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Original Article

Educational Health Program for Mothers Regarding Infantile Colic Syndrome at Assiut City

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ABSTRACT

Background: Infantile colic is period of devastated and inexplicable crying in an apparently healthy infant, leads to drained, bothered and worried parents. It affects 30% of infants worldwide with equivalent frequency in male and female. **Aim**: To evaluate the impact of an educational program on mothers' knowledge regarding infantile colic syndrome. **Methods:** Quasi- experimental (pre/posttest) research design used in all of the five maternal and child health care centers. **Sample:** Included 402 mothers. **Two tools; Tool (1)**: A structure interview questionnaire sheet composed of three parts; **part (I):** Mothers' personal data; **part (II):** Infants' data and **part (III):** Mothers' knowledge about infantile colic syndrome. **Tool (II):** Infant colic scale, which included total of 22 items in five subscales. **Results:** It was found that 29.9% and 68.9 of mothers had university education and from rural area. There was improvement of mothers' knowledge in posttest mean score of knowledge =19.46 while it was 8.46 in pretest. There was statistical significance relation between mothers' total mean score of knowledge and education, occupation and residence in pretest. **Conclusion and recommendations:** There was improvement in mothers' knowledge after implementation of the educational program. The study recommended availability of educational material in five maternal and child health care centers to increase awareness regarding infantile colic.

Keywords: Educational health program; Infantile colic syndrome; Mothers.

Introduction:

Infantile Colic (IC) is one of the extremely well-known problems in gastroenterology **(Gordon et al., 2019)**. It can be defined as "periods of inconsolable, unexplained and incessant crying in a seemingly healthy infant that, quite understandably, leads to exhausted, frustrated and concerned parents seeking to comfort their child" **(Bagherian et al., 2021)**. According to Wessel IC refers to "healthy infants with periods of crying lasting for more than three hours a day, at least three times a week for more than three weeks within the first four months after birth" **(Yen and Lee, 2021)**.

The occurrence of IC in breast and bottle-fed infants is the same with no difference **(Savino et al., 2014 and Bagherian et al., 2021)**. The cause of IC remains ambiguous **(Kheir, 2012)**. The persistent crying of infants during the first three months of life is one of the most common reasons for both breastfeeding termination and visits to medical care providers. Persistent crying can be associated with maternal physical and psychological symptoms or marital conflict and affect the maternal-infant attachment process **(Sommermeyer et al., 2020 and Bagherian et al., 2021)**.

Organic causes account for less than 5% of infants presenting with excessive crying, many risk factors remain unclear, such as an increase in the mother's age, which may be related to the degree of colic pain **(Savino et al., 2014 and Firooz et al., 2021)**. The mainstay of IC management is an acknowledgment by the physician of the difficulties the parents are facing and an inquiry into the well-being of the parents, the single most effective phase remains reassurance of parents regarding the self-limiting nature of the disease as most of babies improve by the age of 3 to 4 months **(Kheir, 2012)**.

Community and pediatric health nurses should provide guidance and informal education for mothers to accompany any intervention for IC, so that they may better understand the potential etiologies and pursue various management and treatment options, evidence is emerging that education of parents can make a difference in preventing many complications that may accompanied with improper practices of IC **(Barr, 2014 and Gordon et al., 2019)**.

Significance of the study:

Infantile colic syndrome is common cause of maternal stress and family disruption, its prevalence has a wide range to 40%. Mothers with infant complaining from colic are at risk for unsuccessful breastfeeding. According to many research teams' experiences; mothers did not have enough mental capacity to take care of their babies properly. Moreover, these mothers were under a lot of stress and anxiety when caring for their infants with colic **(Al Saadoon et al., 2018 and Bagherian et al., 2021)**. Due to the limited information available; this study aimed to provide an educational program for mothers to help them to deal effectively with infantile colic syndrome.

Aim of the study:

The study aimed to evaluate the impact of an educational program on mothers' knowledge regarding infantile colic syndrome in Assiut City.

Study hypothesis:

-Alternative Hypothesis (H1):

Mothers' knowledge about infantile colic syndrome is expected to be improved after the implementation of the educational program.

Subjects and method:

-Research Design:

Quasi- experimental (pre/posttest) research design.

-Setting:

There are five Maternal and Child Health Care centers (MCH) located in Assiut City for serving large number of population from Assiut Governorate and providing all health services to mothers, infant and children; such as antenatal care, family planning, laboratory tests, premarital screening, health education and vaccinations for mothers and infant. The proposed research conducted in all of these five MCH.

-Sampling and sample size calculation:

Systematic random sampling with probability proportionate to size used to select the participating mothers. The number of mothers that was took from each MCH centers was calculated by the number of follow rate of the mothers in this MCH (total of follow rate during 6 months divided on 6); which divided by the total number of mothers follow rate at MCH centers (11095) and then multiplied by the sample size **(Skinner, 2017)**. According to the following equation:

$$\frac{\text{The number of mothers in each MCH}}{\text{Total number of mothers in the selected MCH}} \times \text{estimated sampling size by EPI/info}$$

-Sample Size: Calculated by using Epi info (ver.7); the used parameters to estimate the minimum required sample size included prevalence of IC 30 % according to **(Bagherian et al., 2021)** margin of error 5% and 95% confidence interval. The minimum required sample was 323 mothers with their infant; the number was increased to 402 to compensate dropout and refusals.

