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# Shaken Baby Syndrome: The Effect of an Awareness Nursing Initiative on Parent's Perception and Infants' Sleep Pattern

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**Abstract:** Shaken baby syndrome is a clearly definable medical condition. A proper response requires integration of specific clinical management and community intervention in an interdisciplinary fashion. Greater attention and resources should be devoted to prevention of abusive injuries. The present study was conducted to investigate the effect of shaken baby syndrome nursing initiative on Parent's Perception and infants' sleep pattern. A quasi experimental design was utilized for the study. A convenient sample of 200 mothers and their children were included. The study was conducted at the Motherhood and Childhood Center at Shebein El-kom town, Menoufia governorate, five instruments were used for collecting data. *Instrument one*: socio-demographic structured interview questionnaire about characteristic of studied parent & their infants. *Instrument two:* -parents' knowledge structured interview questionnaire about purple crying. *Instrument three:* parents' knowledge structured interview questionnaire about shaking baby syndrome. *Instrument four:* likert scale of infants' sleep pattern from parent's perspectives. *Instrument five:* likert scale about parent's perception of purple crying and shaken baby syndrome. Results showed that only 37% of participants were knowledgeable about preventive measures of shaken baby syndrome. A significant improvement in parent's perception and infants' sleep pattern were identified. *Conclusion:* shaken baby syndrome nursing initiative has a significant effect on parent's perception and infants' sleep pattern. *Recommendation:* shaken baby syndrome nursing initiative should importantly reinforce during infancy period at each well baby visit to the Motherhood and Childhood Center to enhance children safety and wellbeing.

**Key words:** Shaken baby syndrome · Purple Crying · Infant Sleep pattern and Nursing Initiative

## INTRODUCTION

Recently, Shaken baby syndrome (SBS) is a phenomenon of interest and a major health problem concerned with young children. SBS is the most common cause of death or serious neurological injury resulting in life long disability among infant and young children less than 5 years of age [1]. It is not just a crime it is a public health problem. Nearly all victims of SBS suffer serious health consequences and at least one of every four babies who are violently shaken dies from this form of child maltreatment [2].

More than 50% rates of morbidity and 15-38% mortality rate were documented due to Shaken baby syndrome among children less than one year. About 75% of survivors suffer neurological, cognitive, developmental and psychological sequels. In the United States estimated from 1, 000 to 3, 000 children suffer from SBS each year. One fourth of victims of SBS die and 80 percent of the survivors suffer from permanent damage. It is more common in infants from six to eight weeks old, when infants tend to cry the most [3].

Shaking most often occurs in response to a baby crying. Most parents don't realize that there is a normal crying curve for babies. Recent studies show that crying begins to increase around 2 to 3 weeks of age and peaks around 6 to 8 weeks of age. It then tapers off and usually ends, when the baby is 3 to 4 months old [4]. The key here is that crying is *normal* and is not the problem and it called earlier the PURPLE crying. The problem is how

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caregivers respond to a baby's cry. Picking up a baby and shaking, throwing, hitting, or hurting him/her is never an appropriate response. It is important for parents and caregivers to know how they can cope if they find themselves becoming stressed and frustrated [5].

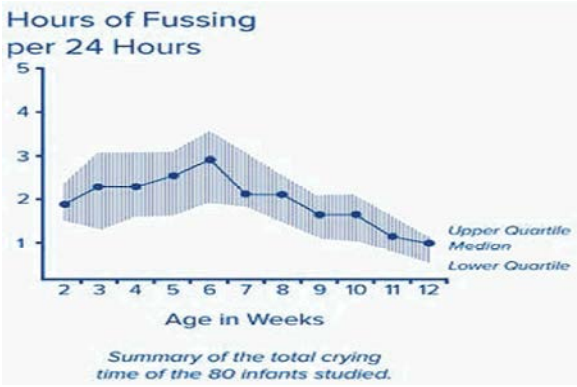


Fig. 1: Normal crying curve for babies. Adopted from: Lee [6].

