

Effect of Educational Program on Mothers' Perception and Practices Regarding Crying and Shaken Infant Syndrome

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Abstract

Background: Shaken Infant Syndrome is subtype of abusive head trauma that occurs when parents violently shake their infant as a result of inconsolable crying. Despite of its high morbidity and mortality, it is a preventable health problem. **The aim** of the present study was to determine the effect of educational program on mothers' perception and practices regarding crying and Shaken Infant Syndrome. **Subjects and Method: Research design:** A quasi experimental research design was used; the study was conducted at outpatient and inpatient pediatric medical department at Tanta Main University Hospital. **Subjects:** Sixty mothers and their infants were selected randomly. **Three tools** were used for data collection: **Tool I:** Structured interview schedule, mothers' perception regarding crying and Shaken Infant Syndrome, **Tool II:** Crying and shaking scale and **Tool III:** mothers' reported practices regarding crying and Shaken Infant Syndrome. **Results:** Represented that two third of mothers had poor perception and majority of them had unsatisfactory reported practices before educational program while immediately and after 2 weeks the total scores of mothers' perception and reported practices were improved. **Conclusion:** There was a significant improvement in mothers' perception and reported practices regarding crying and Shaken Infant Syndrome after educational program. **Recommendations:** Continuous health education program should be applied in health care settings for mothers of infants who are less than one year to improve their perception and practices regarding crying and Shaken Infant Syndrome.

Keywords: Crying, Educational Program, Mothers' perception, Practices, Shaken Infant Syndrome.

Introduction

Infants' crying is a normal component of their development, a frequent symptom in the first three months of life, and a way for communication with their caregivers. Additionally, it is non-specific and can be brought on by a variety of factors, which include; hunger, discomfort, and pain, as well as the infant's need to be close to the caregiver in order to feel safe and secure.^(1,2) Episodes of crying that can trigger shaking behavior of parents and other caregivers are

known to increase in the first month after birth, peak in the second, and decrease thereafter. Prolonged or excessive crying is the most common trigger for Shaken Infant Syndrome (SIS).⁽³⁾

Shaken Infant Syndrome is a form of traumatic brain injury inflicted when an infant is violently shaken. The injury often includes; subdural hemorrhages, retinal hemorrhage and diffuse axonal injury which referred as the triad. It is also referred to as shaken-impact syndrome and inflicted head injury, which is a form of abusive head trauma that include; a constellation of signs

and symptoms that result from violently shaking an infant by the shoulders, arms, or legs.^(4,5)

Injury may result from shaking alone or from shaking combined with impact, such as when an infant is thrown against a wall. Although SIS can occur in children up to 5 Years old, it is most common in infants younger than 12 months, especially those between 2 and 4 months of age.^(4,5)

Certain risk factors that put the infant at risk for SIS include; factors related to infant, parents and environment. Infants' factors include; male infants 60% vs 40% female less than one year of age, low birth weight, one of twins, premature infants as they exhibit atypical behavior such as difficult temperaments, feeding difficulties, erratic sleep pattern and difficulty in self-soothing.^(6,7)

Parents' factors include low self-esteem, poor impulse control, substance or alcohol abuse, young maternal or parental age, low educational level.^(7,8) Environmental factors include; parents who are isolated and who have low level of social support, poverty, lack of support from family and community, unemployment, family violence and single parenting style.^(8,9)

Infants who have been shaken may exhibit signs and symptoms such as vomiting, lethargic behaviors, poor appetite, pale or bluish skin, inability to lift their heads, difficulty to concentrate or follow directions, bruising on arms or chest, and coma. Infants, who are violently shaken, even for a short period of time, are at risk of experiencing permanent brain damage that might lead to death, blindness, hearing loss, cerebral palsy, intellectual disabilities, speech and learning difficulties, seizures, and other serious complications.⁽¹⁰⁻¹²⁾

It is difficult to diagnose and often misdiagnosed due to the variety of symptoms, lack of medical signs of injury

and parents or caregivers telling incorrect information. After shaking infants may be exhibit with a variety of symptoms ranging from non-specific symptoms that don't require urgent care to life threatening complications. The clinical diagnosis is typically based on the infant's history, which is incompatible with the clinical symptoms, and is supported by investigations such as laboratory tests, skeletal surveys, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), ophthalmologists, and physical examination.⁽¹³⁻¹⁵⁾