A total number of 402 mothers with their infant interviewed in this study classified as in the following table:

MCH	Flow rate, 2021	Numbers of selected mothers in each MCH	Percentage
Kelta	2488	90	22.4%
Gharb El-Balad	1842	67	16.6%
El-Arbaeen	3196	116	28.8%
Nazlat Abdullah	998	36	9.0%
Hamra	2571	93	23.2%
Total	**11095**	**402**	**100%**

- Inclusion criteria:

Mothers attended the MCH centers, free from cognitive disorders, had at least one previous child, had current infant his age less than 6 months was suffering from persistent crying without physical causes and accept to participate in the study were included.

-Tools of the study:

Two tools were used by the researchers to collect the essential data after reviewing literature. **Tool (1): A structured interview questionnaire sheet:** It composed from three parts; **Part (1):** Mothers' personal data such as: Name, age, residence, levels of education, mothers' occupation and name of MCH center. **Part (II):** Infants' data which comprised of: Methods of feeding, direction technique of formula bottle, using of pacifiers and characteristics of the infantile colic syndrome such as (age developing colic, frequency of colic per day, episode duration in minutes, timing of colic, having defecation problems and frequency of opening bowel/ day as reported by their mothers.

Part (III): Mothers' knowledge about infantile colic syndrome such as: Definition, causes, symptoms, timing of colic, diagnosis, when the colic is not the diagnosis, dangers signs to call the physician and methods to reduce colic attacks.

-Scoring of knowledge: The total score of knowledge was 42. Each correct answer took one grade and wrong or incomplete answer and didn't know took zero grades. The mean score was used in this study to estimate levels of mothers' knowledge as above the mean score was considered satisfactory knowledge **(Yen and Lee, (2021)**. **Reliability:** Testing reliability of the study tools was done by Cronbach′s Alpha which was 0.754.

Tool (II): Infant colic scale was developed by **Ellett et al., (2003)** to help healthcare professionals to diagnose colic in infants. The tool has a total of 22 items in five subscales: (a) Cow's Milk/Soy Protein Allergy/Intolerance (2 items), (b) Immature Gastrointestinal System (4 items), (c) Immature Central Nervous System (8 items), (d) Difficult Infant Temperament (4 items) and (e) Parent–Infant Interaction+ Problem Infant (4 items). The Infant Colic Scale valued on a 6-point Likert-type scale.

-Scoring of the infant colic scale:

The responses were ranged from 1 (strongly disagree) and 6 (strongly agree). A low total mean of score indicated infantile colic syndrome; while high mean of score indicated diagnose of colic. The reliability of the scale was conducted and the Cronbach's alpha coefficient ranged from 0.55 to 0.89 for the subscales, it was 0.73 for the total scale **(Çetinkaya and Bas¸bakkal, 2007)**.

-Validity of the tools: The used tools were evaluated after translation into Arabic language by five experts from Community Health and Pediatrics Nursing Departments, Faculty of Nursing, Assiut University; the required modifications after revision were done.

-Pilot study: It conducted before beginning of data collection on 40 mothers represented nearly (10%) which included in the study because there weren't modifications in the form.

-Methods:

1. Administrative phase:

An official letter approval obtained from the Dean of the Faculty of Nursing, Assiut University to the Assiut Governorate Undersecretary Ministry of Health & population to conduct the study after full explanation of the study aim. The letter involved agreement to perform the study at the selected MCH centers at Assiut City.

2. Ethical considerations:

The Ethical Committee at Faculty of Nursing Assiut University has accepted the plan for this study. There was no risk to the mothers during the applications of the study. Mothers had the right to withdraw from the research at any time. Oral consent, confidentiality and anonymity were assured.

3. Data collection phase: First, the researchers met MCH centers mangers and explained the purpose of the study. The data collection was done through two phases; **first phase:** Taken three months started from the beginning of October until the end of December, 2021. During this period; mothers who were attending to vaccination clinics with their infant and answered on the question whether their infant suffered from infantile colic or not (the response categories were yes or no), then mothers who answered yes and they met the inclusion criteria included in the study. After that, before the beginning of data collection explanation of the study purpose and oral consent was done for the mothers who agreed to participate in the study.

The researchers collected the data in two days per week throughout the three months, an interview questionnaires (pretest) were filled from the mothers while they were waiting for vaccination session to assess their infants' history and their knowledge about IC, after that they were met in health education room in each MCH to implement the health education program sessions. The average number of participated mothers who met per day was (17 mothers); the duration of the session ranged from 35-45 minutes. Then the telephone numbers of the participated mothers were taken to make appointment for the second meeting.

The second phase: After two months when the mothers came to give vaccination to their infant the researchers arranged with them meetings through telephone call to perform posttest by using the same form that was used in pretest.

-Educational program: The educational program developed based on the pertinent literature. Brochure and educational booklet and prepared to include the summarized simple information about definition, causes, complications, associated factors of infantile colic…etc.

-General objective: To improve mothers' knowledge about infantile colic.

-Specific objectives: To identify the level of mothers' knowledge before the implementation of the health education program.

- To plan health educational program about infantile colic.

- To implement and evaluate the impact of the health educational program on mothers' knowledge about infantile colic.

-Contents of the program included: Definition, criteria of infantile colic syndrome, diagnosis, causes, dangers signs, when to call the physician, risk factors and methods to control infantile colic syndrome.

The program followed four steps as: **1) Assessment phase:** The researchers assessed personal data of mothers, the infants' data and mothers' knowledge regarding infantile colic. Also, they used infant colic scale (only one time in the first meeting with the mother) to diagnose infantile colic syndrome.