The PURPLE crying is an acronym to describe a period in an infant's life that may be characterized by inconsolable crying. It begins at birth and continues until about 3-4 months of age, then start to decrease and settle after four month of age [7]. During this period the infant can cry for hours and still be healthy and normal, but often Parents think there must be something wrong or they would not be crying like this, which can be very frightening and frustrating for parents. Generally, many caregivers do not understand that prolonged and inconsolable crying in the infant is common in a normal infant that can lead to shaking or abuse [8].

There is an evidence-based that (SBS) increased in the Period of PURPLE Crying. Thereby, infant crying and sleeping problems have been gathered together, because the most crying occurring in the evening and night. The infants need to sleep about 15 hrs per day and at least 9 hours of sleep per night. If the infants find difficult to settle down to sleep and will wake up during the night, this can be challenging for both infant sleep problems and parents' perceived distress [9]. One third of the victims of SBS survive with few or no sequelae, one third suffer permanent injury and one third die. Parental behaviors, environmental factors and child characteristics all may contribute to a shaking event. Common triggers are frustration or stress when the child is crying. Unfortunately, the shaking may have the desired effect, although at first the baby cries more, he or she may stop crying as the brain is damaged [10].

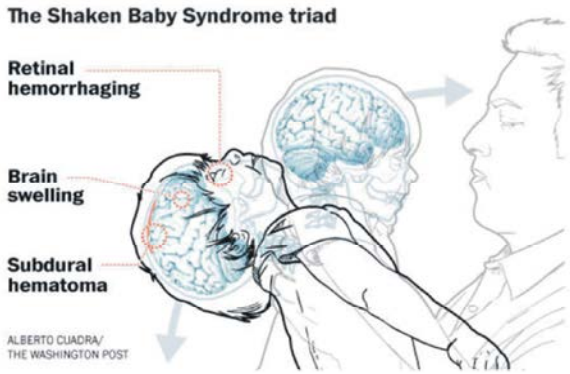


Fig. 2: Shaken baby syndrome 'is child abuse. Adopted from: Barlow *et al.* [11]

SBS is a current problem. In 2004, ninety nine cases of SBS were identified. Sixteen of the cases were died. Documentation was obtained from medical records, police reports and. The documentation of these injuries confirms the frequency of the occurrence and the need for education to reduce the incidence of (SBS) [12].

From a public health perspective, creating greater awareness about SBS is important. Helping people understand the dangers of violently shaking a baby; the risk factors associated with SBS; the triggers for it; and ways to prevent it may help reduce the number of infants affected by SBS [13]. Accordingly, Prevention is a community effort that includes recognizing and communicating the risk factors and common characteristics of perpetrators and victims and also sharing ways to lessen the load on stressed out parents and caregivers [14]. Recent studies recommended urgently the need for education and awareness to reduce the incidence of SBS and enhance infants' sleep pattern [15]. Nursing Initiative is a form of Quality Initiative that is aims to improve quality of care. The challenged is to meet measurable targets in key areas such as hospitalizations and communities. Building on the movement towards person-centered care is very helpful to form a stronger support for individuals and families. Meanwhile, this study was done to investigate the effect of shaken baby syndrome nursing initiative on Parent's Perception and infants' sleep pattern.

**Significance of the Study:** Shaken Baby Syndrome is a form of child abuse. It is not just a crime; it is a public health problem. It is one of the most devastating injuries a form of abusive head trauma that can occur during the first one to two years of life [16].

