

## Effect of Instructional Program on Mothers' Knowledge, Behavior, and Reported Practices Regarding Crying and Shaken Baby Syndrome

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### Abstract

Crying is a common symptom in the first three months of life, a normal part of an infant's development, and a means of communication between the infant and their carers. **Aim:** Evaluate the effect of instructional programs on mothers' knowledge, behavior, and reported practices regarding crying and shaken baby syndrome. **Methods:** A quasi-experimental research design was utilized. **Setting:** The study was conducted in the in-patient and out-patient units at Minia University Children's Hospital. **Sample:** A convenient sample included all the available mothers (52). **Tools:** Three tools were used for data collection. **Tool I:** The interviewing questionnaire included demographic data of the studied mothers and their infants, general knowledge of mothers regarding crying, shaken infant syndrome, and crying and shaken scale. **Tool II:** Behavioral scale regarding inconsolable baby crying. **Tool III:** Mothers' reported practices to soothe infant crying. **Results:** Cleared that; most of the studied mothers had good knowledge post-program compared to the minority of them pre-program. Meanwhile, nearly a quarter and one quarter had fair and good behavior respectively post- program compared to no one had good behavior pre-program. Most of the studied mothers had adequate reported practices post-program compared to half of them pre-program. **Conclusion:** The program effectively improved the total level of mothers' knowledge, behavior, and reported practices regarding crying and shaken baby syndrome. **Recommendations:** The program should be applied early for the mothers in the post-partum period in the hospitals to educate them about the normal behavior of the infant.

**Keywords:** Behavior, Crying, Knowledge, Reported practices, Shaken baby syndrome

### Introduction

Crying is a common symptom in the first three months of life, a normal part of an infant's development, and a means of communication between the infant and their carers. It is also non-specific and may result from various factors, including hunger, pain, or discomfort, in addition to the infant's need for closeness to the carer to feel comfortable and safe (Carollo et al. 2023). According to Joyce & Huecker, (2019), infant crying is one of the most frequent reasons for an infant's visit to the emergency room; it is also linked to unfavorable outcomes that jeopardize the infant's development and immediate and sustained physiological balance.

The PURPLE Crying is an acronym for a stage of an infant's life that may involve uncontrollable crying, it starts at birth and lasts for three to four months, at which point it starts to decline and settle (Younis & Abo Zaid, 2020). The infant may cry for hours throughout this period and remain

healthy and normal, but parents frequently assume something is wrong, which can be quite upsetting and frustrating for them (Hoffman, 2018).

Shaken baby syndrome refers to the signs of brain damage resulting from the forceful shaking of babies, rotational and translational forces caused by the head movements and anatomical characteristics of babies contribute to intracranial and spinal injuries in cases of serious abuse (Sacco et al., 2023). SBS symptoms can have many consequences, such as encephalopathy, retinal hemorrhage, and subdural hemorrhage. The term "encephalopathy" is broad and can exhibit a variety of symptoms, including vomiting, seizures, floppiness, irritability, and cerebral edema (Tibballs, & Bhatia, 2024).

An infant's prematurity, disability, being under one year old, having multiple births, infantile colic, and inconsolable crying are risk factors for shaken

baby syndrome. Single parenthood, early parenthood, lack of support, intolerance for frustration, inexperience in childcare, low educational attainment, domestic violence, criminal past of the caregiver, and childhood abuse or neglect are risk factors associated with the parent or caregiver (Bahadır, et al., 2024).

Mothers should be aware of the hazards of shaking an infant aggressively, as well as the signs, causes, and preventive measures. A decrease in the prevalence of SBS could result from greater public awareness (Ibrahim et al., 2023). The study by AlOmran et al. (2022) found that most parents do not know about natural infant crying and need extra knowledge, such as strategies to comfort the infant, and prevention of SBS.

The nurse plays a crucial role in informing parents about the signs of the "purple" crying phase, clarifying that it is a common and regular occurrence in infants despite being challenging for parents. It is essential to inform parents on how to handle the stress caused by their baby's uncontrollable crying. Additionally, instruct them on how to soothe the infant by wrapping them snugly in a blanket or gently rocking them, placing them in a crib or another secure place, taking a break by stepping away, reaching out to a friend or family member, or seeking assistance (Vannier, 2022).

#### **Significance of the study**

In the world, shaken baby syndrome affects 21–74 newborns per 100,000 live births annually, and 25–30% of shaken babies pass away from their injuries. Severe brain injury is a potential risk for 75% of infants. Approximately 60% of individuals who suffer from shaken baby syndrome either succumb to their injuries during their adult years or are left with lifelong disabilities, according to the International Society for the Prevention of Child Abuse and Neglect (ISPCAN) (Meinck et al, 2020). Global study found that; among five populations in Chile, Brazil, Egypt, India, and the Philippines between 20% and 63% of infants were shaken. Between 1,400 and 10,000 instances of shaken baby syndrome are believed to happen every year in the United States alone (Adham et al, 2019).

The most prevalent cause of trigger shaken baby syndrome is prolonged or uncontrollable sobbing. Crying fits that cause parents and other caregivers to shake are known to increase during the first

month after delivery, peak during the second month, and then decline. Young infants are especially vulnerable to shaking because they cry more often than older infants and toddlers. Many caregivers handle crying with kindness and patience, but occasionally they may face stress from work, family, or financial issues (Gao, et al., 2021).

Shaking the infant is the most common cause of death and a severe neurological injury that results in long-term disability in infants and young children. Although it is severe, it can be prevented by educating the parents. An educational program for mothers would increase their awareness of the risks associated with SIS and lessen its effects. (O'Meara et al., 2020). The Egyptian study done by Morgan et al., (2022); and Mahmoud & Sayed, (2020) on mothers concluded that there was a significant improvement in mothers' perception and reported practices regarding crying and shaken infant syndrome after the educational program. This indicates the influence of education intervention in improving awareness and knowledge.

As a result, this study aimed to evaluate the effect of instructional program on mothers' knowledge, behaviors, and reported practices regarding crying and shaken baby syndrome hopefully to improve mothers' knowledge, behavior, and practices towards infant crying for prevention of shaken baby syndrome which will, directly or indirectly, lead to an increase in the rate of infants' wellness.