2) Planning phase: This phase included the arrangement for the conduction of the educational program such as:

a- Teaching place: The program was conducted at waiting and health education room in every MCH.

b- Teaching Time: The time of the program was decided according to the working time of the vaccination clinic.

c- Teaching methods and materials: The researchers used simple teaching methods such as: Lecture and discussion. The used media was included power point presentation, video and handouts regarding infantile colic prepared by the researchers and distributed to every mother participated in the program.

d- Sessions: The contents of the program were divided into several scheduled sessions (two sessions per week) included enough information of infantile colic according to the duration of session.

3) Implementation phase: The educational program was conducted in three months (two days per week) to complete the program contents.

4) Evaluation stage: During this phase the mothers' knowledge was assessed after two months of receiving the educational program to evaluate their compliance with the acquired data.

-Statistical analysis:

Data entry and data analysis were done using SPSS version 22 (Statistical Package for Social Science). Data were presented as number, percentage, mean, and standard deviation. An independent sample t-test was used to compare quantitative variables between two groups and ANOVA and Fisher exact test used for more than two groups. Paired samples t-test was done to compare quantitative data between pre-test and post-test. Pearson correlation was done to measure correlation between quantitative variables. P-value considered statistically significant when $P < 0.05$.

Results:

Table (1): Represents mothers' personal data; it was found that 57.2% were aged < 30 years, 29.9% had university education, 69.7% house wives and 68.9% from rural areas.

Table (2): Presents that 46.3% of infant were fed by both of breast milk and formula and 53.5% of mothers were using pacifiers for their infants. Also, this table denotes that 51.0% of infants developed colic at age of 1-2 month, 51.7% had 1-2 colic episodes per day, with duration of 1-< 10 minutes in 29.1% and the colic attacks was occurred more at night among 42.3% of the infants.

Table (3): Regarding mothers' knowledge about infantile colic syndrome; this table illustrates that 12.2% of mothers answered definition of infantile colic correctly and 36.8% gave correct timing of colic attack in pretest which improved to be 27.1% and 76.4% post the educational program application. Also, in **table (3): cont.,** it was found that 29.1% and 46% of mothers mentioned blood in the stool as a danger signs to call physician and massaging the abdomen as a method to reduce colic attacks which became 53.2% and 70.1% after the implementation of the educational program with statistical significance differences were found.

Table (4): Shows that 60.0% of mothers used medicine as an approach to manage the colic and 87.6% gave the infant gripe water as a traditional method to soothe the colic attack and fathers were sharing in infant care with 44.5% of mothers.

Figure (1): Proves that there was statistical significance increase in mothers' knowledge regarding infantile colic after the implementation of the educational program with mean ± SD= 19.46 ± 6.06.

Figure (2): Clears that previous experiences as source of information mentioned by 49.0% of mothers, 31.8% were relatives and friends, while family older persons were the sources for 30.1% of mothers.

Table (5): Discloses that there were statistical significance relation between mothers total score of knowledge regarding infantile colic and their education, occupation and residence in pretest p-values= 0.000, 0.000 and 0.008 respectively. While there was a statistical significance difference with history of previous baby who was suffering from colic and total score of mothers' knowledge in posttest P-value=0.041.

Table (6): Clarifies the mean ± SD of the infant colic subscales as following, 7.85 ± 1.04 for cow milk/ soy protein allergy/intolerance, 29.45±4.83 for immature central nervous system. Whereas, the total mean ± SD of infant colic scale= 80.65 ± 9.32.

Table (7): Implies that there were statistical significance relation between total mean score of the infant colic scale and mothers' education and residence p-values= 0.020 and 0.025 respectively. On the other hand there weren't statistical

significant relations between total score of infant colic scale and infant data such as infant' age, sex, nutritional methods and use of pacifiers p-values= 0.364, 0.992, 0.888 and 0.219 respectively.

Fig. (3): Describes the presence of significant negative correlation between total score of mothers' knowledge and total score of infant colic scale (r= - 0.109 & P= 0.029).

Table (1): Distribution of mothers according to their personal data (n=402)

Items	n	%
Mother age (year):		
< 30	230	57.2
≥ 30	172	42.8
Mother education:		
Illiterate	48	11.9
Read & write	29	7.2
Primary	34	8.5
Preparatory	54	13.4
Secondary	107	26.6
University	120	29.9
Post-graduate	10	2.5
Mother occupation:		
House wife	280	69.7
Working	122	30.3
Residence:		
Rural	277	68.9
Urban	125	31.1

Table (2): Distribution of infant methods of feeding and characteristics of infantile colic syndrome as reported by mothers (n=402)

Items	n	%
Methods of feeding:		
Only breast milk	175	43.5
Breast milk and formula	186	46.3
Formula only	41	10.2
If formula used how to use a feeding bottle: (n=227)		
Horizontal	163	71.8
Vertical	64	28.2
Use of pacifiers:		
Yes	215	53.5
Age developing colic (months):		
1 – 2	205	51.0
3 – 4	134	33.3
5 – 6	63	15.7
Frequency of colic per day:		
1 – 2	208	51.7
3 – 4	149	37.1
5 or more	45	11.2
Episode duration in minutes:		
1 - < 10	117	29.1
10 - < 15	128	31.8
15 - < 30	93	23.1
30 - < 45	47	11.7
45 - < 90	7	1.7
≥ 90	10	2.5
Timing of colic:		
Morning	37	9.2
Evening	78	19.4
Night	170	42.3
All day	117	29.1