During pregnancy, at birth, and during medical follow-up visits, nurses should provide parents, especially mothers, caregivers, healthcare providers, and the community at large about SIS, typical infant's crying, causes of crying, how to soothe a crying infant, and what to do if the infant is inconsolable. Teaching parents and caregivers about triggers is the most essential element of education. The majority of parents do not intend to hurt their infants and have no idea that shaking can cause serious complications for them.⁽¹⁶⁾

Nurses should inform parents and other caregivers that crying is normal, especially in infants under six months old, since it increases in the first month after birth, peaks in the second month, and thereafter declines gradually. Nurses should reassure caregivers that the crying episodes will subside with time.^(16,17)

The Period of PURPLE crying, which was created by the National Center of Shaken Infant Syndrome to assist parents in understanding the patterns of infant crying, may be helpful for parents to get familiar with it. Crying has a beginning and an ending since it is called a "period." The acronym PURPLE stands for: P (Peak pattern, in which crying increases, peaks during the second month, and then declines; U for Unexpected timing of prolonged

crying bouts; R for Resistance to soothing; P for Pain-look on the infant's face; L for Long crying bouts; and E for Late afternoon and Evening clustering.^(17,18)

Significance of the study

Infant abuse or maltreatment in its most extreme form is known as Shaken Infant Syndrome. It is a non-accidental brain injury inflicted on the infants caused by vigorously shaking. It is the most common reason why infants die or suffer serious brain damage in the first year of life. More than 50% of accidents result in injuries, and Shaken Infant Syndrome affects 21–74 infants out of every 100,000 worldwide annually, of those, as a result of their injuries, 25% to 30% pass away. The remaining 70% may suffer significant brain damage.^(19,20) So this study will be conducted to determine the effect of educational program on mothers' perception and practices regarding crying and Shaken Infant Syndrome.

Prognosis for infants with Shaken Infant Syndrome is poor; the majorities of infants either die or has developmental delays as a result.^(19,20) Therefore, implementing a program to avoid infant abuse is considered a priority; nevertheless, it can be challenging to determine the precise frequency of SIS. Therefore, the aim of current study was to determine the effect of educational program on mothers' perceptions and practices regarding crying and Shaken Infant Syndrome.

Aim of the study

The aim of this study was to determine the effect of educational program on mothers' perception and practices regarding crying and Shaken Infant Syndrome.

Research hypothesis: Implementing educational program on mothers' expected to improve their perception and practices regarding crying and Shaken Infant Syndrome.

Subjects and Method

Research design:

A quasi-experimental research design was used in the present study.

Settings:

Study was carried out at Outpatient and Inpatient Pediatric Medical Department at Tanta University Hospital. The Pediatric Medical Department is consisted of two floors. The 1st floor consists of cardiology, neurology, and chest ward. The 2nd floor includes renal, endocrine, hereditary, and liver ward. The Pediatric Outpatient Clinics consists of chest, endocrine, neurology, nutrition and ear, nose, and throat clinic.

Subjects:

A convenience sampling of 60 mothers and their infants were included in this study. Thirty mothers and their infants who admitted to the previously mentioned settings and possessed the inclusion criteria. Inclusion criteria of infants were both sexes, from one month to one year, and free from any brain disease and congenital anomalies. The sample size calculation based on type I error 0.05 and power of test 95%.

Tools of data collection: Three tools were used in the current study as the following:

Tool I: Structured Interview Schedule for Mothers: It was developed by the researcher after reviewing of the related literatures^(21,22) to collect information about mothers and their infants and assess mothers perception regarding crying and Shaken Infant Syndrome. It was consisted of two parts.

Part I: Socio-demographic characteristics of infants such as: age, gender, weight, birth order and type of feeding.

b: Socio-demographic characteristics of the studied mothers such as: age, level of education, marital status, parity, and residence.

Part II: Mothers' perception regarding crying and Shaken Infant Syndrome: It

was developed by the researcher after reviewing the related literatures ^(23,24) to assess mothers' perception before, immediately and after 2 weeks of implementing educational program regarding crying and Shaken Infant Syndrome, such as: definition, risk factors, causes, signs and symptoms, complications and prevention. Questionnaire sheet contained 10 questions; each question was scored from 0-2 grades. The correct and complete answer was scored 2, while correct and incomplete answer was scored 1, and incorrect answer or didn't know was scored 0. The sum of all questions was 20.