Approximately, all victims of Shaken Baby Syndrome suffer serious health consequences and at least one of every four infants who are violently shaken dies from this form of child ill-management. Shaken Baby Syndrome is represented with very high rates of morbidity (more than 50%) and mortality (15-38%) among children less than one year. The fact is that many new parents and caregivers find themselves unprepared for the realities of caring for a baby and the stress that can accompany those realities which push them to shake their fragile infants to stop crying forcefully [17]. There is an evidence-based that Shaken Baby Syndrome is increased in the Period of PURPLE Crying. Inconsolable crying is normal developmental behavior in babies. It helps to think of crying as one of the ways babies communicate. Research also shows that most babies who cry a great deal are healthy and stop crying for prolonged periods of time after 4 months of age Thereby, infant crying and sleeping problems have been gathered together, because the most crying occurring in the evening and night. Crying is *normal* and is not the problem. The problem is how caregivers respond to a baby's cry. Picking Researches recommended that to prevent potential Shaken Baby Syndrome, parents need to learn how to respond to their own irritability. The National Center on Shaken Baby Syndrome offers preventive measures focusing on educating and empowering people to consciously prevent Shaken Baby Syndrome [18]. The present study was conducted to investigate the effect of shaken baby syndrome nursing initiative on Parent's Perception and infants' sleep pattern.

**Purpose of the Study:** The present study aims to investigate the effect of shaken baby syndrome nursing initiative on Parent's Perception and infants' sleep pattern.

**Research Hypotheses:**

- Parents who undergone shaken baby syndrome nursing initiative awareness will demonstrate significant perception of shaken baby syndrome health hazards for their infants.
- Neonates who experienced shaken baby syndrome nursing initiative awareness will show better sleep pattern.

## MATERIALS AND METHODS

**Research Design:** A Quasi-experimental design (pre, post and follow up test) was used to fulfill the purpose of the study.

**Research Setting:** This study was conducted at Motherhood and Childhood Health Center Menoufia Governorate.

**Sample and Sampling Technique:** A purposive sample of 200 parents and their infants were selected from the above mentioned setting.

**Inclusion Criteria:** Each infant was selected according to the following criteria.

- Infants who are healthy and free from any health problems.
- Infants' age ranged from birth up to one year of life.

Based on the previous similar studies and inclusion \ exclusion criteria of this study total of (200) parents and their infants was included. The sample size was calculated at the confidence level of 99% and an acceptable margin of error at 10 %.

**Exclusion Criteria**
**Infants Who Have:**

- Chronic physical illness.
- History of abnormal sleep disorders

**Instruments of Data Collection:** In order to achieve the purpose of the study, five instruments were utilized.

**Instrument One:** Socio-demographic structured interview questionnaires to assess general characteristics of the studied sample: It was developed by the researcher and consisted of two parts:

**Part One:** Socio-demographic Characteristic of Studied Infants. It included questions about Gestational Age, current age, gender, order of birth and health status.

**Part Two:** Socio-demographic Characteristic of Studied parent's. It included questions about age, gender, type of delivery, level of education and current job.

**Instrument Two:** Parents' knowledge Structured interview Questionnaire: it consisted of two parts.

**Part One:** Parents' knowledge about Shaking Baby Syndrome (SBS). It consisted of twelve questions to assess parent's knowledge regarding SBS.

**Part Two:** Parents' knowledge about Purple Crying. It consisted of six questions to assess parent's knowledge regarding Purple Crying.

**Scoring System:** The sum of the correct items was calculated and also the sum of the incorrect items. Answers which considered correct take score (1) and score (0) for incorrect answers. Then all answers more than 60% considered correct and answers less than 60% considered incorrect.

**Instrument Four:** Likert Scale about Infants' sleep pattern from caregivers' perspectives: It consisted of five items. Each item is rated on a 3-point Likert scale and scored as follow.

**Scoring System:**

| Scoring items | Score |
|---|---|
| Strongly agree | 2 |
| Agree | 1 |
| Disagree | 0 |

**Instrument Five:** Likert Scale about caregivers' Perception of purple crying and SBS: It consisted of seven items each item is rated on a 3-point Likert scale and scored as follow.

**Scoring System:**

| Scoring items | Score |
|---|---|
| Strongly agree | 2 |
| Agree | 1 |
| Disagree | 0 |

**Reliability:** To ensure the reliability of questionnaire Cronbach's Alpha test was used. The reliability coefficients value of all instruments was of high scores approaching the correct one and the total degree of reliability was (.733) which is high value and approaching the correct one.