Having defecation problems:		
Yes	129	32.1
Frequency of opening bowel/ day:		
1 – 2	213	53.0
3 – 5	109	27.1
≥ 6	15	3.7
Not able to remember	65	16.2

Table (3): Distribution of mothers' according to their knowledge regarding infantile colic in pre/posttest (n=402)

Items	Pre-test (n= 402)		Post-test (n= 402)		P-value
	No.	%	No.	%	
Definition of infantile colic:					
Incorrect	353	87.8	293	72.9	0.000*
Correct`	49	12.2	109	27.1	
Causes of infantile colic:					
Don't know	158	39.3	0	0.0	0.000*
Cows' milk protein allergy	86	21.4	272	67.7	0.000*
Transient lactose intolerance and excessive gas production	56	13.9	237	59.0	0.000*
Painful gut contractions	117	29.1	206	51.2	0.000*
Increased levels of gut hormones	26	6.5	212	52.7	0.000*
Maternal smoking	5	1.2	80	19.9	0.000*
Imbalance in intestinal microflora	8	2.0	45	11.2	0.000*
Behavioral problems	15	3.7	63	15.7	0.000*
Gastro-oesophageal reflux disease	11	2.7	90	22.4	0.000*
Symptoms of infantile colic:					
Don't know	63	15.7	0	0.0	0.000*
Burping often or passing a lot of gas	135	33.6	235	58.5	0.000*
Having a bright red (flushed) face	94	23.4	230	57.2	0.000*
Having a tight belly	130	32.3	245	60.9	0.000*
Curling up their legs toward their belly when crying	115	28.6	205	51.0	0.000*
Clenching their fists when crying	69	17.2	191	47.5	0.000*
Absence of other organic cause	13	3.2	57	14.2	0.000*
Timing of colic:					
Incorrect	254	63.2	95	23.6	0.000*
Correct	148	36.8	307	76.4	
Diagnosis of infantile colic:					
Incorrect	311	77.4	86	21.4	0.000*
Correct	91	22.6	316	78.6	
Infantile colic last for 4-6 months of the baby age:					
Incorrect	233	58.0	13	3.2	0.000*
Correct	169	42.0	389	96.8	

Chi-square test Fisher exact test

Table (3): Cont.

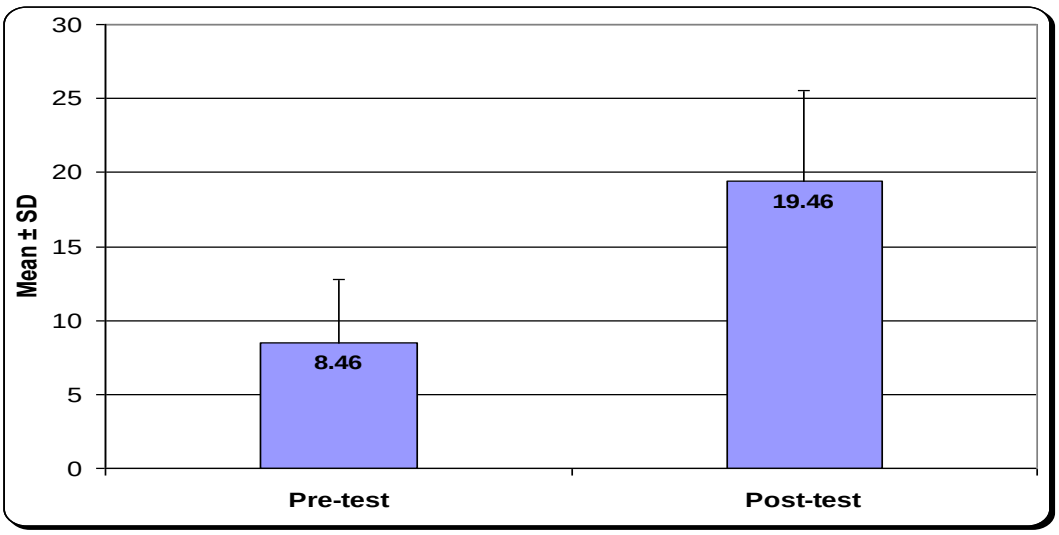
Items	Pre-test (n= 402)		Post-test (n= 402)		P-value
	No.	%	No.	%	
Infantile colic is NOT the diagnosis if the baby:					
Don't know	72	17.9	0	0.0	0.000*
Has a rash	67	16.7	263	65.4	0.000*
Has a temperature.	94	23.4	226	56.2	0.000*
Is not gaining weight as expected	48	11.9	150	37.3	0.000*
Is crying and unhappy all the time	82	20.4	148	36.8	0.000*
Vomits regularly or vomits green fluid	41	10.2	168	41.8	0.000*
Has any difficulty breathing	59	14.7	146	36.3	0.000*
Is not a normal color	38	9.5	133	33.1	0.000*
Cannot feed well	107	26.6	120	29.9	0.308
Dangers signs to call physician:					
Don't know	68	16.9	1	0.2	0.000*
Fever	179	44.5	270	67.2	0.000*
Forceful vomiting	122	30.3	242	60.2	0.000*
Diarrhea	115	28.6	262	65.2	0.000*
Blood in the stools	117	29.1	214	53.2	0.000*
Methods can reduce colic attacks:					
Don't know	33	8.2	0	0.0	0.000*
Massaging the abdomen	187	46.5	282	70.1	0.000*
Bathing the baby	52	12.9	228	56.7	0.000*
Putting a warmed towel on the baby's stomach	29	7.2	225	56.0	0.000*
Wrapping the baby	34	8.5	152	37.8	0.000*
Taking the baby around outside the home	44	10.9	96	23.9	0.000*
Swinging (Standing or in the baby bouncer)	103	25.6	115	28.6	0.341
Play the baby light and repetitive sounds	26	6.5	94	23.4	0.000*
Give pacifier	103	25.6	137	34.1	0.009*
Avoid overfeeding	26	6.5	104	25.9	0.000*
Seek help from other family members	38	9.5	65	16.2	0.004*
Get air bubbles out of the bottle	33	8.2	92	22.9	0.000*