The total scores of mothers' perception were scored as follows

- Less than 60% was considered poor perception when total scores ranged from 0-11.
- From 60 to less than 75% was considered fair perception when total scores ranged from 12-14.
- From 75-100 % was considered good perception when total scores ranged from 15-20.

Tool II: Crying and Shaking Scale

Crying and shaking scale is very brief consisted of 12 items, which were 8 items for crying scale and 4 items for shaking scale. It was developed by Barr R (2009) ⁽²⁵⁾ to assess mothers' perception about how much they were agreed with each statement about an infant's behavior and needs in the first few months of life and answers were coded on a scale where 5=strongly agree, 4=Agree, 3=Uncertain, 2=Disagree, 1=Strongly disagree, this scale consisted of:

a- Crying scale: consisted of 8 items such as; infants crying more often in the late afternoon and evening, infant crying increases in the first few weeks of life and reach a peak in the first 2 month or 3months, if an infant is healthy he/she should not cry unexpectedly or without a clear reason,

when an infant cries, it is always a sign that something is wrong, sometimes the crying infant can look like that he is in pain, even if he is not, sometimes a crying infant can cry for 5 or more hours a day, a good parents should be able to soothe the crying infant, and it is ok to walk away from a crying infant when his/her crying becomes very frustrating.

b- Shaking scale: consisted of 4 items such as; one important role for parents are to protect their infants by making sure people who take care for their infants know about the danger of shaking an infant, shaking an infant can cause serious health problem or even death, shaking an infant is a good way to help his/her infant stop crying, and sometimes infant crying can be frustrating or upsetting that the parents cannot see if the person caring for their infant is shaking or hurting him/her.

The total Scores of crying and shaking scale were scored as follow:

- Less than 60% was considered poor perception when total scores ranged from 12-35.
- From 60 to less than 75% was considered fair perception when total scores ranged from 36 <45.
- From 75-100 % was considered good perception when total scores ranged from 45-60.
- **Tool III: Mothers' Reported Practices regarding Crying and Shaken Infant Syndrome:** This tool was developed by the researcher after reviewing the related literatures ^(25,26) to assess mothers' responses to general crying and inconsolable crying.
- **Responses to Crying scale** included 12 items such as; pick up the infant when fussed or crying, give the infant a warm bath, massage the infant gently on the back, arms and legs, use a white noise or rhythmic sounds, place the infant on the left side position, wrap the infant in a blanket, rock

the infant gently on a rocking chair, look at the infant and smile, burp the infant back, sing softly to the infant, let the infant breastfeed or bottle feed or giving the infant a pacifier, and check the infant's diaper.

- **Responses to Inconsolable Crying Scale** included 10 items such as; give the infant to someone else for a while,
- continue to calm the crying infant, put the infant down in a safe place for a while, take a break from the sound of crying, talk to the infant, get help to take care of the infant, take the infant for a walk, shaking the infant, yelling or screaming at the infant, and hitting, slapping or striking the infant.

Scoring system for mothers' reported practices was scored from 0-1. Done was scored 1, while didn't do was scored 0. The sum of all items was 22. Item from 8-10 in the scale of response to inconsolable crying was reversed scores.

The total Scores of Mothers' Reported Practices was divided as follows:

- From less than 65% was considered unsatisfactory reported practices when total scores less than 15.
- From 65%-100% was considered satisfactory reported practices when total scores ranged from 15-22.

Method

1-An official permission to conduct the study was obtained from Faculty of Nursing, Tanta University directed to outpatient and inpatient pediatric medical department at Tanta Main University Hospital to obtain their approval and cooperation for carrying out this study.

2-Ethical considerations:

Mothers were informed about the confidentiality of the information obtained from them. The nature of the study didn't cause any harm or pain for the entire sample. Mothers' oral consent was obtained to participate in the study after explaining the aim and benefits of it by the researcher.

Mothers who accepted to participate were involved in the current study, and they had the right to withdraw from the study at any time. Ethical approval was obtained from the research ethics committee of Faculty of Nursing, Tanta University in 2019.

3- Tools development:

Three tools were developed and modified based on the review of related literatures. Tool I: Structured interview schedule, it was developed to assess mothers' perception. Tool II: crying and shaking scales to assess mothers' perception regarding crying and Shaken Infant Syndrome. Tool III: Reported mothers' practices regarding crying and Shaken Infant Syndrome.