**Validity:** For validity assurance purposes, five instruments were submitted to a jury of three experts in the pediatrics and pediatric nursing field (two professors in pediatric Nursing and one professor in pediatrics). The modifications were done to ascertain their relevance and completeness.

**Data Collection Methods**

**An Official Letter:** Prior to data collection, a written permission to carry out the study was obtained from the director of the Newborns and Maternity Medical Center after submitting an official letter from the Dean of the Faculty of Nursing at Menoufia University explaining the purpose of the study and methods of data collection.

**Ethical Consideration:** For protection of human rights, an informed written and oral consent was obtained from caregivers to obtain their permission to share in the study. This study was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans.

Parents were informed about the objectives of the study, its importance, safety, duration, procedure and confidentiality. Also, they informed that their participation was voluntary and they had the right to participate or withdraw at any time.

**Pilot Study:** A pilot study was carried out on 10% of the sample (20) infants and their caregivers to test the practicability, applicability and feasibility of items in the tools. Modifications were done. Therefore, the sample of the pilot study was excluded from the total sample size.

**Procedure of Data Collection**

**Assessment Phase:** Data was collected over a period of 6 months started from the first of February to the first of August 2019. The data were collected according to the vaccination timetable of cases attendance to the Motherhood and Childhood Health Center The researcher introduced herself to caregivers before starting constructed intervention. Each group of caregivers was interviewed after administering vaccination for their infants. Medical history for each infant was collected before starting the intervention to confirm inclusion and exclusion criteria for sample selection.

- Assessment of parent's and infants' characteristics was done using instrument one (pretest).
- Assessment of parent's knowledge about SBS and Purple crying was done using instruments two (pretest).
- Assessment of infants' sleep pattern (ISP) and Purple crying (PC) from parent's perspectives was done using instruments (pretest).

Caregivers instructed about the specific time and room for the conduction of scientific intervention sessions according to their stated vaccination timetable.

**Implementing Phase:** At first, the entire available parents who accepted to share in study were classified into equal groups. Each group consisted of ten parents and their infants. A constructed scientific intervention was applied to each group with face to face approach using power

point presentation. Each group received two sessions in the first day of infant vaccination. They asked to call the researcher at any time for any needed information.

**Session 1:** Each group received brief explanations about anatomy and functions of the human brain, definition of shaken baby syndrome (SBS), the potential health hazards and complication of SBS. Also, normal and abnormal infants' sleep pattern and characteristics of consolable and purple crying were emphasized. This session lasted for 60 minutes. Discussion and scientific booklets were used.

**Session 2:** Each group demonstrated and re-demonstrated proper soothing and handling techniques for their infants according to their developmental stage. Parents learned how to assess characteristics of the infant's sleep. They asked to provide their infants with proper handling and soothing techniques daily specially preceding sleep time. Also they asked to assess their infants' sleep pattern daily and give their feedback when required. This session lasted for 60 minutes.

This sequence of data collection was repeated daily at the obligatory vaccination time. The researcher contacted the sample weekly for six months through telephone to ensure that they follow the instructions in a safe way and also clarify any misunderstanding.

**Reassessment Phase:** Reassessment was done at the next time for vaccination (post intervention) for each group using the same instruments (posttest).

**Follow up Phase:** Follow- up was done after 6 months using the same instruments (follow up test).

**Statistical Analysis:** Data was coded and transformed into specially designed form to be suitable for computer entry process. Data was entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 21. Graphics were done using Excel program.

Quantitative data was expressed as mean & standard deviation (X±SD) and analyzed by using t-test for comparison between means.

Qualitative data was expressed in the form of number and percentage (No. & %). It was analyzed by using chi-square test ($X^2$). Pearson correlation was used for explaining relationship between normally distributed quantitative variable.

## RESULTS

Table 1 shows Socio demographic characters of caregivers, it shows that, the mean age of the studied caregivers was (29.1±7.13). 100 % of the studied sample was females. 48.0% of them have Bachelor degree. 98.0% was married. 50.0 % was employee while 20 % had academic occupation. 52.0 % has normal delivery. 64.0 % of the studied caregivers were mothers. The majority of the sample (74.0 %) hasn't any chronic diseases.