Chi-square test Fisher exact test

Table (4): Distribution of reasons, management, traditional methods and person help mother in their infant colic attacks (n=402)

Items	n	%
#Reasons and causes of the infantile colic as reported by mothers:		
Abdominal cramps and contractions	187	46.5
Constipation	107	26.6
Gases	144	35.8
Hunger	48	11.9
# Management methods of infantile colic:		
Put the baby on prone position/ massage abdomen	134	33.3
Giving medicine	241	60.0
Continue breast feeding (drinking herbs)	21	5.2
Giving herbal treatment	159	39.6
Change to formula milk	24	6.0
#Traditional methods used by mothers to sooth their infant colic :		
Giving the gripe water	352	87.6
Giving the infants water with lemon juice	12	3.0
Giving the infants olive oil	24	6.0
Quitting breastfeeding	39	9.7
#Persons who help mother during the infant colic attacks:		
None	11	2.7
Spouse	179	44.5
Family elders	224	55.7
Friend who gave birth	8	2.0
Other children and caregiver	49	12.2
Neighbor	15	3.7

More than one answer was allowed



Paired samples t-test **P-value** =0.000*

Figure (1): Total score of mothers' knowledge regarding infantile colic syndrome

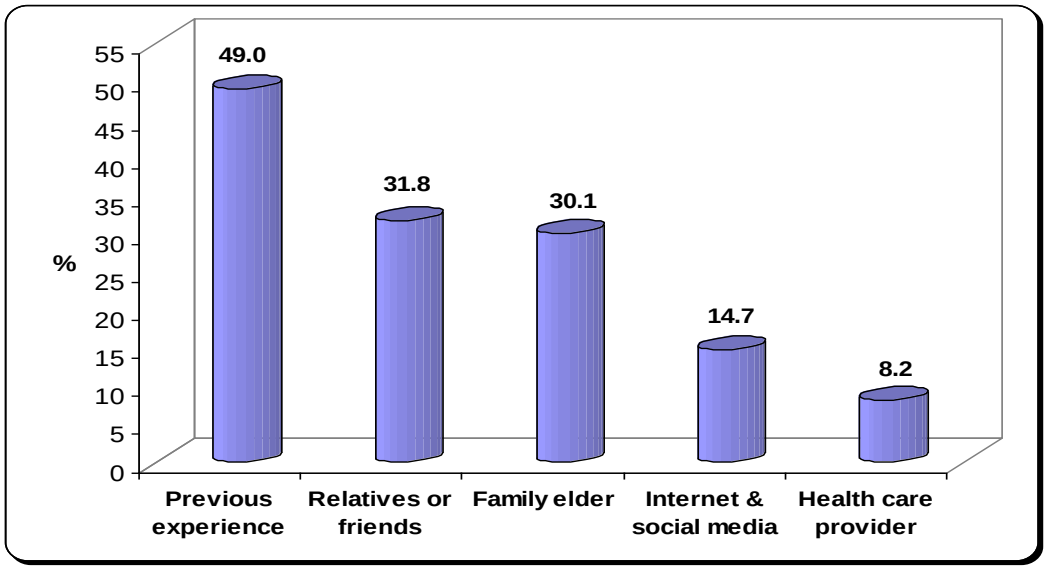


Figure (2): Distribution of the studied mothers related to their source of information about infantile colic syndrome

Table (5): Relation between total mean score of mothers' knowledge regarding infantile colic syndrome and their personal data

Items	Total mean score of mothers' knowledge	
	Pre-test	Post-test
	Mean ± SD	Mean ± SD
Mother age (year):		
< 30	8.62 ± 4.34	19.73 ± 6.44
≥ 30	8.25 ± 4.20	19.09 ± 5.51
P-value	0.395	0.290
Mother education:		
Illiterate/ Read & write	7.25 ± 4.36	18.94 ± 5.79
Basic education	8.25 ± 3.97	18.76 ± 5.29
Secondary	7.80 ± 4.05	19.77 ± 6.94
University/ Post-graduate	9.86 ± 4.29	19.98 ± 5.94
P-value	0.000*	0.394
Mother occupation:		
Not working	7.77 ± 3.85	19.32 ± 5.62
Working	10.04 ± 4.79	19.77 ± 7.00
P-value	0.000*	0.496
Residence:		
Rural	8.08 ± 4.00	19.18 ± 5.84
Urban	9.30 ± 4.75	20.08 ± 6.51
P-value	0.008*	0.167
History of previous baby with colic:		
Yes	8.58 ± 4.20	19.11 ± 5.78
No	8.07 ± 4.54	20.56 ± 6.81
P-value	0.310	0.041*

Independent samples t-test ANOVA test

Table (6): The mean score of the infant colic scale as reported by infants' mothers