4-Content validity:

A panel of five pediatric nursing professionals was given the study's tools to review for content validity and questionnaire clarity. Modifications were carried out accordingly. The face validity of the questionnaire was calculated based on experts' opinions after calculating content validity index of its items and it was 99.1%.

5-Content reliability: The study tools were tested by the pilot subjects. The test of reliability (cronbach's alpha) was=0.912 including high reliability of tests.

6-A pilot study: A pilot study was carried out on six mothers (10%) and their infants to test the tools for their clarity, applicability, feasibility and the required modifications were done. The pilot study was left out from the study sample.

7-Phases of the study:

The study was conducted on four phases: It was carried out by the researcher for all study subjects to collect baseline data about the studied mothers and their infants, and to assess mothers' perception regarding crying and Shaken Infant Syndrome before, immediately after and after two weeks from implementation of educational program (I, II).

The researcher was assessing the mothers' reported practices before, immediately after and after two weeks from application of the program. The researcher was available 2 days per week in each one of the previously mention settings, to assess mothers' perception and practices before, immediately and after two weeks from implementation of educational program (Tool III).

2) Planning Phase:

- Setting objectives of the educational program.
- Preparation of the content which was covered the reasons behind the implementation of the session.

3) Implementation Phase:

- Educational program was carried out for mothers by conducting successive sessions in accordance with the mothers' actual needs being identified.
- Educational program was conducted in five sessions, two / week. The time of each session was about 30-45 minutes including periods of discussion according to the mothers' progress and feedback.
- Different methods of teaching were used including lectures, group discussion and demonstration to facilitate mothers' understanding.
- The studied mothers were divided into small groups (12 groups) and each group was consisted of five mothers.
- The educational program was carried out for each group separately through conduction of successive sessions according to the actual needs assessment of the studied mothers.
- Each session was started by a summary about what had been discussed in the previous session.

The educational program sessions were carried out as follows:

- **The first session:** It was focused on definition, risk factors of crying and Shaken Infant Syndrome.

The second session: It was focused on causes, signs and symptoms of crying and Shaken Infant Syndrome.

The third session: It was focused on complications and prevention of Shaken Infant Syndrome.

The fourth session: It was concentrated on mothers' practices regarding crying and Shaken Infant Syndrome. In addition to provide health education about normalcy of crying and how to calm the crying infant.

The fifth session: It was concentrated on proper soothing techniques and coping strategies that mothers should follow when frustrated.

Each session ended by a summary of its content and feedback from the mothers, to ensure that mothers got the maximum benefit.

4) Evaluation phase:

Evaluation of the effects of educational program on mothers' perception and reported practices was carried out using the same assessment tools (Tool I, II, and III).

Each mother was evaluated immediately after implementation of the program (post-test) and two weeks later, and these were compared to pre-test levels.

-The data was collected over a period of one year from December 2020 to November 2021. The study work took a period of 2 years.

Statistical analysis

Statistical Package for the Social Sciences, version 23, SPSS Inc. Chicago, IL, USA, was used to arrange, tabulate, and statistically analyze the collected data. The range, mean, and standard deviation for quantitative data were computed. When comparing two groups and more for qualitative data, which represents a categorical set of data by frequency, percentage, or proportion of each category, the Chi-square test was used (2). Using

parametric data from independent samples, the student t-test was employed to compare the means of the two groups. The F value of the ANOVA test was calculated to compare more than two means of parametric data. Using Pearson's correlation coefficient, correlation between variables was evaluated (r). For the purposes of interpreting the findings of significance tests, significance was adopted at $p < 0.05$.⁽²⁷⁾

Table (1): Demonstrates percentage distribution of infants regarding their socio-demographic characteristics. It was observed that the age of 66.7% of infants was from 4 to less than 8 months. Regarding to gender, it was cleared that 60% of infants were females, while 40% were males. In relation to weight of infants, it was noticed that 43.3% weighted from 5 to less than 7 kg. The table also indicated that 41.7% of infants were the second infants in their family. Regarding to type of feeding, it was found that 46.7% had mixed feeding.

Table (2): Shows percentage distribution of studied mothers regarding their socio-demographic characteristics. The table revealed that 70% of studied mothers their age was from 20 to less than 30 years old, while 30% of them were from 30 to 40 with mean age 27.30 ± 3.96 . Concerning educational level, it was observed that 46.7% of studied mothers were secondary education and 15% of them were university education. Regarding to their marital status, it was revealed that 100% of them were married.

