what strategies Iranian physicians used to treat neonatal colic. To this end, the data were collected using original reference books in Persian medicine, such as *The Canon of Medicine*

(*Al Qanun Fi Al-Tibb*), *Al-Mansouri Fi Al-Tibb*, *Zakhireye Khwarazmshahi*, *Kholasa'tol Tajareb*, and *Kholasa'tol Hikma*. Moreover, a manual and electronic search of references and articles published by modern medicine in databases, such as SID, PubMed, Magiran, Irandoc, IranMedex, UpToDate, and Google scholar search engine was performed using the keywords, including "colic", "infant crying", and "pneuma". The obtained data were then analyzed in this study.

Results and Discussion

Causes of Colic

Pregnancy Period and Delivery

Recent types of research indicate that stress during pregnancy directly affects crying and infantile colic. Furthermore, childbirth complications have direct effects on infants. Scientists have found a direct correlation between childbirth complications and infant crying. More stressful deliveries have been associated with more crying (9). Mothers who have stressful problems during pregnancy are more likely to report colic in their infant, and there is a direct correlation between infantile colic and bitter experiences during pregnancy (10).

Iranian physicians have also been aware of the effect of pregnancy conditions on infants, and they have concerned about avoiding pregnant mothers from bad moods while giving various recommendations and mentioning them in their textbooks. In this regard, Hakim Arzani in *Mofareh-al-Qoloub* states: "Women should avoid anger, sadness, and sorrow during pregnancy, especially the first month" (11). Avicenna goes farther and even advises on mental states during sexual intercourse: "If couples intend to have children, they should avoid sexual intercourse when they are sad, experience any resentment, or even when they are afraid of something" (11, 12). Furthermore, Avicenna advises on delivery time to keep the mother calm during delivery: "At the time of delivery, the delivery room should be at a moderate level in terms of coldness, warmth, lightness, and darkness. In addition, one of the people closest to the person should be there to participate in activities, such as pouring hot water on the waist and anointing oil on the back" (13). It is not clear whether the Iranian physicians have considered these recommendations to avoid crying and colic. They could have been effective in reducing infantile colic by reducing stress during pregnancy since the effects of stress during pregnancy and delivery have been identified today on infant crying. Moreover, recommendations,

such as the cooperation of the parturient woman's relatives with the midwife, which is still used today in methods, such as Bradley (14) should be accepted to alleviate maternal pain and stress.

Infantile Migraine and Subdural Hematoma

Various studies have shown the correlation between infantile migraine and colic. Children with migraine had a higher rate of colic, and this ratio was reported as much as 41.6 versus 35.7 in a study (15). In this regard, anything that helps an infant sleep can also prevent migraine attacks. Moreover, the prevention of some stimuli, such as loud music and high light can help to prevent crying infants with migraines. Slow infant movement is also effective in this regard (16). It is worth mentioning that subdural hematoma can cause severe crying in infants (17).

The relationship between cerebral problems and infant crying has also been mentioned in Persian medicine. Hakim Arzani (17-18 AD) indicated the reason for infant crying: "Brain disorders are among the causes of infant crying, and one of the treatments in this regard is to expose the infant's nose to castoreum". Another reason for infant crying is gathering liquid in the infant's head. According to Iranian physicians, it is due to the wetness of the infant's brain as well as the pressure that is put on the infant's head by the midwife's hand. Hakim Arzani states a remedy in this regard: "You have to cut a sour lemon, pour salt on it, and heat it on the fire. Subsequently, compress it over the protuberance from the cut side. Doing this two to three times a day for a few days can help relieve the complication." He eventually mentioned that this complication occurred for his child, and he treated the child using this technique (11,18).

Infant Gastrointestinal Disorder

Disorders, such as infantile intestinal microbial flora, anal stenosis, and bowel motility can affect the infantile colic in such a way that the bowel motility in infants is known as an underlying factor in the colic the possible cause of which is the lack of development of the autonomic nervous system. Anatomical causes, such as anal stenosis, may also make this high level of motility. Chronic constipation, flatulence, and fecal disorder caused by a disturbance in the passage will be associated with increased bowel motility. Studies also show a difference between healthy infants and those who had colic in terms of intestinal microbial factors (Table 1). This can be responsible for changes, such as inflammation, excess stomach gas, and

flatulence in infants with infantile colic (2, 19, 20).

Iranian physicians have also cited problems, such as fecal retention in the digestive tract as one of the reasons for infant crying. In this regard, Ali Ibn Abbas Ahwazi mentions some of the reasons for infant crying: "The reasons for the infant crying are hunger, thirst, heat, cold, as well as pain in the organs, urine, and fecal retention" (21). According to physicians, one of the reasons for fecal retention is the weakness of repulsive force in the gastrointestinal tract and anal spasm. To solve this problem, Avicenna and other Iranian physicians recommend bladder and abdominal massage with oil after birth. The midwife should anoint her little finger into the violet oil and enter the infant's anal to open the spasm. This should be continued until a few days after birth (13, 22). Since this type of care was provided to most of the infants, it can be concluded that in addition to assisting the fecal defecation in all infants, this complication in Persian medicine has also been remedied in infants with anal stricture by timely detection and treatment, which is one of the causes of infantile colic.