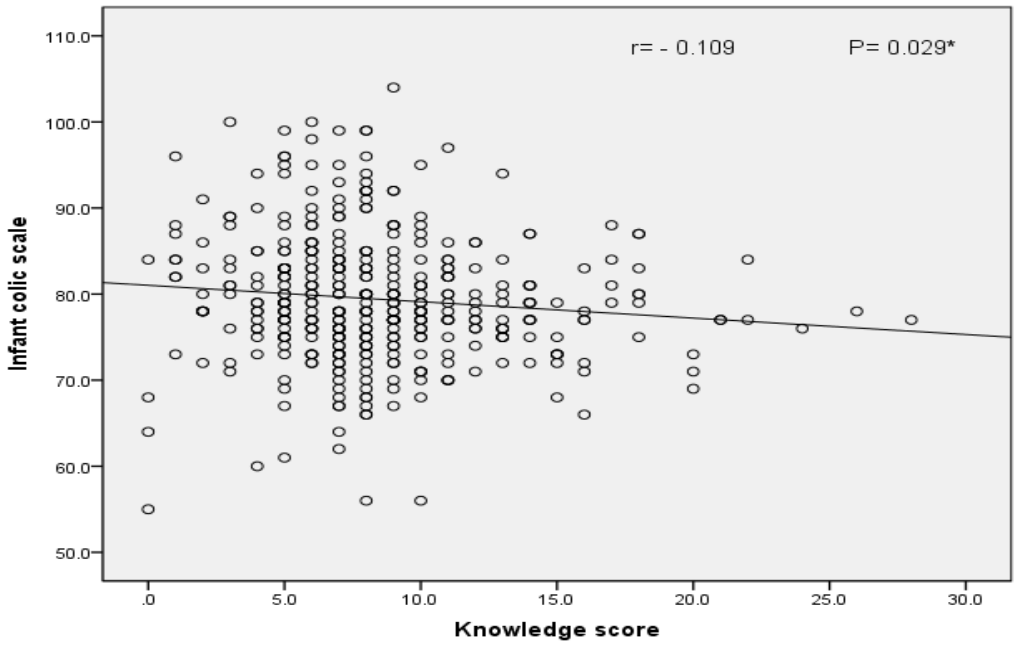
Subscales	Mean ± SD	Range
Cow milk/ Soy protein Allergy/ intolerance	7.85 ± 1.04	6.0-11.0
Immature Gastrointestinal system	15.10 ± 2.43	12.0-22.0
Immature Central Nervous System	29.45 ± 4.83	21.0-41.0
Difficult Infant temperament	13.75 ± 2.63	7.0-18.0
Parents-infant interaction+ problem infant	14.50 ± 2.24	12.0-21.0
Total Infant colic scale	80.65 ± 9.32	64.0-99.0

Table (7): Relation between infant colic scale and mothers' personal data & infants' data

Items	Total mean score of infant colic scale	P-value
	Mean ± SD	
Mother age (year):		
< 30	79.11 ± 7.59	0.352
≥ 30	79.81 ± 7.30	
Mother education:		
Illiterate/ Read & write	80.71 ± 8.59	
Basic education	79.93 ± 6.72	0.020*
Secondary	78.77 ± 6.62	
University/ Post-graduate	77.47 ± 7.57	
Mother occupation:		
Working	79.15 ± 7.63	0.292
Not working	80.01 ± 7.06	
Residence:		
Rural	78.85 ± 6.93	0.025*
Urban	80.66 ± 8.43	
History of previous baby with colic:		
Yes	79.12 ± 7.11	0.166
No	80.33 ± 8.46	
Child age (months):		
< 3	79.04 ± 7.48	0.364
≥ 3	79.72 ± 7.46	
Child sex:		
Male	79.42 ± 7.46	0.992
Female	79.41 ± 7.49	

Types of delivery:		
Normal	79.44 ± 8.15	0.953
C.S.	79.40 ± 7.05	
Nutritional status:		
Only breast milk	79.27 ± 7.84	
Breast milk and formula	79.44 ± 7.06	0.888
Formula only	79.90 ± 7.77	
If formula used how to use the feeding bottle:		
Horizontal	79.01 ± 7.03	0.089
Vertical	80.81 ± 7.45	
Using of pacifiers:		
Yes	78.99 ± 6.89	0.219
No	79.90 ± 8.06	

Independent samples t-test ANOVA test



Pearson correlation

Fig. (3): Correlation between total score of mothers' knowledge and total score of infant colic scale

Discussion:

Despite the introduction of several treatment approaches for infantile colic, no definitive treatment has so far been provided for this problem. Infantile colic is a distressing experience for parents during the first few months of their infant's life and the effect of which remains unclear due to the self-limiting nature of the illness **(Al-Shehri et al., 2016)**. This study aimed to evaluate the impact of an educational program on mothers' knowledge regarding infantile colic.

From the proposed results; it was observed that less than one third of mothers were housewives and more than half of them were working women. This observation was in congruent with **Bagherian et al., 2021** who conducted a study entitled" How Do Mothers Take Care of Their Infants with Colic Pain" and recorded that about three-fifths of mothers were housewives. In referral to place of residence; more than three-fifths of the studied mothers were from rural areas.

Concerning source of information; it was found that previous experiences, information from friends or relatives and family elder were the main sources of information for nearly half, more than one-third and one-third of mothers respectively. This may be due to the normal consequence that individual gain information from their previous experience. These results agreed with **Al-Shehri et al., 2016** who carried out a research in Saudi Arabia" Assessment of maternal knowledge about infantile colic" and reported that more than one-third and less than one-third of mothers' information came from previous experience and relatives or friends.

