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Original Article

The Effectiveness of Massaging, Swaddling, and Reflexology Intervention in Mothers' Practices Regarding Infantile Colic

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ABSTRACT

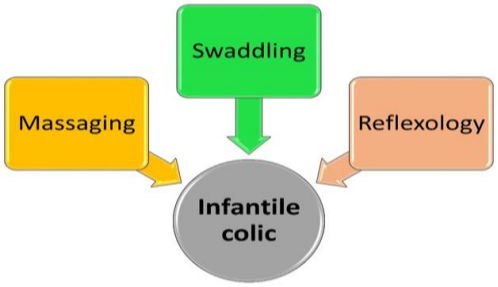
Background and objectives: During the first few months of a baby's life, the parents should deal with terrible condition of infantile colic, in which the infantile cries, groans, or otherwise displays signs of suffering. This study aimed to evaluate the effectiveness of massage, swaddling, and reflexology intervention programs in the practices that mothers use to treat infantile colic.

Materials and Methods: A quasi-experimental research design was employed to investigate 60 mothers (30 subjects in the intervention group and 30 subjects in the control group) who attended treatment and routine follow-ups in outpatient primary health care centers for infantile colic in Erbil from August 1, 2022, to December 1, 2022. A format for health education programs was constructed and designed based on related literature. The data were collected through face-to-face interview techniques, the post-test was administered after one month of intervention with the program. ≤ 0.05 was considered statistically significant

Findings: According to the findings, almost all of the infants in both groups were in their second month of life. Comparing mothers` practices for massaging, swaddling, and reflexology score between the control group and the intervention group before the intervention program (pretest) showed no statistically significant difference. However, there was a statistically significant difference in the mothers` practice for massaging, swaddling, and reflexology score between the control group and the intervention group after the intervention program (post-test). Moreover, there was a statistically significant median increase in massaging, swaddling, and reflexology scores (between the pre- and post-test) of both groups.

Conclusion: Based on the results, it can be concluded that massage therapy, swaddling, and reflexology care can be significantly effective in managing infantile colic.

GRAPHICAL ABSTRACT



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Introduction

Infantile colic can be defined as a period of intense, continuous crying for no apparent reason. Excessive crying occurs between 3 and 12 weeks of the infant's age, and then intensifies. Based on Wessel's diagnostic criteria, infantile colic refers to the condition in which a healthy baby cries for more than three hours per day, three days per week, and this continues for three weeks. Such crying is normally seen in the afternoons and at night [1]. This leads to stress and even anxiety in infants' parents, especially mothers, because they do not know how exactly to treat this condition. Accordingly, mothers normally resort to anything to relieve their child's pain [2]. It is estimated that the incidence rate of colic in infants ranges from 8% to 40%. Regarding the incidence of infantile colic, no difference was found in the infants' sex, the way they were fed, i.e. breastfeeding or feeding with powdered milk, or whether the infants were premature or mature. Based on some research conducted in Iran, about 40 to 50% of newborns aged under 3 months suffer from colic. A matter of great regret is that out of five infants, one suffers from infantile colic, and despite a wide range of studies conducted on this subject, nobody has yet found the real cause behind this condition [3, 4]. Massaging the infant has been suggested for colic treatment, and this is commonly used by parents. Furthermore, massage therapy has been proven to be effective in promoting premature infants' growth and development and improving early interaction between the mother and her infant. Nevertheless, some studies have shown that massaging the infant is not effective in treating infantile colic if it is evaluated based on the outcome of a reduction of the infant's cries [5, 6]. The infant can be protected against cold and heat using swaddling since this can play the same role the mother's uterus played to restrict the infant's movement, which helps the infant feel secure and relaxed. As Avicenna argues in this regard, "choose a clean and soft cloth for swaddling." and wrap the infant gently. Swaddling can protect the infant against heat and cold, improve sleep quality, and reduce pain [7]. Although it has been poorly understood, infantile colic, characterized by excessive sobbing in the first few months of a toddler's life, is common among infants. Therefore, it brings about considerable frustration not only for parents, but also for other carers. Depending on the region and the definitions used, between 3% and 40% of newborns experience infantile colic [8]. Reflexology is a non-pharmacological method of treatment that can be utilized as a pain-relieving strategy in conditions of infantile colic. As a science, reflexology spots reflex zones both in a person's hands and feet, based on the belief that these are connected to glands and body organs. With a 40% prevalence, the infantile colic syndrome is commonly associated with mothers' stress and even family disruption [9]. Breastfeeding failure is more likely in mothers whose infants complain of colic. According to the findings of many research teams, mothers lack the mental capacity to properly take care of their babies. Furthermore, these mothers experienced a great deal of not only stress, but also an anxiety while caring for their colic infants [10]. This present study aimed to find out the characteristics of infantile colic and evaluate the effectiveness of massaging, swaddling, and reflexology in its treatment.