Nutrition

A randomized controlled trial showed a significant decrease in colic symptoms among infants whose mothers followed a low-allergen diet (23). Infants of lactating mothers who have eliminated foods, such as cow's milk, peanuts, wheat, soybeans, and fish from their diet are less likely to cry during the day (24).

Iranian physicians also believe that the quality of breast milk is influenced by the food the mothers consume. They generally recommend that they should consume some foods and prohibit the consumption of certain foods. In this regard, Avicenna states in the Canon of Medicine: "Bread made from Roman wheat, as well as lamb, goat, grape, fig, almond, and hazelnut, are suitable for the mother". Moreover, regarding the prohibition of certain foods, he states: "Mothers must avoid the Garden cress, Mustard, and Ocimumbasilicum (basil)" (25, 26).

Another factor that affects the quality of breast milk is the mother's mood. Avicenna states: "The mother must have a good mood to avoid stubbornness and bitterness, and her physical symptoms, such as sadness and anger should not affect her rapidly since all these conditions can alter the quality of milk and negatively affect the infant" (25).

Another important factor in infant crying is the amount of milk the infant drinks per day. Rhazes

Table 1. Factors Affecting Infantile Colic in Modern and Persian Medicine and Ways to Prevent or Treat Them

Factors affecting infantile colic in modern medicine	Suggested ways of treatment or prevention	Factors affecting infant crying in traditional medicine	Suggested ways of treatment or prevention
Breastfeeding mothers with allergen diet	Removing cows' milk, wheat, soy, and fish from the mothers' diet The use of soy or hydrolyzed infant formula for infants who use infant formula	Breastfeeding mothers with late digestive and flatulent diet, which cause pneuma colic in infants	Consumption of wheat, lamb, figs, grapes, fresh fish, almonds and hazelnuts by breastfeeding mothers Avoiding garden cress, mustard, and Ocimumbasilicum (basil), beef, and stale fish by breastfeeding mothers
Infantile bowel motility due to the lack of development of the autonomic nervous system	Compliance with nutritional recommendations	Drinking too much milk by the infant leads to pneuma colic in the infant's intestine Inadequate food digestion in the infant's digestive tract due to infant gastrointestinal weakness and pain in the vertebrae and intestines due to pneuma colic and infant gastrointestinal weakness	The infant should be fed enough milk to avoid flatulence Compliance with nutritional recommendations and anointing the infant's vertebrae by pneuma reducer oils, such as warm water, sesame oil, and wax
Stress during pregnancy and delivery	Avoiding stressors during pregnancy and using methods such as water delivery	Mothers' inappropriate mood can cause discomfort in the infant by affecting breast milk	Mothers' avoidance of stubborn morality because this mood changes the milk's temper and affects the infant
Migraine	Using ways that make the infant sleep better	Hot and dry dyspepsia of the brain Insomnia and seeing scary dreams by the infant due to overeating or poor digestion and pneuma colic vapors in brain	Smelling castoreum by infants Smelling castoreum Avoid overeating and anointing temples and vertebrae by oil
Infantile bowel motility due to anatomical factors, such as stenosis, as well as any flatus and fecal disorder	Use surgery to open the anal way	Fecal retention in the infant's intestine due to weakness of the gastrointestinal tract in defecation	Recommending to open the fecal way and inserting finger in it and greasing the anal with oil

(854-925 AD) states in *Al-Mansouri Fi Al-Tibb*: "The infant should be fed enough milk to avoid flatulence because excessive infant milking results in laziness, drowsiness, restlessness, crying, and vomiting" (27,28). However, Iranian physicians, consider spinal pain, insomnia, and pneuma colic as some of the factors affecting infant crying; moreover, they believe that these complications are directly correlated with flatulence caused by inadequate infant nutrition (Table 1).

Pneuma Colic

The flatulence in the gastrointestinal tract can cause pain in the intestines, which is called pneuma colic. Avicenna states: "One of the diseases of infants is colic, which is a pain in the intestine. Among the symptoms, one can name infant crying and writhing. The cure for this

disease is sesame oil, wax, and warm water" (13). Hakim Arzani explains how to treat pneuma colic in more detail: "Pour oil, warm water, and salt into the bladder of a cow and compress on the abdomen of the infant." He also suggests that the mother should put her infant on her thighs prostrated and massage her infant's back with violet oil to relieve abdominal pain (18).

Spinal Pain

Another consequence of infant flatulence is spinal pain. Iranian physicians believed that the pneuma created in the infant's intestines can be transferred through the vessels, nerve fibers, and membranes to other organs, including the spine, thereby causing pain and difficulty. On the other hand, muscle soreness in this area doubles its sensitivity to the long stay of the infant in the

cradle. Regarding this case, Baha Al-Dawla Razi states in *Kholasa'tolTajareb*: "When anointing, you should massage the infant's nerves and muscles on both sides of the back vertebrae to the neck and massage with your finger. I saw many infants who were crying so close to becoming unconscious and not breastfeeding. They were not silent at all but they found the breast and slept deeply using this way" (29). However, several studies have recently provided strong evidence regarding the effects of massage on reducing stress, anxiety, and pain, as well as intestinal diseases, such as colic (10).