#### **Aim of the study**

Evaluate the effect of instructional program on mothers' knowledge, behavior, and reported practices regarding crying and shaken baby syndrome

#### **Research hypotheses**

- H<sup>1</sup>:** The mothers who will receive an instructional program regarding crying and shaken baby syndrome will have a higher level of knowledge than in the pre-program.
- H<sup>2</sup>:** The mothers who will receive an instructional program regarding crying and shaken baby syndrome will have better behavior than in pre-program
- H<sup>3</sup>:** The mothers who will receive an instructional program regarding crying and shaken baby syndrome will have higher reported practice levels than in pre-program

**H<sup>4</sup>:** There will be statistically significant differences between the mothers' knowledge, behavior and reported practices regarding crying and shaken baby syndrome and selected demographic characteristics.

### Subjects and methods

#### Research design

The current study utilized one group quasi-experimental research design to accomplish its objective. The type of experimental design is akin to true-experimental design; however, this manipulation of the independent variable is necessary without the random assignment of participants to conditions or the sequence of conditions (Grove & Gray, 2018).

#### Setting

The study was conducted at the in-patient and out-patient units at Minia University Children's Hospital. It is affiliated with the ministry of Higher Education and Scientific Research and receives children from all over Minia governorate who complained of different diseases.

#### Sample

A convenient sample included all the available mothers (52) over a period of two months.

#### Tools of the study:

It was developed after reviewing the related literature and included three tools

**Tool I:** Structured interviewing questionnaire about crying and shaken baby syndrome and included the following parts:

**Part 1:** Demographic characteristics of the studied mothers such as age, education, occupation, and number of children.

**Part 2:** Demographic characteristics of the infant such as age, sex, and weight

**Part 3:** General knowledge about crying and shaken baby syndrome included questions pertaining to the definition, signs and symptoms, causes, and complications of shaken baby syndrome.

**Part 4:** The crying and shaken scale to assess mothers' knowledge regarding crying and shaken infant syndrome adopted from (Barr et al., 2009) consisted of 12 items, which were (8 items) for the crying scale and (4 items) for the shaken scale. The point (3, 4 and 7) in crying scale and the point (3) in the shaken scale was reverse-coded. Answers were coded on a scale where 4=strongly agree, 3=Agree,

2=Disagree, 1=strongly disagree, agree, and strongly agree were categorized as correct answers, while disagree and strongly disagree were categorized as incorrect answers.

#### Scoring system for mothers' knowledge

The correct answer took 1 and the incorrect one took zero. The mothers had a poor level of knowledge if the score was Less than 60%=13.2, fair knowledge if the score was 60-<75%=13.2-16.5 and a good level if the score was more than 75%= 16.5 (Nada et al., 2020)

#### **Tool II: Behavioral scale regarding inconsolable infant crying**

It includes a 12-item, three-subscale and it was adopted by Barr et al. (2009) to evaluate mothers' behavior concerning child crying. A three-point Likert scale, where 1 represents never responding 2 = sometimes an answer, 3 = always, it included the following parts:-

**Part 1:** Responses to the general crying scale (5 items), mothers were asked, "How often did you do these things with your infant in the past month?"

**Part 2:** Response to inconsolable crying (4 items), mothers were asked, "When your infant's crying was un-soothable, how often did you do this response in the past month?"

**Part 3:** Self-talk responses to the inconsolable crying scale, included (3 items) Mothers were asked, when their infant's crying was un-soothable, how often did they do these things with the infant in the past month?"

#### Scoring system for mothers' behavior

The entire set of response scales was between 1 and 36, good if the percent ( $\geq 75\%$ ) of total crying score =  $\geq 27$  points, fair (60%- < 75%) score = 21-< 27 points, and poor (<60%) score = < 21 points (Morgan et al., 2022)

#### **Tool III: Mothers' reported practices to soothe infant crying**

It was developed by the researchers and includes 7 items such as checking the infant's diaper and if there is teething, talking and singing to the infant, taking the infant on a trip even by foot or car, providing the infant breast or bottle feeding, gently massage infants' arms, legs and back, give the infant a warm bath, expose the infant to arrhythmic sounds or white noise.

#### Scoring system for mothers' reported practices

The done practice received a score of one, and the not done practice received a score of zero. A total score of 60% or more was deemed adequate practice, while a score below 60% was deemed inadequate practice.

#### **Ethical considerations**

An approval from the Ethical Committee in the Faculty of Nursing of Minia University to conduct the study was taken. Written approval was obtained from the head of the hospital mentioned above, and verbal consent was obtained from all mothers who participated in the study. The researchers then explained the purpose and nature of the study, confidentiality was assured, and mothers were free to refuse or discontinue participation in the study at any time without giving any reason. The collection of data took into account the privacy and anonymity of the study subjects and the researcher followed all the necessary protective measures during the data collection process.

#### **Tool validity:**

Five pediatric nursing specialists assessed the scales' validity, the researchers translated the scales, and statements and then reviewed them with the five experts. Tools were reviewed for topic coverage, item sequencing, clearness, relevance, applicability, format, and length, minor changes have been made such as rephrasing certain sentences based on the suggestions of experts.

#### **Tool reliability:**

Cronbach's alpha reliability was used to test the reliability of the instruments used to check its consistency 0.86 for the knowledge assessment questionnaire, 0.89 for self-reported practice, and 0.85 for behavior response.

#### **Pilot study**

A pilot study was carried out involving 10% of the mothers to evaluate the time necessary for completing the study instruments and to examine the clarity of the current study tools, as well as the time needed for their application. No changes were made, ensuring that the participants in the pilot study were incorporated into the study sample.

#### **Data collection procedure**

Planning of educational program: The program material was divided into four sessions, three theoretical sessions, and a practical session.

**The program was implemented in four phases, as the following:**

**Assessment phase:** The researchers assess mothers' willingness to participate in the study as well as demographic data of mothers such as age, educational level, occupation, etc. Researchers explained the nature and purpose of the research to the mothers who participated after that the researcher fill the questionnaire sheet from mothers as a pre-program which included personal data about mothers and infants and knowledge regarding crying and shaking infant syndrome using, on the other hand; the researchers assessed mothers' behavior regarding crying after that the mothers reported practices to sooth infant crying was assessed.