Materials and Methods

Quasi-experimental (pre/post-test) research design was applied in this research conducted in four Maternal Child Health Care (MCHC) Centers (Kurdistan, Nafh Akray, Mala Afandy, and Birth Registration) in Erbil City, Kurdistan Region, Iraq. The MCHCs mentioned above provide mothers, infants, and children with all health services, including health education, family planning, vaccinations, and laboratory tests. A non-probability (purposive) sample of 60 (mothers of infants) was recruited. They were divided into two groups: one group of 30 mothers underwent an educational program as an intervention group, and another group of 30 carers was not exposed to the program and considered a control group. The participants attended healthcare centers in Erbil, Kurdistan (Nafh Akray, Mala Afandy, Birth Registration) for treatment, routine follow-up, and vaccination for infantile colic. Eight mothers

were excluded from the study (3 from the intervention group and 5 from the control group). Mothers having infants between 1-3 months who complained of infantile colic were included. A format for a health education program was constructed and designed based on related literature and prior studies. The intervention took about 60 minutes for each of the mothers. The assessment (pretest) was conducted from August 1, 2022, to the end of November 2022. The data were collected through face-to-face interviews, and the post-test was applied after one month of intervention in the program. The sessions were programmed as follows: The first session: mothers' knowledge about infantile colic; The second session: effectiveness of massaging in treating infantile colic; the third session: effectiveness of swaddling in treating infantile colic; the fourth session: effectiveness of reflexology in treating infantile colic. Moreover, an assessment was used to assess mothers' general information about gestational age, newborn's weight and sex, infant's age, mode of feeding, and period of crying (crying more than three hours in a day, crying three days or more in a week, crying more than three weeks, a total of about 1 hour in each 24-hour period, a total of about 1-4 hours in 24 hours, a total of more than 4 hours in each 24-hour period, crying mostly in the late afternoon or evening, waking up at night crying). Assessment of mother's practice regarding infantile colic consists of massaging (11 items), swaddling (7 items), and reflexology (8 items). Cronbach's alpha (0.85) was used to assess the reliability. Before data collection, the ethical committee at the College of Nursing, Hawler Medical University, issued the ethical approval of this research. In addition, all the participating mothers signed informed consent. Official permission was obtained from the College of Nursing, and the Ministry of Health/General Directorate of Health/Erbil Governorate. Before data collection, the purpose of the intervention was explained to the mothers; they all had the right to withdraw from the study; and the researcher promised to ensure and maintain confidentiality and anonymity. A verbal agreement was obtained from the mothers who participated in the study. The data was analyzed through the interpretation of the data using SPSS version 24. The Mann-Whitney U test was used to compare the effectiveness of health intervention program (pre-and post-test), and the Wilcoxon signed-rank test was used to test whether there was a difference between the pre-and post-test programs of mothers` practice regarding infantile colic in both groups. A p-value of ≤ 0.05 was considered statistically significant.