Seeing Scary Dreams

Sometimes a child wakes up from a horrible dream and cries. Drinking too much milk causes it to spoil in the stomach, and the infant will see scary dreams. The issue of how eating too much food causes horrible dreams is discussed among Iranian physicians, and there are two different theories from Galen and Avicenna in this regard. Galen states that overeating causes spoilage in the stomach and spoiled food causes pneumonia. The thick gas from the spoiled food reaches the brain and causes the spirit to panic. However, Avicenna believes that the stomach and brain are two linked organs, and food spoilage causes stomach discomfort. As a result of this connection, imaginations are created in the brain, and the child has a terrible sleep (11, 25). Aside from discussing how full stomachs can cause terrible sleep, Iranian physicians agree on how to treat this condition. Therefore, Sayyed Esmail Jorjani states in *Zakhira* textbook: "Mothers should eat easily digestible foods and prevent infants to sleep rapidly after breastfeeding. They should stay awake and add Cumin (Caraway), Thyme, and Marjoram (*Origanum Majorana*) to their food" (22). Concerning the treatment of this complication, Aghili Shirazi also states: "The cure is reducing food and not to allow the infant to sleep rapidly after breastfeeding. If you could not do this, it is better to put the infant in a cradle and move for better digestion" (25).

It can be concluded from the following recommendations that paying attention to the quantity and quality of infant food and removing the factors that cause flatulence in infants can reduce infants' fear of sleep and consequently reduce infant crying (Table 1).

Insomnia

Iranian physicians consider insomnia as one of the reasons for infant crying, and they have

suggested some solutions to treat it. One of the oldest methods is drug use. Rhazes suggests using opium syrup for infant insomnia, and Avicenna finds this syrup useful for prolonged crying (6). Other Iranian physicians, such as Baha Al-Dawla Razi and Jorjani, have suggested other narcotic and sedative drugs including poppy seeds, cannabis, lettuce seeds, castoreum, as well as Cucurbita seed, violet, lettuce seed, and poppy oils. To this end, these medications can be used orally and topically; moreover, they can be inhaled or consumed by breastfeeding mothers (22).

Aghili Shirazi also states: "One of the things that is hypnotic and stops infant crying is putting the infant in the cradle and singing a rich and sad song devoted to children" (25).

Complementary strategies to reduce infant crying in Persian medicine

Strengthening the Infant's Skin

Infant skin can be stimulated by environmental factors, such as cold, heat, and clothing due to its thinness and sensitivity, which makes the infant cry. Avicenna states in the *Canon of Medicine*: "The skin of a newborn infant is very delicate and very sensitive to cold and violence, and everything is harsh to the infant. Therefore, to strengthen the skin after birth, the infant should be bathed with brine and herbs, such as sumac and fenugreek. Moreover, *Alpinia galanga* can be added to the brine for better strengthening" (Table 1) (13).

Swaddling the Infant

Swaddling can protect the infant from cold and heat, which can act the same as a mother's uterus because of restricting the infant in terms of movement that make the infant feel relaxed and secure. Avicenna states in this regard, "Choose a cloth for swaddling, which is washed and soft. Then, wrap the infant gently." Recent studies show that swaddling is effective in protecting the infant from cold and heat as well as improving sleep quality and reducing pain (13,30).

Protection against Irritants and Use of Sedatives

Physicians in the past believed that transferring the infant from the mother's uterus to this world makes the environmental conditions very different for the infant. They have therefore emphasized that the infant's body temperature should be kept close to the mother's uterus. They had the same idea about the amount of light and sound to the infant's eye and ear. They emphasized that the infant should be kept in a low light environment and away from strong sounds.

Furthermore, they recommended using a good lay and moving in the cradle for their relaxation. Rhazes states in *Al-Mansouri Fi Al-Tibb*: "Put a cloth on the infant's eyes during the first days of birth and do not leave the infant in a bright place. Sing for the infant until h/she starts speaking" (27,28). AghiliShirazi, in addition to repeating the Rhazes's recommendations, found the use of the cradle to be more effective when singing a lullaby. In addition, he regarded the cradle movement as an exercise for the infant (25).

Conclusion

Control of infantile colic in Persian medicine is based on three principles of preventive measures, medical procedure, and reducing stimulus factors. Based on the prevention principle of the Iranian physicians, flatulence and its consequences (pneuma colic, spinal pain, seeing scary dreams, and insomnia) can be prevented by helping fecal defecation as well as a quantitative and qualitative control of maternal and infant food. Solutions, such as massage with oils and the use of hypnotic medications eliminates these complications, which also help prevent them by identifying the stimulus factors.

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Conflicts of interest

There is no conflict of interest regarding the publication of the study.

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