In contrast, these finding disagreed with **Ünal et al., 2021** who evaluated the knowledge level and attitude of mothers about infantile colic and reported that less than half of mothers received information from health professionals, 18% from the internet and social media and 13% from family elders. If mothers took their advice from unknowledgeable source this may lead to negative consequences on the infants' health this was the main message delivered by **Indrio et al., 2017** in the study about " knowledge, attitudes, and practices of pediatricians on infantile colic in the Middle East and North Africa region" and indicated that the traditional approach of parental reassurance does not adequately assuage the worries of the parents, which could lead to the use of alternative erroneous approaches suggested by family, friends, or the internet.

As regard methods of infant feeding, the present study showed that less than half of the mothers had breast fed their infant and formula; from the researchers point of view this may explained by the obvious false perceived belief among mothers that breast milk alone isn't enough to feed their infants. In a previous study, as stated by **Demirel et al., 2018** who assesses through a study performed in Turkey "Factors Affecting Colic in Infants and the Applications of Mothers and showed that breast milk includes melatonin during the night, meaning that nights are good for

breastfeeding infants to reduce colic and this illustrated why infantile colic was more prevalent among the studied infant even thought all studies reported that types of feeding not matter in developing of the self-limited infantile colic, but it will know that breast milk protect against many of infantile health diseases including the colic syndrome.

As well as, **Karabel et al., 2010** who conduct study to evaluate the treatment approaches and risk factors in infantile colic in Turkey and found that the data on the relation between nutrition type and colic development were controversial; no significant relation was found between colic incidence and nutrition type in a number of studies. These results supported by **Didişen et al., 2020** who performed research about "infantile colic in infants aged one-six months and the practices of mothers for colic" and reported that about two-fifths of mothers were feeding their infants by both breast milk and formula. But on the other hand; **Hannula et al., 2020** who studied in Finland parents' experiences of reflexology treatment for infants with colic and **Demirel et al., 2018** reported that less than three-quarters of mothers were feeding their infants' breast milk only. **Wolke et al., 2017** in his systemic review reported that feeding type has also been previously reported to be associated with more night waking in infants. Night waking is often signaled by crying and, thus, may have increased the total cry duration in diary reports in those breast feeding.

Concerning the direction of the bottle; less than three-quarters of mothers were holding the bottle horizontally during the infant feeding; this may be related to insufficient knowledge about technique of infant bottle feeding. In addition, the present results showed that there wasn't variation between horizontal and vertical position these may be explained by that may be there another causes of infant colic. In this regard **Zengin et al., 2016** who studied "approach to infantile colic baby" and reported that feeding with a bottle in a horizontal position and not removing the baby's gas after feeding causes the formation of infantile colic.

The current study found that slightly more than one half of the studied mothers their infants start colic from the first two months of age; this may be explained by immature gastrointestinal system. In addition, there wasn't significant association was found between infantile colic and feeding pattern. These finding supported by **Al Saadoon et al., 2018** who estimated "prevalence and associated factors of infantile colic among Omani babies" and reported that the colic starts in range from 1-16 weeks and no significant association was found between infantile and feeding pattern. Moreover, these finding supported by **Zengin et al., 2016** who stated that the duration of colic can changed according to a number of variables, but it usually starts after two weeks and is cured before four months; however, it extends to the fifth months in 30% of cases.

Regarding time of colic; the current study observed that more than two-fifths of mothers reported that their infants had colic at night. This

observation was at the same line with **Chinawa et al., 2013** who assessed in Nigeria "mothers' perception and management of abdominal colic in infants recorded that nearly half of mothers believed that colic occurs at night. These results disagreed with **Al Saadoon et al., 2018** who reported that most of mothers stated that the crying episodes of colic occurred in the evening or night. Colic in babies could happen at every time of the daytime, nevertheless selected study noticed that it is usual occurred at evening time. Due to incidence of most colic at night this may effect on the infants' sleeping pattern as confirmed by the results of **Valla et al., 2021** who carried out a study regarding "association between colic and sleep problems in infancy and subsequent development, emotional and behavioral problems".

In referral to mothers' knowledge about causes of infantile colic; the current study revealed that less than half of mothers reported that abdominal cramps and contractions were considered as cause of infants' colic. These results supported by **Hjern et al., 2020** who performed "a systematic review of prevention and treatment of infantile colic" and assumed that the causes of excessive crying/infant colic are multifactorial, with maternal, paternal, infant and environmental factors being implicated.

When dealing with mothers' knowledge about management of infantile colic; it was found that one-third, two-thirds and slightly less than two-fifths of them stated that massage the infants' abdomen, giving medicine and use herbal medicine respectively. In the light of this; health education about how to manage infant colic during ante-natal visits and vaccination clinics should be encouraged to help enlighten the care givers about this condition. The results of the current study were supported by **Bagherian et al., 2021** who stated that mothers said that the common methods to relieve colic pain were herbal medicines and the position change. Also, **Demirel et al., 2018** recorded that nearly three-quarters of mother said that message by patting on the back for colic.

These results were in contrasted with **Al Saadoon et al., 2018** who reported that more than two-fifths, slightly one-quarter and only 6.9% of mothers had knowledge that infant colic can be managed by abdominal massage, giving medicine and herbal treatment respectively. Moreover, these results disagreed with **Al-Shehri et al., 2016** who revealed that more than one-quarter of mothers know that using of herbal medicines treat colic and **Bele et al., 2021** who conducted study in South Africa about " cultural practices regarding the management of infant colic by women and indicated that mothers stated use of herbal medicines to treat IC. Also, these findings contrasted with **Ünal et al., 2021** who reported that sedative methods known by most of mothers were massaging the infant's abdomen.