In relation to parity of studied mothers, it was found that 76.7% were multiparous, while 23.3% were primiparous. As regard to

the residence of the studied mothers, it was observed that 61.7% of them were from rural area, while 38.3% were from urban area.

Table (3) : Represents percentage distribution of studied mothers' perception regarding Shaken Infant Syndrome. It was found that there were statistical significant differences in the studied mothers' perception regarding definition, risk factors, causes, signs and symptoms, complications, and prevention before, immediately, and 2 weeks after implementation of educational program with ($P=0.001$, $P=0.001$, $P=0.002$, $P=0.001$, $P=0.001$, and $P=0.001$) respectively.

Table (4): Shows the total scores of the studied mothers' perception regarding crying and Shaken Infant Syndrome before, immediately and 2 weeks after educational program. It was found that 71.7% of mothers their total scores of perception were poor before educational program implementation. While immediately and 2 weeks after educational program 56.7% and 51.7 % of them their total scores of perception improved and obtained good scores respectively with statistical significant difference ($P=0.001$).

Table (5): Shows total scores of mothers' reported practices before, immediately, and two weeks after implementation of educational program. It was found that 80.0% of mothers' their total scores of reported practices were unsatisfactory before educational program compared to 90.0% were satisfactory immediately and after two weeks of the program, with statistically significant difference ($P=0.001$).

Table (6): Shows the correlation between total scores of mothers' perception and reported practices regarding crying and Shaken Infant Syndrome. Positive

correlation was detected between mothers' perception and reported practices before, immediately and 2 weeks after educational program. Mothers displaying more perception had a good practice before, immediately and 2 weeks after educational program ($P = 0.001$).

Table (1): Percentage Distribution of Infants Regarding their Socio-Demographic Characteristics

Socio-demographic characteristics of infants	(n=60)	
	No	%
Age of infants (months)		
1 < 4	7	11.7
4 < 8	40	66.7
8 – 12	13	21.7
Range	2 – 11	
Mean ± SD	5.78 ± 2.17	
Gender		
Male	24	40.0
Female	36	60.0
Weight		
< 3	5	8.3
3 < 5	19	31.7
5 < 7	26	43.3
> 7	10	16.7
Birth order		
First	20	33.3
Second	25	41.7
Third	13	21.7
Fourth	2	3.3
Feeding		
Breast feeding	21	35.0
Artificial feeding	11	18.3
Mixed	28	46.7

Table (2): Percentage Distribution of Studied Mothers Regarding their Socio-Demographic Characteristics

Socio-Demographic Characteristics of Mothers	(n=60)	
	No	%
Age of mother (years)		
20 < 30	42	70.0
30 < 40	18	30.0
Range	20 – 38	
Mean ± SD	27.30 ± 3.96	
Educational level		
Illiterate		
Read & write		
Primary		
Preparatory		
Secondary		
University		
Marital Status		
Married	60	100
Parity		
Primiparous		
Multiparous		
Residence		
Rural	37	61.7
Urban	23	38.3

Table (3): Percentage Distribution of Mothers' Perception Regarding Shaken Infant Syndrome.

Mothers' Perception regarding SIS	(n=60)															X ² P-value	P1	P2	P3			
	Before educational program						Immediately after program						2 weeks after educational program									
	Don't Know or Wrong		Correct & Incomplete		Correct & Complete		Don't Know or Wrong		Correct & Incomplete		Correct & Complete		Don't Know or Wrong	Correct & Incomplete	Correct & Complete							
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No					%		
Definition of SIS	42	70.0	9	15.0	9	15.0	4	6.7	20	33.3	36	60.0	6	10.0	25	41.7	29	48.3	76.091 0.001*	0.001*	0.001*	0.425
Risk factors	20	33.3	37	61.7	3	5.0	4	6.7	30	50.0	26	43.3	8	13.3	32	53.3	20	33.3	31.216 0.001*	0.001*	0.001*	0.336
Causes	15	25.0	32	53.3	13	21.7	5	8.3	24	40.0	31	51.7	5	8.3	29	48.3	26	43.3	16.553 0.002*	0.001*	0.009*	0.634
Signs and symptoms	14	23.3	35	58.3	11	18.3	5	8.3	21	35.0	34	56.7	6	10.0	24	40.0	30	50.0	21.995 0.001*	0.001*	0.001*	0.763
Complications	39	65.0	14	23.3	7	11.7	9	15.0	21	35.0	30	50.0	9	15.0	25	41.7	26	43.3	49.060 0.001*	0.001*	0.001*	0.728
Prevention	20	33.3	37	61.7	3	5.0	3	5.0	18	30.0	39	65.0	5	8.3	21	35.0	34	56.7	56.763 0.001*	0.001*	0.001*	0.585

*Statistically significant difference at (P<0.05).