Results and Discussion

Table 1 compares the socio-demographic characteristics of the mother's gestational age at birth. Almost all of the participants (96.7% vs. 83.3%) in the control group and intervention group were more than 37 weeks. Most were aged between 20 to 29 years old. Less than half (43.3% vs 26.7%) in both the control and intervention groups graduated from different universities. Regarding the infants' demographic characteristics in the control and intervention groups, Table 2 demonstrates that less than half (46.7 % vs. 43.3%) of the infants' weights in both groups were between 3-3.5 kg. The highest percentage (43.3% vs. 56.7 %) of infants in the control group and intervention group were girls. Almost all of the infants (86.7% vs. 100%) of both groups were ≤ 2 months. Concerning the mode of feeding, more than half (63.3%) and half (50%) of the infants were fed using mixed breastfeeding methods.

Table 3 illustrates the comparison of mothers` practices for massaging, swaddling, and reflexology score between the control group and the intervention group before the intervention (pretest). The test showed that there was no statistically significant difference in massaging, =403, Z= - 0.73, P > 0.46. The swaddling score among both groups was =436, Z= - 0.231, and P > 0.8. The reflexology score among control and intervention groups, U (N control group =30, N intervention group = 30) =436, Z= - 0.548, P > 0.5, respectively.

Table 4 demonstrates the comparison of mothers` practice for massaging, swaddling, and reflexology score between the control group and intervention group (post-test). The Mann–Whitney U test showed a difference in the

practice of massaging, swaddling, and reflexology scores among mothers of both groups in the post-test. There was a statistically significant difference in the massage score among the control and intervention groups, u (n control group =30, n intervention group = 30) =36.5, z= - 6.225, P < 0.00. There was a statistically significant difference in the swaddling score among control and intervention groups, U (N Control group =30, N Intervention group = 30) =144.5, Z= - 4.594, P < 0.00. Finally, a statistically significant difference existed in the reflexology score among control and intervention groups, U (N Control group = 30, N Intervention group = 30) =49, Z= - 6.636, P < 0.00.

According to Table 5, the Wilcoxon signed rank test showed that there was a statistically significant median increase in massage score (22) Z = - 4.72, P = 0.000, with a large effect size, r = 0.86.

Table 1: Mothers' demographic characteristics

		Control Group		Intervention Group	
Items		No.	(%)	No.	(%)
Gestational age at birth	>37	1	(3.3)	5	(16.7)
	<37	29	(96.7)	25	(83.3)
Age of mother	>20 years old	3	(10)	4	(13.3)
	20-29 years old	20	(66.7)	16	(53.3)
	30-39 years old	7	(23.3)	10	(33.3)
Level of education	Illiterate	1	(3.3)	2	(6.7)
	Primary School	2	(6.7)	6	(20)
	Intermediate school	5	(16.7)	6	(20)
	Secondary	3	(10)	3	(10)
	Diploma	6	(20)	5	(16.7)
	University	13	(43.3)	8	(26.7)
Socioeconomic state	Low	8	(26.7)	9	(30)
	Middle	22	(73.3)	21	(70)
	High	0	(0)	0	(0)

Table 2: Infants' demographic characteristics in control and intervention groups

		Control Group		Intervention Group	
		No.	(%)	No.	(%)
Infant's weight after delivery	2-2.4 Kg	3	(10)	7	(23.3)
	2.5- 2.9 Kg	12	(40)	9	(30)
	3-3.5 Kg	14	(46.7)	13	(43.3)
	< 3.5	1	(3.3)	1	(3.3)
Sex	Boy	17	(56.7)	13	(43.3)
	Girl	13	(43.3)	17	(56.7)
Infant age	2 months old	26	(86.7)	30	(100)
	3 months old	4	(13.3)	0	(0)
	4 months old	0	(0)	0	(0)
Mode of feeding	Exclusive Breastfeeding	6	(20)	9	(30)
	Bottle feeding	5	(16.7)	6	(20)
	Mixed feeding	19	(63.3)	15	(50)

Table 3: Comparison of mothers' practice for massage, swaddling, reflexology, and infantile colic characteristics score between the control and intervention groups pretest