**Planning phase:** This phase involves organizing the implementation of the program, the researchers divided the sample into small groups (5 mothers per group), and the planning phase also included the teaching location which was the medical and out-patient unit of the previously mentioned hospital, the duration of the training sessions, and the method of teaching such as discussion, lectures, and demonstration using illustrated Arabic brochure, posters, images, and educational videos about shaken and crying knowledge and measures to sooth infant crying.

**Implementation Phase:** - The program was tailored to the mothers based on their identified real needs. The educational program was delivered two days a week in the morning shift at four sessions, with each session lasting approximately 25–30 minutes including discussion time.

**The first session:** Included an introduction, definition, causes and characteristics of infant crying.

**The second session:** It focused on the definition, signs and symptoms, causes, complications, and prevention of shaken baby syndrome.

**The third session:** It was focused on mothers' behavior regarding general and inconsolable crying

**The fourth session:** It focused on mothers' practices regarding crying and the measures to soothe the crying infant and strategies to help frustrated mothers to cope with crying. At the end

of each session, the researchers summarized the content of the session and got feedback from mothers to ensure that the mothers got enough knowledge.

Evaluation phase: Evaluation of an educational program for mothers' knowledge regarding crying and shaking infant syndrome was reassessed using (Tool I), the mothers' behavior regarding crying was reassessed using (tool II) and the mothers' reported practices were reassessed using (Tool III). Each mother was evaluated at one-month post-test and the data was collected over two months, from the beginning of September to the end of October 2024.

#### **Statistical analysis**

The Statistical Package for Social Science was utilized to carry out the statistical analysis (SPSS

28.0). Coding and data entry both went through steps where extensive testing was performed. The data were presented with descriptive statistics in percentages and frequencies for qualitative variables. These statistics were used to describe the data. Fisher's exact test is applied to determine whether there is a link between two qualitative variables and a small number of samples. Microsoft Excel was used to create graphs for data visualization. Tests of statistical significance based on inference, such as the Pearson correlation and the relationships between the study variables. A correlation coefficient test was also utilized to determine the relationship between the total mothers' knowledge and the total mothers' practice, and a value of  $p$  less than 0.05 was considered statistically significant.

**Results****Table (1): Percentage Distribution of the Studied Mothers and Infants Regarding their Demographic Characteristics (n=52).**

Items	No.	%
<b>Mothers' age/ years</b>		
20 - <25	24	46.1
25 - <30	21	40.4
30 - < 35	3	5.8
35 – 40	4	7.7
<b>Mean ± SD</b>	<b>25.7 ± 4.9</b>	
<b>Occupation</b>		
Work	16	30.8
Housewife	36	69.2
<b>Education</b>		
Not read and write	23	44.3
Diploma	19	36.5
Baccalaureate degree	10	19.2
<b>Children number</b>		
<b>One</b>	15	28.8
<b>Two</b>	12	23.1
Three	18	34.6
Four	7	13.5
<b>Age of infant/ month</b>		
1 - <3	29	55.8
4 - 6	23	44.2
<b>Mean ± SD</b>	<b>3.4±1.6</b>	
<b>Sex</b>		
Male	29	55.8
Female	23	44.2
<b>Weight</b>		
3.00- < 5.00	8	15.4
5.00 – < 7.00	29	55.8
7.00 – 9.00	15	28.8
<b>Mean ± SD</b>	<b>5.7 ± 1.42</b>	

Table (1): Illustrates that; regarding mothers' age, 46.1% of the studied mothers had 20-< 25 years old with Mean ± SD 25.7 ± 4.9. On the other hand, 69.2% were housewives, 44.3% did not read and write and 34.6% of them had three children. Regarding infant age, it was clear that 55.8% of the studied infants' age ranged from 1 - <3, and more than half 55.8% of infants were male and weighed from 5.00 – < 7.00 kg with mean ± SD 5.7± 1.42.

**Table (2): Percentage Distribution of the Studied Mothers as regards Correct Answers to General Crying and Shaken Knowledge Pre/Post Program (n=52)**

Item	Pre		Post		Test of significance	
	No.	%	No.	%	t-test	P. value
<b>General Crying knowledge</b>						
Crying is a very useful and necessary exercise for the growth and development of the infant.	43	82.7	48	90.6	1.408	0.235
Crying is the only method an infant expresses their needs.	34	65.4	48	90.6	9.729	0.002**
A crying infant can make any person lose control of their temper.	40	76.9	52	98.1	10.864	0.001**
<b>General shaken knowledge</b>						
Definition of shaken baby	40	76.9	46	86.8	1.725	0.189
Anyone who feels frustrated can rock the baby.	48	92.3	52	98.1	1.951	0.163
Predisposing factors that expose the infant to harm	36	69.2	46	86.8	4.732	0.03*
Causes of shaken baby syndrome	43	82.7	50	94.3	3.518	0.06
Prevention of Shaken baby syndrome	49	94.2	50	94.3	0.001	0.981
Signs and symptoms of shaken baby syndrome	11	21.2	38	71.7	26.942	0.001**
Complications of shaken baby syndrome	10	19.2	37	69.8	27.159	0.0001**

(\*\*) Highly statistically significant difference at  $P \leq 0.001$  (\*) Statistically significant difference at  $P \leq 0.05$

Table (2): Highlights that; there were highly statistically significant differences regarding correct answers of general crying knowledge in the items of crying is the only method an infant expresses their needs and crying infant can make any person lose control P. value were 0.002 and 0.001, respectively. On the other hand, regarding the correct answer of general shaken knowledge, there were highly statistically significant differences in the items of predisposing factors that expose the infant to harm, signs and symptoms, and complications of shaken baby syndrome P. value at 0.03, 0.001, and 0.0001 respectively.