P1 Before and immediately after educational program

P2 Before and 2 weeks after educational program

P3 Immediately and 2 weeks after educational program

Table (4): Total Scores of Mothers' Perception Regarding Crying and Shaken Infant Syndrome

Total Perception (crying& shaking)	n=60						X ² P-value	X ² P 1	X ² P 2	X ² P 3
	Before		Immediately		After 2 w.					
	N	%	N	%	N	%				
Poor < 60%	43	71.7	12	20.0	20	33.3	36.441 0.001*	32.431 0.001*	18.521 0.001*	3.231 0.199
Fair 60-75%	6	10.0	14	23.3	9	15.0				
Good 75-100%	11	18.3	34	56.7	31	51.7				
Range	2 – 19		3 – 20		2 – 20		F 20.397			
Mean ± SD	9.35 ± 4.75		14.85 ± 4.91		13.85 ± 5.39		P 0.001*	0.001*	0.001*	0.290

*Statistically significant difference at (P<0.05).

P1 Before and immediately after educational program

P 2 Before and 2 weeks after educational program

P 3 Immediately and 2weeks after educational program

Table (5): Total Scores of Mothers' Reported Practices regarding Crying and Shaken Infant Syndrome

Total Practice	n=60						X ² P value	X ² P 1	X ² P 2	X ² P 3
	Before		Immediately		After 2 w.					
	N	%	N	%	N	%				
Unsatisfactory < 65%	48	80	6	10.0	6	10.0	88.200 0.001*	59.391 0.001*	59.391 0.001*	0.0 1.0
Satisfactory ≥ 65%	12	20	54	90.0	54	90.0				
Range	8 – 18		10 – 22		9 – 22					
Mean ± SD	12.42 ± 2.57		20.48 ± 3.19		18.72 ± 3.28		P 0.001*	0.001*	0.001*	0.004 *

*Statistically significant difference at (P<0.05).

P1 Before and immediately after educational program

P 2 Before and 2 weeks after educational program

P 3 Immediately and 2weeks after educational program

Table (6): Correlation between Total Scores of Mothers' Perception and Reported Practices regarding Crying and Shaken Infant Syndrome

Correlation between perception and reported practices	Mothers' Perception					
	Before		Immediately after		After 2 weeks	
	R	P	R	P	r	P
	0.761	0.001*	0.784	0.001*	0.786	0.001*

*Statistically significant difference at (P<0.05)

r = correlation coefficient

Discussion

Crying is the infant's way of communication, but when it is uncontrolled, it can cause stress and irritation in parents, persuade them to take inappropriate action, and put the infant at danger for Shaken Infant Syndrome. ^(28,29)

Shaking an infant vigorously by parents or other caregivers constitutes physical abuse with extremely high rates of morbidity and mortality. It is the most frequent cause of death and a severe neurological injury that causes long-term disability in infants and young children under the age of five. ^(26,30)

Despite its severity, it can be prevented by providing information to the parents. An educational program for mothers, who are the primary caregivers, would enhance their awareness of the risks associated with SIS and reduce its effects. ⁽³¹⁾ So the aim of this study was to determine the effect of educational program on mothers' perception and practices regarding crying and Shaken Infant Syndrome.

Regarding age of infants, the results of the present study showed that more than two third of them their age was between 4 to less than 8 months. From the researcher point of view, this is may be due to infants in this age, have problems with teething, held by many people and grasp objects with their mouth so that make them at risk for many diseases. These results are in contrast with **Taser (2015)** ⁽³²⁾ who found that less than half of infants' age ranged from 3 to 7 days after birth.

As regards socio demographic characteristics of the studied mothers, the current study revealed that more than two thirds of mothers were between 20 to less than 30 years of age and nearly three quarter of them were multiparous. This

may be due to early marriage of the studied mothers as nearly two third of them lived in rural area. This result is in line with **Alshahrani et al. (2018)** ⁽²⁰⁾ stated that the majority of the mothers in the study, or nearly two-thirds, were aged 20 to 40 and were from rural areas.