Infantile Colic Practice Domains	N	(%)	Median	Mean Rank	U-Test	Z-score	P-value
Massaging Score							
Control Group	30	(100)	2	32.07	403	- 0.73	0.465
Intervention Group	30	(100)	1	28.93			
Swaddling Score							
Control Group	30	(100)	0	30.97	436	- 0.231	0.817
Intervention Group	30	(100)	0	30.03			
Reflexology Score							
Control Group	30	(100)	0	30.97	436	- 0.548	0.584
Intervention Group	30	(100)	0	30.03			

Table 4: Comparison of mothers' practice for massaging, swaddling, reflexology, and infantile colic`s characteristics score between the control and intervention groups posttest

Infantile Colic Practice Domains	N	(%)	Median	Mean Rank	U Test	Z score	P value
Massaging Score							
Control Group	30	(100)	2	16.72	36.5	- 6.225	0.000
Intervention Group	30	(100)	22	44.28			
Swaddling Score							
Control Group	30	(100)	0	20.32	144.5	- 4.594	0.000
Intervention Group	30	(100)	11	40.68			
Reflexology Score							
Control Group	30	(100)	0	17.13	49	- 6.636	0.000
Intervention Group	30	(100)	16	43.87			

On the other hand, the test showed no statistically significant median difference in massaging (2) for mothers in the control group before the course program compared to after the course program (2), Z = - 1.44, P = 0.152, with a small effect size, r = 0.26. There was a statistically significant median increase in the swaddling score (11) when mothers included in the course program were compared to those not included in the course program (0), Z = - 4.56, P = 0.000, with a large effect size, r = 0.83. Hence, according to the test result, there was no statistically significant median difference in swaddling (0) for mothers in the control group before the course program compared to after the course program (0), Z = - 1.34, P = 0.18, with a small effect size, r = 0.25.

Furthermore, the test showed that a statistically significant median increase occurred in reflexology score (16) when mothers included in the course program were compared to those not included in the course program (0), Z = - 4.91, P = 0.000, with a large effect size, r = 0.90. In contrast, the test showed that for mothers in the control group before the course program, the median difference in reflexology (0) was not statistically significant compared to after the course program (0), Z = 0, P = 1, with a zero effect size, r = 0.

Analysis of the demographic characteristics revealed that most of the babies' gestational ages were more than 37 weeks. This result is consistent with the study conducted by Vandenplas *et al.*, which aimed to investigate the effect of fermented milk powder for infants with colic, and reported that 37–42 weeks was the inclusion criteria [11]. Likewise, in Gerasimov *et al.*'s study, the gestational age of 37-42 weeks was included in the inclusion criteria [12]. However, disagreed with a study conducted by Talachian *et al.* in Iran on the infantile colic incidence and risk factors among infants in Iran. They found that more than three-quarters of infants' gestational ages were less than 37 weeks

[13]. The majority of participating mothers were between the ages of 20 and 29 in both groups. The results were consistent with Khalaf *et al.*'s educational health program for mothers concerning infantile colic syndrome in Egypt. The results revealed that the highest percentage of participating mothers was less than 30 years old. The highest percentage of mothers' level of education was a university degree in both groups. The results of their study were consistent with those of Qahtani and *et al.* in Saudi Arabia, who reported that most of the participating mothers' level of education was a university degree [14]. According to the babies' socio-demographics, in both groups, most of the infants were aged 3-3.5. This result was supported by Talachian *et al.* on infantile colic in Iran and its incidence and risk factors, indicating that most of the babies participating in their study were more than 2.5 kg. Moreover, in the control group, the highest percentage belonged to the boys, while the highest percentage was related to the girls in the intervention group [13]. Concerning the infants' ages, nearly all of them were in their 2 months of age (in both groups). This result was consistent with the study done by Al Qahtani *et al.* in Saudi Arabia, who reported that almost all of the participating babies were about 2 months old [14]. The study found that a high percentage used mixed feeding, which was not consistent with the findings of Talachian *et al.* who reported that most of the participants used only breastfeeding style [13].