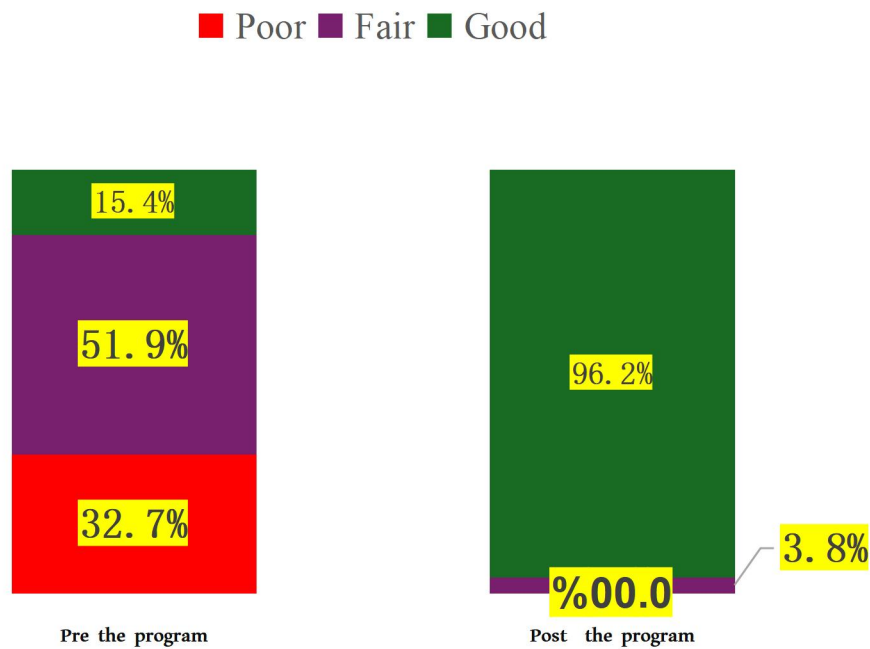
**Table (3): Percentage Distribution of the Studied Mothers Regarding Correct Answers of Crying and Shaken Baby Scale Items Pre/Post Program (n = 52).**

Crying scale items	Pre-program		Post-program		Test of significance	
	No.	%	No.	%	t-test	P-value
Infants often cry in the afternoon and evening.	48	92.3	53	100.0	4.238	0.040*
The baby cried in the first few weeks of his life and peaking in the first three months	50	96.2	52	98.1	0.363	0.547
If your infant is healthy, he shouldn't cry unexpectedly or for no apparent reason. (Reverse scored)	19	36.5	36	67.9	10.366	0.001**
An infant's crying is usually an indication that something is wrong (Reverse scored)	17	32.7	44	83.0	27.307	0.0001**
An infant may appear to be in agony even when they are not at times when they cry.	40	76.9	47	88.7	2.554	0.110
Occasionally, healthy babies may cry for five or more hours per day.	19	36.5	49	92.5	35.959	0.0001**
A good parent should be able to comfort a crying baby. (reverse scored)	8	15.4	30	56.6	19.311	0.0001**
If your crying baby becomes too fussy, it's okay to leave.	15	28.8	44	83.0	31.291	0.0001**
<b>Shaken baby scale</b>						
A crucial <i>responsibility</i> of parents is to safeguard their infants, ensuring that others who are close to them are aware of the risks involved in shaking the baby	49	94.2	51	96.2	0.230	0.631
Shaking a baby can result in life-threatening injuries or even death.	26	50.0	45	84.9	14.606	0.0001**
Shaking an infant is <i>one</i> effective method to get a crying baby <i>to</i> stop (Reverse scored).	17	32.7	41	77.4	21.79	0.001**
I understand the desire for someone to shake or hurt a baby because a baby's crying can be very frustrating and upsetting.	32	61.5	46	86.8	8.764	0.003**
A baby can sustain serious injuries from being shaken, which is highly dangerous.	27	51.9	44	83.0	11.591	0.001**

(\*\*) Highly statistically significant difference at  $P \leq 0.001$  (\*) Statistically significant difference at  $P \leq 0.05$

Table (3): Shows that; there was an increase in the correct answers to crying scale items post-program in the area of infants often cry in the afternoon and evening, if your infant is healthy, he shouldn't cry unexpectedly or for no apparent reason, an infant's crying is usually an indication that something is wrong, occasionally, healthy babies may cry for five or more hours per day, if your crying baby becomes too fussy, it's okay to leave 92.3%, 36.5%, 32.7%, 36.5%, 14.5%, 28.8% in pre-program changed to 100.0%, 67.9%, 83.0%, 88.7%, 92.5% and 56.6% respectively in post-test with statistically significant differences. On the other hand; the percent of correct answers increased from 50%, 32.7%, 61.5%, and 51.9% at pre-program to 84.9%, 77.4%, 86.8%, and 83% respectively at post-program regarding shaken baby scale items such as Shaking a baby can result in life-threatening injuries or even death, shaking an infant is *one* effective method to get a crying baby *to* stop, I understand the desire for someone to shake or hurt a baby because a baby's crying can be very frustrating and upsetting, the baby can sustain serious injuries from being shaken with statistically significant differences P. Value at 0.0001, 0.001, 0.003 and 0.001 respectively.





**Figure (1): Percentage Distribution of the Studied Mothers According to Their Total Knowledge Level Regarding Crying & Shaken Baby Pre/ Post Program (n = 52).**

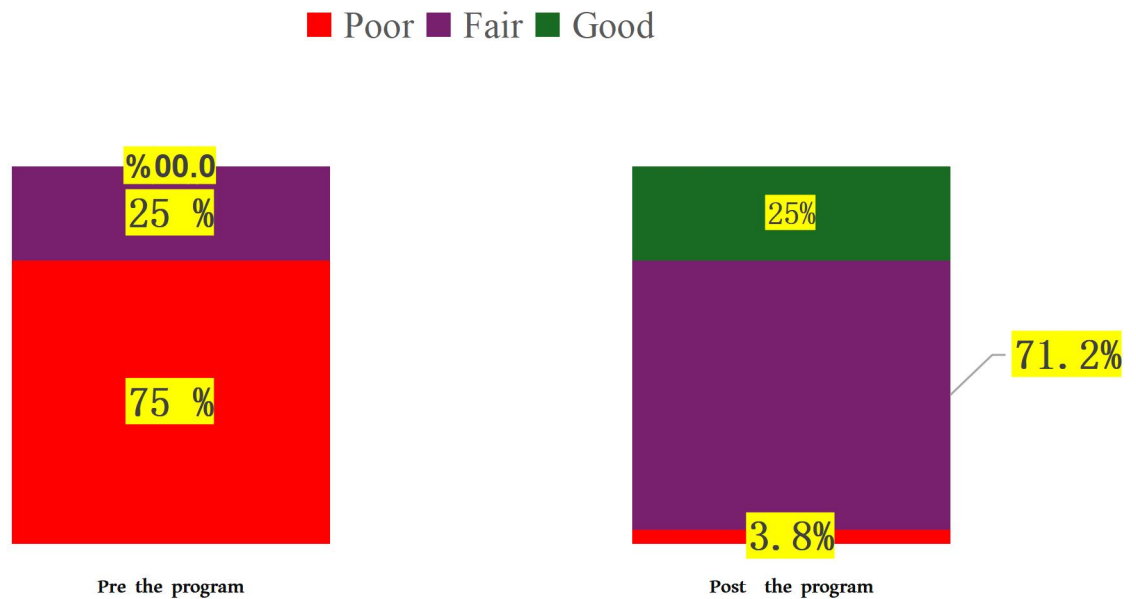
Figure (1): Clears that; the minority of the studied mothers (15.9%) had good knowledge regarding crying and shaken baby syndrome pre-program compared to most of them (96.2%) post-program.