Table 1: Distribution of Socio demographic characters of studied caregivers (N =100)

| | Studied group | |
|---|---|---|
| Socio demographic characters | No. 100 | % |
| Age / years | | |
| Mean ±SD | 29.1±7.13 | |
| Range | 20-45 | |
| Gender: | | |
| -Female | 100 | 100 |
| Educational level | | |
| -Illiterate | 0 | 0.00 |
| -Intermediate education | 22 | 22.0 |
| -Bachelor | 48 | 48.0 |
| -Postgraduate | 30 | 30.0 |
| Marital state | | |
| -Married | 98 | 98.0 |
| -Divorced | 2 | 2.00 |
| Occupation | | |
| -Academic | 20 | 20.0 |
| -Employee | 50 | 50.0 |
| -Others | 30 | 30.0 |
| Type of delivery: | | |
| -Normal | 52 | 52.0 |
| -Cesarean | 48 | 48.0 |
| Person who give care to the infant | | |
| -Mother | 64 | 64.0 |
| -Father | 0 | 0.00 |
| -Others(mother &grandmother) | 36 | 36.0 |
| History of chronic disease | | |
| -Yes | 26 | 26.0 |
| -No | 74 | 74.0 |

Table 2: Number and percent distribution of infant Socio demographic characters (N=100):

| | Studied infants | |
|---|---|---|
| Socio demographic characters | No. | % |
| Gestational age: | | |
| -< 37 weeks | 14 | 14.0 |
| -37 - 40 weeks | 86 | 86.0 |
| -40 - ≤ 42 | 0 | 0.00 |
| Infant age | | |
| -One day - < one month | 98 | 98.0 |
| -One month - < 6 months | 2 | 2.00 |
| Infant order | | |
| -First | 20 | 20.0 |
| -Second | 30 | 30.0 |
| -Third | 38 | 38.0 |
| -Others | 12 | 12.0 |

Table 3: Number and percent distribution of parent knowledge about purple cry and shaking baby syndrome pre and post intervention (N=100)

| | Knowledge | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Pre | | Post | | Follow up | | | |
| Studied variable | No. | % | No. | % | No. | % | McNemar test | P value |
| Knowledge about purple cry and SBS: | | | | | | | | |
| -Good | 2 | 2.00 | 100 | 100 | 100 | 100 | 192.0 | P1:0.001** |
| -Poor | 98 | 98.0 | 0 | 0.00 | 0 | 0.00 | 192.0 | P2:0.001** |

**highly significant P1: Between pre and post P2: Between pre and follow up

Table 4: Distribution of Parents' Perception about purple crying and SBS

| | Pre | | Post | | Follow up | | | |
|---|---|---|---|---|---|---|---|---|
| | Agree | Disagree | Agree | Disagree | Agree | Disagree | | |
| Parents' Perception About purple crying and SBS | N (%) | N (%) | N (%) | N (%) | N (%) | N (%) | McNemar test | P value |
| I am perceived the importance of purple crying | 30(30.0) | 70(70.0) | 90(90.0) | 10(10.0) | 100(69.0) | 0(0.00) | 75.0 | P1:<0.001** |
| | | | | | | | 107.0 | P2:<0.001** |
| I am perceived that purple crying is healthy | 20(20.0) | 80(80.0) | 85(85.0) | 15(15.0) | 95(95.0) | 5(5.00) | 84.7 | P1:<0.001** |
| and necessary exercise for the child. | | | | | | | 115.1 | P2:<0.001** |
| I am perceived the dangerous of SBS | 40(40.0) | 60(60.0) | 90(90.0) | 10(10.0) | 100(100) | 0(0.00) | 54.9 | P1:<0.001** |
| | | | | | | | 85.7 | P2:<0.001** |
| I am perceived that SBS can lead to death of | 38(38.0) | 62(62.0) | 80(80.0) | 20(20.00) | 95(95) | 5(5.00) | 36.4 | P1:<0.001** |
| the child | | | | | | | 72.9 | P2:<0.001** |
| I am able to teach others about dangerous of SB | 25(25.0) | 75(75.0) | 90(90.0) | 10(10.0) | 100(100) | 0(0.00) | 86.4 | P1:<0.001** |
| | | | | | | | 120.0 | P2:<0.001** |
| I am perceived the importance of SBS | 45(45.0) | 55(55.0) | 86(86.0) | 14(14.0) | 95(95.0) | 5(5.00) | 37.1 | P1:<0.001** |
| intervention program | | | | | | | 59.5 | P2:<0.001** |
| I will never shake my infant again | 30(30.0) | 70(70.0) | 90(90.0) | 10(10.0) | 100(100) | 0(0.00) | 75.0 | P1:<0.001** |
| | | | | | | | 107.0 | P2:<0.001** |