In addition, these results weren't in the same line with **Didişen et al., 2020** who reported that more than three-fifths of mothers reported that change the position of their infants & more than one half massaged the infants' abdomen. In

infant colic; there is no evidence-based treatment yet, as the underlying functional gastrointestinal tract disease is unclear. Informing, comforting and guiding families are the cornerstone of the primary care approach in IC **(Yen and Lee, 2021)**.

Regarding the person who help mother in the infant colic attacks as they reported; it was obvious that elder family members and spouse were more supportive to mothers by more than one half and less than one half respectively. These may be explained by that most of mothers from rural areas and there were a good connection in the family. These results supported by **Ünal et al., 2021** who reported that more than half of spouse and half of elder family member helped mothers.

The current study revealed that there was improvement in mothers' knowledge about IC after the implementation of the educational program. This finding aligned with the study hypothesis. In the same regard, **Telmesani and Khan, 2016** who carried a study entitled" infantile colic-a challenge to parenthood" and informed that many of the hospitals use a teaching program that significantly reduces the risk of shaken baby syndrome in colicky infants, the program includes a pamphlet, handed out to parents of infants in the emergency room, among others, that tells parents that infant’s crying is normal and usually peaks at about six to eight weeks and then begins to decline. It gives advice about soothing babies and about planning for how to deal with frustration.

Intervention activities of any type whether to change knowledge like in this current study or to decrease the intensity of pain as **Khajeh et al., 2019 and Montazeri et al., 2022** who assessed the effect of behavioral therapy counseling on IC in infants of anxious mothers: a randomized controlled clinical trial all of these researches showed significance improvement after application of the intervention program.

These results agreed with **Yen and Lee, 2021** who evaluated "the effects of a health education intervention program on infantile colic" and reported that there was a significant improvement in mothers' knowledge level after the intervention. Moreover, these results supported by **Al Qahtani and Ahmed, 2021** who performed study regarding "the effect of educational program for new mothers about infant abdominal massage and foot reflexology for decreasing colic at Najran City" and reported that the majority of mothers' knowledge was improved post program.

The current findings referred to that there wasn't statistical significant relation between mothers' mean score of knowledge and their age, this finding congruent with **Khajeh et al., 2019** who reported the absence of significance relation with intervention and mothers' age. Whereas, **Al Qahtani and Ahmed, 2021** found that there was a statistically significant positive correlation between total scores of mothers' knowledge with their age.

The current findings observed that there was statistical significance relation between maternal total mean score of knowledge with their education and occupation in pretest p-values= 0.000 and 0.000. So, this result was in agreement with **Al Qahtani and Ahmed, 2021** who reported that education level and working status were affected on maternal knowledge.

The current study revealed that the total mean score of infantile colic scale was 80.65 ± 9.32 and there wasn't statistical significant relation with child's age, sex, the nutritional status, type of feeding and use of pacifier. These results agreed with **Didişen et al., 2020** who reported the total mean score of infantile colic scale was 65.2± 12.6. Also, did not reveal a significant relation between the mean score of the colic scale and the infants' gender, way of feeding, use of a feeding bottle, use of a pacifier, mother's working status. While, on other hand **ATEŞ, 2021** who conducted a study about "colic scale scores and associated factors in infants diagnosed with infantile colic" and found that there was statistical significance relation between total mean score of the infant scale and the infants' gender, how to use the bottle and using of pacifier.

Also, these results supported by **Karabel et al., 2010** who found no significant relation between the incidence of colic and the manner of providing nutrition. There is no consensus on whether the manner of feeding and the development of colic are related to each other or not. However, it is known that breastfeeding for the first six months is a preventive factor against infantile colic.

Limitations of the study:

Mothers were hurry and did not have enough time for the interview; yet, an attempt was made to interview them adequately.

Conclusion:

Infantile colic affects newborns for up to three months. It is a self-limiting condition. Owing to the stress this condition causes parents or caregivers try a variety of treatments ranging from pharmacological to non-pharmacological methods. These treatments all have an effect on the infant who suffering from colic.

The findings of the current study concluded that there was statistical significance increase in mothers' knowledge regarding IC after the implementation of the educational program which more affected by their education, occupation, residence and social class. And this was aligned with the study alternative hypothesis (H1). Moreover; there was significant negative correlation between the mean score of mothers' knowledge and the mean score of infant colic scale.

Recommendations:

1. Health education behaviors should focus on family reassurance and counseling as the mainstay of management.
2. Nurses should teach parents different strategies that would help them to alleviate their stress regarding infantile colic and how to properly manage it.
3. Availability of brochures, booklets and educational material in MCH center to

increase awareness regarding infantile colic and how to control.

4. Dietary modification under supervision should be included in educational interventions as it is a good low risk option in bottle-fed colicky infants when cow's milk protein allergy is suspected.
5. Further research work is needed for evidence based management protocols.

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Sh K¨ designed the study tools, **AM and H A** prepared the proposal, **Sh K**¨ prepared the manuscript, **AM** gained the official permission letters, **Sh K**¨, **AM and H A** collected the data and guided the paper in the whole process from designing to writing. **Sh K**¨ analyzed the data. **H A and AM** reviewed articles and extracted data. All listed authors meet the authorship criteria and that all authors are in covenant with the manuscript contents.

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