**Table (4): Percentage Distribution of the Studied Mothers According to Infant's Behavior Scale Pre/Post Program (n = 52).**

Items	Pre-program						Post-program						Test of significance	
	Never		Sometimes		Always		Never		Sometimes		Always		t-test	P. <i>Type equa</i> <b>value</b>
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
<b>Responses to General Crying Scale.</b>														
Took up the infant when he or she cried or fussed	0	0.0	31	59.6	21	40.4	1	1.9	2	50.9	25	47.2	1.552	0.446
Put the infant down in a secure place and leave when he or she fussed or wailed.	44	84.6	7	13.5	1	1.9	10	18.9	39	73.6	4	7.5	48.158	0.0001**
Informed anyone who looks after your infant about the signs of a crying infant	46	88.5	4	7.7	2	3.8	16	30.2	31	58.5	6	11.3	39.551	0.0001**
When the infant cried or fussed walked around with him	15	28.8	37	71.2	0	0.0	9	17.0	36	67.9	8	15.1	10.040	0.009**
Told those who look after your infant measures to do if they start to get annoyed with their cries.	44	84.6	8	15.4	0	0.0	17	32.1	36	67.9	0	0.0	29.762	0.0001**
<b>Response to inconsolable Crying Scale.</b>														
Give the infant to another person for a little while	21	40.4	28	53.8	3	5.8	2	3.8	42	79.2	9	17.0	22.914	0.0001**
Place the infant in a secure place for a short period.	39	75.0	13	25.0	0	0.0	18	34.0	31	58.5	4	7.5	18.896	0.0001**
Took a break from the voice of a crying infant	40	76.9	12	23.1	0	0.0	2	45.3	28	52.8	1	1.9	1.331	0.003**
Took the baby for a drive or a walk	14	26.9	38	73.1	0	0.0	8	15.1	40	75.5	5	9.4	6.519	0.035*
<b>Self-talk Responses to inconsolable Crying Scale.</b>														
Told yourself that the crying would end	31	59.6	21	40.4	0	0.0	5	9.4	46	86.8	2	3.8	31.222	0.0001**
Told yourself that the infant was fine.	31	59.6	21	40.4	0	0.0	7	13.2	40	75.5	6	11.3	27.069	0.0001**
Told yourself there is nothing you can do.	33	63.5	19	36.5	0	0.0	21	39.6	25	47.2	7	13.2	10.754	0.005**

(\*\*) Highly statistical significant differenceat  $P \leq 0.001$  (\*) Statistical significant differenceat  $P \leq 0.05$

**Table(4):** Shows that; regarding mothers’ response to general crying; the highest percent of the mothers respond by never at pre- program in the areas of, put the infant down in a secure place and left when he or she fussed or wailed, informed anyone who look after your infant about the signs of a crying infant, when the infant cried or fussed walked around with him and told those who look after your infant measures to do if they start to get annoyed with their cries these results changed to sometimes at post program with statistically significant differences p.value at 0.0001, 0.009 and 0.0001 respectively, Meanwhile, mothers’ response to inconsolable crying was changed from never at pre-program to sometimes at post-program in all items of mothers’ response to inconsolable crying scale with statistically significant differences. Regarding self- talk response of the mothers to inconsolable crying, the same table shows that; the highest percent of mothers respond by never at pre-program compared to sometimes at post-program in the area of, told yourself the crying would end told yourself that the infant was fine and told yourself there is nothing you can do with statistically significant differences P. value 0.0001, 0.0001 and 0.005 respectively.



**Figure (2): Percentage Distribution of the Studied Mothers According to their Total Behavioral Level regarding Shaken Baby Pre /Post Program (n = 52).**

Figure (2): Clears that; no one of the mothers had a good behavior pre the program implementation compared to 71% and 25% of them had fair and good behavior respectively post the program implementation.

**Table (5): Percentage Distribution of the Studied Mothers Regarding Self-Reported Practices to Sooth Infant's Crying Pre /Post Program (n=52)**

Mothers' reported practices	Pre-program		Post-program		Test of significance	
	No.	%	No.	%	t.test	P.value
Look for symptoms of sickness, teething, or an unclean diaper in the infant	50	96.2	53	100.0	2.078	0.149
Sing to or talk to the baby.	33	63.5	50	94.3	15.110	0.0001*
If the caregiver is calm enough to operate a vehicle, take the infant for a stroll or a drive.	33	63.5	52	98.1	20.439	0.0001**
Offer the baby breast- or bottle-feeding and safe toy.	46	88.5	49	92.5	0.485	0.486
Rock the infant gently or give him or her a back rub.	24	46.2	40	75.5	9.479	0.002**
Give the baby a warm bath.	25	48.1	40	75.5	8.353	0.004**
Expose the infant to a white noise.	20	38.5	35	66.0	8.002	0.005**

(\*\*) Highly statistically significant difference  $P \leq 0.001$  (\*) Statistically significant difference  $P \leq 0.05$

Table (5): Proves that; There were statistically significant differences between pre and post-program in the area of singing to or talking to the infant, if the caregiver is calm enough to operate a vehicle, take the infant for a stroll or a drive, rock the infant gently or give him or her a back rub, give the infant warm bath and expose the infant to a white noise p. value at 0.0001, 0.002, 0.004, 0.005 respectively.