*Significant **highly significant P1: Between pre and post P2: Between pre and follow up

Table 5: Number and percent distribution of infant sleep pattern pre and post intervention (N=100):

| | Infant sleep pattern | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Pre | | Post | | Follow up | | | |
| Studied variable | No. | % | No. | % | No. | % | McNemar test | P value |
| Infant sleep pattern: | | | | | | | | |
| -Good | 4 | 4.00 | 90 | 90.0 | 93 | 93.0 | 148.4 | P1:0.001** |
| -Bad | 96 | 96.0 | 10 | 10.0 | 7 | 7.00 | 184.6 | P2:0.001** |

**highly significant P1: between pre and post p2: between pre and follow up

Table 6: Distribution of Infants' sleep pattern from mothers' perspectives pre, post and follow up the intervention.

| | Pre | | Post | | Follow up | |
|---|---|---|---|---|---|---|
| Infants' sleep pattern | Agree N (%) | Disagree N (%) | Agree\ N (%) | Disagree N (%) | Agree N (%) | Disagree N (%) |
| Infant cry less | 2 (2.00) | 98(98.0) | 86 (86.0) | 14 (14.0) | 91(91.0) | 9 (9.0) |
| Infant calm faster | 24 (24.0) | 94(94.0) | 93 (93.0) | 7 (7.0) | 95 (95.0) | 5 (5.00) |
| Infant sooth easily | 32 (32.0) | 68(68.0) | 93 (90.0) | 7 (7.0) | 100 (100) | 0 (0.00) |
| Infant sleep quickly | 12 (12.0) | 88(88.0) | 97 (97.0) | 3 (3.0) | 99(99.0) | 1(1.00) |
| Infant sleep better and longer | 6 (6.00) | 94(94.0) | 94(94.0) | 6 (6.0) | 97 (97.0) | 3(3.00) |

Table 2 reveals socio demographic characters of studied infants, it shows that, 86.0% of the studied infants were (37-40 weeks) on gestation. 98.0 % were neonates compared with 2.0% were infants less than six month of age. 38.0% of the studied infants were the third in their siblings order.

Table 3 indicates number and percent distribution of caregivers' knowledge about purple cry and shaking baby syndrome pre and post intervention. This table indicates highly significant statistical differences between pre, post and follow up tests regarding caregiver's knowledge about purple cry.

Table 4 shows parents' Perception about purple crying and SBS. This table clarifies highly significant statistical difference was found between pretest and posttest. Also, highly significant statistical difference was found between posttest and follow up. 86.0 & 95% of caregivers had better perception of the importance of SBS intervention program. In addition, 90 & 100% of them decided to could never shake their infants again.

Table 5 reveals number and percent distribution of infant sleep pattern pre and post intervention This table indicates highly significant statistical differences between pre, post and follow up tests regarding infant sleep pattern. 90 and 100 % have good sleep pattern in post and follow up tests respectively.

Table 6 indicates infants' sleep pattern from caregivers' pre, post and follow up the intervention. This table indicates high percentage rate of caregivers were agree about all items that indicate noticeable improvement in their infants' sleep pattern in post and follow up test respectively.