The new mothers` practice of massaging was compared between the control group and intervention group (pretest). The Mann-Whitney U test was applied to compare whether there was a difference in the mothers' practices of massaging, swaddling, and reflexology in the two groups in the pretest.

The findings showed the difference was not statistically significant in the massaging, hence the results were consistent with Gürol and Polat who found that the difference between the experimental group and control group in the pretest was not statistically significant after comparing the two groups (control and intervention) for new mothers` practice for swaddling in the pretest [15].

In addition, the comparison of the swaddling score among these two groups showed that the differences were not statistically significant in the pretest. The comparison of the reflexology score among the control and intervention groups revealed that no statistically significant difference existed in the reflexology score between the two groups in the pretest. The results were supported by Karatas *et al.* who found that no significant difference in the first application session was found between the groups [16]. Regarding the comparison of mothers` practice for massaging between the two groups (control and intervention) in the posttest, Mann-Whitney test showed statistically significant differences in the massaging between these two groups; the results were supported by Sheidaei *et al.*, who found a statistically significant difference between mothers` practice for massaging between the control group and intervention group in the post-test [5].

Table 5: Comparison of practice domains before and after the program of mothers in control and intervention groups (pretest and posttest)

Control Group					Intervention Group				
Practice Domains	Median	Z	P	*r*		Median	Z	P	*r*
Massaging Score									
Pretest	2	- 1.44	0.152	0.26	Pretest	1	- 4.72	0.000	0.86
Posttest	2				Posttest	22			
Swaddling Score									
Pretest	0	- 1.34	0.18	0.25	Pretest	0	- 4.56	0.000	0.83
Posttest	0				Posttest	11			
Reflexology Score									
Pretest	0	0	1	0	Pretest	0	- 4.91	0.000	0.90
Posttest	0				Posttest	16			

Regarding the comparison of mothers` practice for swaddling between the two groups in the post-test, there were statistically significant differences in the swaddling between the control group and intervention group. The results of Didişen *et al.*'s study show that swaddling is a traditional practice and is used to reduce infant colic and reduce infant pain [17]. This is consistent with our study. However, it is important to mention that swaddled babies are at an increased risk of sudden infant death syndrome and late-onset hip dysplasia. Therefore, mothers should be advised to avoid placing their swaddled babies in straight and lateral positions during sleep [18].

The practice domains were compared between the pretest and posttest of the program of mother's practice regarding infantile colic in the control group and intervention group. The Wilcoxon signed-rank test was used to test whether there was any difference between the pretest and posttest programs of mothers` practice regarding infantile colic in both groups in the intervention group. The test determined that there was a statistically significant median increase in massage scores when mothers included in the course program were compared to those not included in the course program. On the other hand, the test determined that there was not a statistically significant median difference in massaging for mothers in the control group before the course program compared to after the course program. These results were supported by Sheidaei *et al.* who reported significant improvement in all symptoms during the intervention in the massage group, while in the rocking group, just the severity of colic improved [5].

Moreover, the test determined that in the intervention group, there was a statistically significant median increase in swaddling scores for mothers included in the course program. For those not included in the course program, there was not a statistically significant median difference in swaddling scores. The result was consistent with Van *et al.* who reported that there was a significantly higher decrease in young infants' crying during the intervention group if they were swaddled, while they showed a significantly higher decrease in crying in the control group [19].

Furthermore, the test found a statistically significant median increase in reflexology scores when mothers included in the course program were compared to those not included in the course program. In contrast, the test showed no statistically significant median difference in reflexology for mothers in the control group before the course program compared to after the course program. The results were consistent with Icke *et al.* who found that after applying the reflexology intervention to the study group, the colic severity decreased significantly compared to the control group [9].

Conclusion

Based on the findings of the current study, massage therapy, swaddling, and reflexology mother care can be significantly effective for treating colic pain in infants. They can also improve colic crying characteristics of infants. Furthermore, mothers can use an educational supportive care program to treat infantile colic suitably and conveniently. It is recommended that the future research include multiple hospitals with more participants to help establish this guideline as a clinical practice reference.

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Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

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