■ Inadequate ■ Adequate

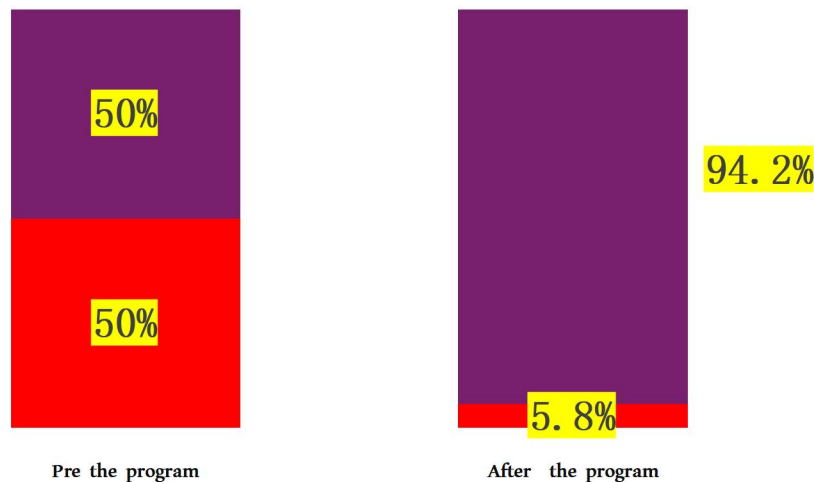
**Figure (3): Percentage Distribution of the Studied Mothers according to their Total Self-Reported Practices Level to Sooth Infant Crying (N = 52).**

Figure (3): Shows that; regarding the total level of mothers' reported practices regarding methods to sooth infant crying, current study results cleared that; 50% of mothers had adequate reported practice pre-program, and this percent was increased to reach 94.2% at post-program

**Table (6): Correlation between Total Level of Knowledge, Behavior, and Practice with Mothers' Age, Number of Children, and infant's Age and Weight pre/ post program (n=52)**

Items		Pre-program			Post-program		
		Knowledge	Behavior	Practice	Knowledge	Behavior	Practice
Mothers' age	r	<b>-0.317-</b>	0.212-	0.148	0.251-	0.021	.184
	P value	<b>0.022*</b>	0.131	0.293	0.073	.880	.193
Number children	r	0.195-	0.059-	0.131	0.240-	-.129-	.132
	P value	0.165	0.676	0.353	0.087	.363	.352
Age of child	r	0.190	0.204-	0.210-	0.011	-.032-	-.024-
	P value	0.178	0.146	0.135	0.937	.821	.866
Weight of child	r	0.195	0.126-	0.169-	0.092	-.076-	-.067-
	P value	0.166	0.374	0.231	0.517	.592	.635

(\*\*) Highly statistical significant differenceat  $P \leq 0.001$  (\*) Statistical significant differenceat  $P \leq 0.05$

Table (6): Illustrates that there was a statistically significant negative fair correlation between mothers' knowledge and their age P-value 0.022. However, there was no statistically significant correlation between mothers' knowledge, behavior, and practice and the number of children, age, and weight of child.

**Table (7): Relation Between Total Level of Mothers' Knowledge with their Demographic Characteristics Pre/ Post Program (n=52)**

Items	No.	Pre-program						After the program					
		Total knowledge level								Total knowledge level			
		Poor		Fair		Good		Fair		Good			
		No.	%	No.	%	No.	%	No.	%	No.	%		
<b>Mother's age/ years</b>													
20 - < 25	24	5	20.8	14	58.3	5	20.8	0	0.0	24	100.0		
25 - < 30	21	8	38.1	11	52.4	2	9.5	2	9.5	19	90.5		
30 - < 35	3	1	33.3	1	33.3	1	33.3	0	0.0	3	100.0		
35 - 40	4	3	75.0	1	25.0	0	0.0	0	0.0	4	100.0		
Fisher (P- value)		6.535 (0.366)						3.308 (0.381)					
<b>Occupation</b>													
Work	16	7	43.8	6	37.5	3	18.8	2	12.5	14	87.5		
Housewife	36	10	27.8	21	58.3	5	13.9	0	0.0	36	100.0		
Fisher (P-value)		2.100 (0.375)						4.680 (0.031)*					
<b>Education</b>													
Not read and write	23	6	26.1	16	69.6	1	4.3	0	0.0	23	100.0		
Diploma	19	9	47.4	8	42.1	2	10.5	2	10.5	17	89.5		
Baccalaureate degree	10	2	20.0	3	30.0	5	50.0	0	0.0	10	100.0		
Fisher (P-value)		11.608 (0.006)**						2.584 (0.164)					

(\*\*) Highly statistical significant differenceat  $P \leq 0.001$  (\*) Statistical significant differenceat  $P \leq 0.05$

Table (7): Proves that; there were statistically significant differences between mothers' total knowledge level and their occupation at post-program P-value 0.03 and education pre- program p. value 0.006.

**Table (8): Relation between the studied mothers' practices with their demographic characteristics Pre/ post program (n=52)**

Items	No.	Pre the program				After the program			
		Total practice level				Total practice level			
		Inadequate		Adequate		Inadequate		Adequate	
		No.	%	No.	%	No.	%	No.	%
<b>Mothers age/ years</b>									
20 - < 25	24	13	54.2	11	45.8	2	8.3	22	91.7
25 - < 30	21	12	57.1	9	42.9	1	4.8	20	95.2
30 - < 35	3	0	0.0	3	100.0	0	0.0	3	100.0
35 - 40	4	1	25.0	3	75.0	0	0.0	4	100.0
Fisher ( <i>P</i> - value)		4.149 (0.204)				1.143 (0.859)			
<b>Occupation</b>									
Work	16	8	50.0	8	50.0	0	0.0	16	100.0
Housewife	36	18	50.0	18	50.0	3	8.3	33	91.7
Fisher ( <i>P</i> - value)		0.00 (0.945)				1.415 (0.234)			
<b>Education</b>									
Not read and write	23	11	57.9	8	42.1	1	4.3	22	95.7
Diploma	19	4	40.0	6	60.0	1	10.0	9	90.0
Baccalaureate degree	10	11	47.8	12	52.2	1	5.3	18	94.7
Fisher ( <i>P</i> -value)		0.946 (0.632)				0.424 (0.809)			

(\*\*) Highly statistical significant difference at  $P \leq 0.001$  (\*) Statistical significant difference at  $P \leq 0.05$

Table (8): Clarifies that; there were no statistically significant differences between mother's practice level and their age, education, and occupation.