Fig. 3 indicates correlation between parent's knowledge about shaking baby syndrome and infants' sleep pattern post intervention: Correlation between parent's knowledge about shaking baby syndrome and infant sleep pattern post intervention. This table clarifies that, a positive correlation was found between parent's knowledge about shaking baby syndrome and their infants' sleep pattern where r equals 0.281.

Fig. 4 shows correlation between parent's perception of shaking baby syndrome and infant sleep pattern post intervention: Correlation between caregivers' perception of shaking baby syndrome and infant sleep pattern post intervention: This table clarifies that, positive correlation was found between caregivers' perception of shaking baby syndrome and their infants' sleep pattern where r equals 0.946.

Fig. 5 reveals effect size of shaken baby syndrome program. This figure indicates that, the SBS awareness program was highly effective in improving caregivers' knowledge about purple crying and health hazards of SBS where Cohen's D were (8.63 & 8.25) respectively. In addition, there was large effect size of the program on parent perception of purple crying, health hazards of SBS and their infant sleep pattern where Cohen's D was (9.10 & 9.23) respectively.

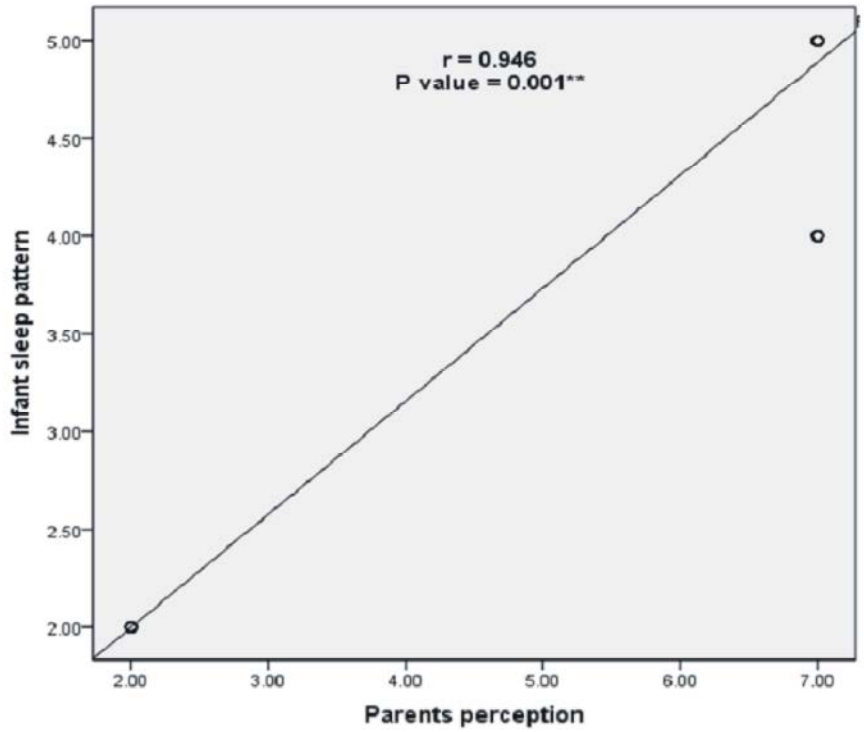


Fig. 3: Correlation between parent's perception of shaking baby syndrome and infant sleep pattern post intervention