Regarding mothers' level of education, it was found that nearly half of studied mothers had secondary education. This can be attributed to poor perception and unsatisfactory practices of mothers regarding their responses to infants crying and nearly two thirds of them from rural areas. These study results were not matched with **Fujiwara et al. (2012)** ⁽³³⁾ who found that more than half had primary school.

Concerning the mothers' perception regarding SIS, revealed that, prior to an educational program, over two thirds of them lacked knowledge about risk factors, causes, signs and symptoms, complications, and prevention of SIS. This can be brought on by a lack of antenatal care and instructional materials concerning this syndrome in hospitals. While immediately and after 2weeks more than half of them had good perception with highly statistically significant differences. **Simonnet et al. (2014)** ⁽³⁴⁾ who agreed with the present finding, found that parents' perception significantly improved after program participation. On the other hand, **Barr et al. (2009)** ⁽²⁵⁾ who disagreed with the current study, stated that there was no significant difference in the shaking perception scores across the group.

The current study found that, following the implementation of the educational program, mothers' perceptions of infant crying and Shaken Infant Syndrome overall significantly improved. According to the

researcher, this improvement can be linked to the educational program's attraction and simplicity, which was created using a simple Arabic language, clear images, and a simply illustrated video. The findings of **Younis and Abo Zaid (2020)** ⁽³⁵⁾ were in line with the findings of the present study and indicated that the health risks of SIS and parents' perceptions of purple crying had improved as a consequence of the implementation of educational program.

Giving mothers soothing strategies to use when their infants cry helps them to use safe practices, makes them feel more in control, raises their confidence in their ability to handle the situation, and reduces the risks of shaking. These results, according to the researcher, may be a result of mothers learning new skills and knowledge through educational program that concentrated on calming techniques and enabling mothers to use them on their infants.

The results of **Hashem et al. (2020)** ⁽³⁶⁾ were in line with those of the current study, which found that almost all mothers used soothing techniques to calm their infants following the implementation of a preventive instructional module.

The current study shown that, prior to the educational program, most of the studied mothers had unsatisfactory practices Shaken Infant Syndrome. This might be because the mothers had a poor perception of SIS and its risks, which was to be expected given that mothers based their beliefs and practices on their knowledge and perception. The same finding was reported by **Beth and Preston (2014)** ⁽³⁷⁾, who also demonstrated that the majority of American mothers had tough and unsuitable beliefs and practices related to Shaken Infant Syndrome. Additionally, **Adham et al. (2019)** ⁽³⁸⁾ revealed that the majority of

the mothers had unsuitable attitudes and practices regarding the risks of shaken infant syndrome. The results of the current study showed a positive correlation between mothers' perceptions of infant crying and reported practices related to that crying and SIS. This shows that mothers who comprehended infant crying and Shaken Infant Syndrome took appropriate safety measures for their infants. Therefore, those mothers can reduce the risk that SIS will occur. **Sayed and Mohamed (2020)** ⁽³⁹⁾, who agreed with the current finding, and concluded that mothers' perceptions and reported practices about SIS in the post-intervention period showed a positive correlation with a highly statistically significant relationship. As a consequence of the educational program's implementation, which led to a statistically significant improvement in mothers' perceptions and reported practices related to crying and Shaken Infant Syndrome, the research hypothesis has been confirmed.

Conclusion

Based on the results of the current study it can be concluded that, there was a significant improvement in mothers' perception and their reported practices regarding crying and Shaken Infant Syndrome after educational program, and there was a positive correlation between the total perception scores of mothers and reported practices related to response to general and inconsolable crying.

Recommendations

The following recommendations are put out in light of the study's findings:

1-Continuous health education program should be applied in health care facilities for mothers of infants who are less than

one year to improve their perception and practices regarding crying and Shaken Infant Syndrome.

2-Provide all new parents with manual booklet about infant crying, how to deal with it, Shaken Infant Syndrome complication and prevention.

For Further Researches:

1-Inclusion of fathers and other caregivers in future studies should be considered for completing the educational program evaluation.

2-Media should be used as an important tool for increasing awareness of parents about the hazards of SIS and its prevention.

3-This study should be replicated on more mothers at different geographical areas to generate larger statistical power with a diverse group of mothers and attain more generalization results.

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