### **Discussion**

Current study results illustrates that; regarding mothers age, less than half of the studied mothers had 20-< 25 years old with Mean  $\pm$  SD 25.7  $\pm$  4.9. On the other hand; more than two thirds were house wives, more than two fifth not read and write and more than quarter of them had three children. On the other hand; regarding infant's characteristics, current study results proved that; more than two fifth of the studied infants their age ranged from 1 - <3, more than half of them were male and weighed from 5.00 - < 7.00 kg with mean  $\pm$  SD 5.7 $\pm$  1.42.

Current study results were supported by **Faheim, et al. (2022)** who studied educational guideline program & its effect on mothers' performance regarding prevention of shaken baby syndrome, reported that; roughly two fifth of the mothers who were under study were between the ages of 25 and 30, with an average age of 29.32 $\pm$ 2.86 years, just under half of them could not read, while slightly over half of them were homemakers.

Regarding to personal data of the infant, current study results were supported with the study by **Kaya, et al. (2022)** about shaken baby syndrome prevention program and its effect on Turkish mothers' awareness and knowledge, concluded that; more than two thirds were male. Also, the study by **Morgan et al. (2022)** about educational program its effect of mothers' perception and practices regarding crying and shaken infant syndrome, came in the same line and concluded that; more than two fifth of the studied infants their weight ranged between 5-< 7kg.

On the other hand; the present study findings were not consistent with the study by **Abead, (2023)** about mothers' responsiveness to their infants' crying and its relation to some demographic variables, stated that; over half of the studied infants were girls, and over two thirds of them were between the ages of 6 and 12 months.

Regarding to general crying knowledge current study results highlighted that; there were a highly statistically significant differences of correct answer in the items of crying in an infant is their only method of expressing their needs, any person can lose control of their temper with an infant's inconsolable crying P. value were 0.002 and 0.001, respectively. On the other hand, regarding correct answer of general shaken knowledge, there were highly statistically significant differences in the items of predisposing factors which expose the infant to harm, signs and symptoms and

complications of shaken baby syndrome P. value at 0.03,0.001and 0.0001 respectively.

The Egyptian study by **Younis & Abo Zaid, (2020)** came in congruence with the present study results who studied shaken baby syndrome: effect of an awareness nursing initiative on parents' perception and infants' sleep pattern concluded that; Caregivers' understanding of shaken baby syndrome and purple crying significantly increased after the posttest and follow-up test, with a p-value of 0.0001.

The study by **Hashem et al. (2020)** about efficacy of a preventive instructional module on mothers' knowledge regarding shaken baby syndrome, proved that, significant differences in mothers' knowledge about shaken baby syndrome were found before and after using the preventive module in all areas of knowledge including definition, cause, risk factors, and health outcomes of shaken baby syndrome p < .001. From the researcher's point of view, the mothers in the study showing interest in learning about shaken baby syndrome as a new health issue specific to infants which leads to improvement in their knowledge.

Regarding to the crying scale the study results proved that; there were an increase in the correct answer of crying scale at post program in the area of infants often cry in the afternoon and evening and, if your infant is healthy, he shouldn't cry unexpectedly or for no apparent reason, an infant's crying is usually an indication that something is wrong, occasionally, healthy babies may cry for five or more hours per day, if your crying baby becomes too fussy, it's okay to leave, most of them, near two fifth, the minority and more than quarter in pre -program changed to all of them, just over two thirds, the majority most of them and more than half respectively in post-program with statistically significant differences. On the other hand; the percent of correct answers were increased at post-program regarding shaken baby scale items with statistically significant differences.

The study by **Lopes et al. (2018)** about the Dias program found an increase in participants' understanding of the distinct attributes of infant crying and the effects of shaking, along with improvements in caregiver mental health, caregiver methods for handling crying, and positive attitudes towards infant care.

Current study findings were supported by **Dodds, (2017)** who studied fetal head trauma in children under the age of two in New York City, along with a

comprehensive examination of shaken baby syndrome were in the same line and found that; A need for an educational program for new parents seems necessary, particularly to enhance understanding of infant crying, which could help prevent various complications in early childhood

Regarding to total level of mothers' knowledge related to crying and shaken baby syndrome the study results proved that; less than one-quarter of the studied mothers had a good level of knowledge pre-program compared to most of them post-program. ***This result accepted the first hypothesis***

Current study results were supported by the study by **Kaya et al. (2022)** cleared that; the intervention and control groups showed a notable difference in mean scores for crying and shaking knowledge before and after the test, with a p-value of 0.05. Also, the current study findings were supported by the study by **El Sayed & Mahmoud (2020)**, who found that; most of the mothers exhibited a deficient overall knowledge score regarding the prevention of shaking baby syndrome.

Also, the study by **Helal, et al. (2022)** about evaluation of mothers' understanding and management of their infants' crying, cleared that; A significant majority of the studied mothers demonstrated inadequate understanding of how to interpret their infants' crying. From the researchers' point of view, the enhancement of mothers' knowledge can be associated with the significance and effectiveness of training sessions in enhancing mothers' understanding, which impacts the quality of care and effectiveness of results. Additionally, the educational program's straightforwardness and appeal, developed with basic Arabic language, clear visuals, and video, contribute to this enhancement.

Regarding to mothers' response to general crying the study results cleared that; the highest percent of the mothers responded by never at a pre-program in all areas, these results changed to sometimes at post-program with statistically significant differences. Meanwhile, mothers' response to inconsolable crying was changed from never at pre-program to sometimes at post-program in all items of mothers' response to inconsolable crying scale with statistically significant differences. Regarding the talk response of the mothers to inconsolable crying, the same table shows that; the highest percent of mothers responded by never at pre-program compared to sometimes at post-program in all items with statistically significant differences.

Current study results consistent with the study by **Morgan, et al. (2022)** showed that; in pre-health education, two fifth, over half, more than two-thirds, and more than one-quarter of mothers never picking up the infant when he or she cried, instead placing the infant down safely and leaving when signs of frustration were evident, communicated the specific characteristics of the infant's crying to others responsible for the child's care, when the infant exhibited fussiness or crying, the caregivers would walk around with the infant and instruct others on how to manage the situation if the infant became frustrated due to crying. Following one month of health education, there was a significant improvement in the mother's responses to the infant's crying, with a P value of 0.001.

Concerning to inconsolable crying the same study proved that,, there has been a notable progression from not practicing in pre-health education to the regular application in all items with statistically significant differences. Furthermore, concerning the self-talk response, the mother's reactions exhibit enhancement following health education compared to before its implementation.

The study by **Wiley, et al. (2020)** about parents' understanding of infant crying: A potential avenue for the prevention of abusive head trauma, cleared that; parents respond to a crying infant by putting their baby down and physically walking away when they felt they are becoming too frustrated

Regarding mothers' behavior, current study results cleared that; no one had good behavior pre-program implementation compared to nearly three quarters had fair behavior and one quarter had good behavior post the program implementation. ***This result accepted the second hypothesis***

Current study results were consistent with **Nada et al. (2020)** who studied the purple crying program impact on mothers' performance in preventing shaken infant syndrome congruence with the current study proved that; More than half of mothers exhibited a favorable level of scores regarding their responses to crying behaviors one month after the implementation of the program, in contrast to a smaller proportion prior to the program. Also, the study results were confirmed by **Eisenman, et al. (2019)** who studied the Calm Baby Gently initiative: An instructional baby book intervention focused on safe methods for addressing infant crying, found that; Mothers in the program showed increased confidence and were more



knowledgeable in how to react when their infants were crying.

Present study findings proved that; regarding mothers' reported practices to sooth infant crying, there were statistically significant differences between pre and post-program in the area of singing to or talking to the infant, if the caregiver is calm enough to operate a vehicle, taking the infant for a stroll or a drive, rock the infant gently or give him or her a back rub, give the infant warm bath and expose the infant to a white noise p. value at 0.0001, 0.002, 0.004, 0.005 respectively.

The study results were in the same line with **Nada et al. (2020)** proved that; more than two-thirds of mothers failed to comfort their infants by picking them up when they were upset or crying, didn't bathe them with warm water, and didn't cover them with a blanket. The majority of participants did not follow recommendations such as gently massaging the baby's back, using white noise or rhythmic sounds, placing the baby on the left side, allowing breastfeeding or bottle feeding giving a pacifier, and checking the baby's diapers. This was compared to a smaller number of participants after the health education program, with a statistically significant P-value of 0.001.

Current study results were consistent with the study by **Hashem et al. (2020)** who found that; after the preventive instructional module was introduced, nearly every mother utilized soothing methods to comfort their babies. Also, current study results were supported by **Barr, et al. (2018)** who studied the implementation of abusive head trauma prevention over Eight-year outcomes, they showed that; mothers who recently delivered babies found the program helpful in understanding typical infant crying, calming methods, and dealing with challenges.

Regarding the total level of mothers' reported practices, the present study findings cleared that; half of the mothers had adequate reported practice pre-program, and this percentage increased to most of them post-program. *This result accepted the third hypothesis*

The current study findings were congruent by **Morgan, et al. (2022)** cleared that; Most mothers had low total scores for their reported practices before the educational program, while the majority had satisfactory scores right after and two weeks after the program, showing a significant statistical difference (P=0.001). Also, the study by **Sakelo et al. (2020)** about care of newborns and the various factors

influencing mothers of infants who are one month old, reported that; most of the studied mothers exhibited inadequate practices in addressing their infants' crying. From the researchers' point of view, providing mothers with calming techniques to practice when their babies cry lowers the likelihood of shaking, increases their sense of control, helps them employ safe practices, and boosts their confidence in their ability to manage the situation. Also, it might be because mothers had a limited understanding of shaken infant syndrome and its dangers due to their reliance on personal knowledge and perception. Present study results proved that; there was a statistically significant fair negative correlation between mothers' knowledge and their age, but no statistically significant correlation was found between mothers' knowledge, behavior, and practices with their number of children, infant age, and weight.

Current study results were contradicted with **Faheim et al. (2022)** proved that: after the educational guideline program was implemented, a significant positive correlation was found between mothers' age and educational level with their overall knowledge, attitude, and beliefs at post- and follow-up program. Also, the study by **Ji et al.(2021)** about infant cry analysis and classification, EURASIP Journal on Audio cleared that; for young parents, however, it can be difficult to distinguish and properly understand signals from a crying infant.

The present study findings proved that; there were statistically significant differences between mothers' knowledge and their occupation at a post-program P-value of 0.03 and education pre- program p. value of 0.006. Current study results were congruent with the study by **Botha, et al. (2019)** about the impact of persistent crying in infants on family life: a thorough literature review cleared that; having children, being older, and having higher levels of education were predictors for being more aware of abusive head trauma.

Also, the study by **Adham et al. (2019)** about the understanding, beliefs, and attitudes of mothers concerning the dangers associated with shaken baby syndrome, came in the same line with the study results and found that; there is a positive relationship between mothers' age and their knowledge, beliefs and attitudes towards the risk of shaken baby syndrome, and a negative relationship between parents' education level, occupation and mother's knowledge. The study by **(AlOmran et al., 2022)** came in congruence with the current study results and

found that; gender, marital status, and occupation are significantly associated with the level of knowledge.

From a researcher's point of view, education of the mothers helps her to gain knowledge about the dangers of shaken babies and methods to calm infant crying which helps her to avoid inappropriate management of infant crying either from reading or from social media. Also, working mothers do not have enough time to calm the infant with different calming methods instead they may violently shake him thinking that this is the method to make the infant stop crying.

### **Conclusion:**

From the results of the current study, it can be concluded that; there was an improvement in mothers' knowledge, behavior, and practices after implementation of the program evidenced by, less than one-quarter of the studied mothers having good knowledge level pre-program compared to most of them post-program. On the other hand; regarding mothers' total behavior level, no one had good behavior about infant crying pre-program implementation compared to nearly three quarters had fair behavior and one quarter had good behavior post-program implementation. Moreover; most of the studied mothers had an adequate level of practice post-program compared to half of them pre-program with statistically significant differences.

### **Recommendations**

1. The current study should be conducted in various hospital settings on a large sample size
2. The hospital should be supplied with a booklet, brochure, and pamphlets about measures to sooth infant crying for prevention of shaken baby syndrome.
3. It is important to employ media effectively as an effective tool to increase mothers' awareness about the risks posed by shaken baby syndrome.
4. The study should be applied early for mothers in the post-partum phase in the hospitals to educate them about the normal behavior of the infant

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