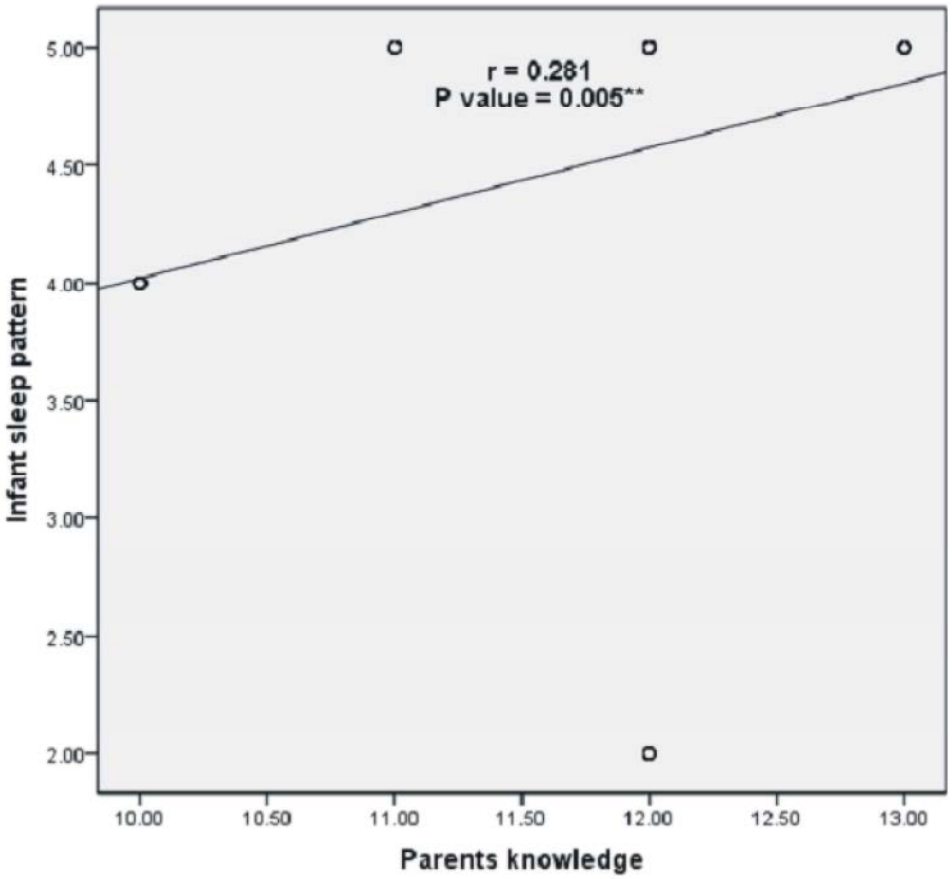


Fig. 4: Correlation between parent's knowledge about shaking baby syndrome and infant sleep pattern post intervention

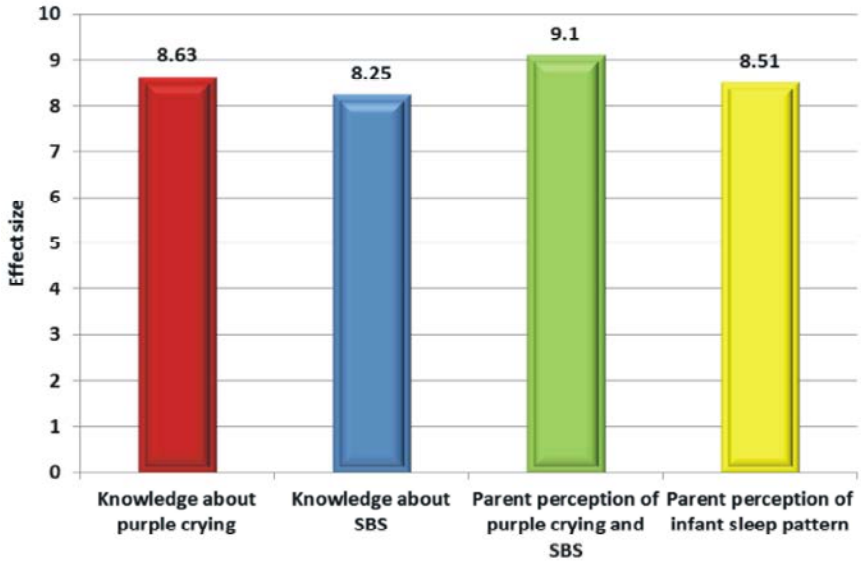


Fig. 5: Effect size of the program:
Cohen's D for knowledge about purple crying = 8.63 (large effect)
Cohen's D for knowledge about SBS = 8.25 (large effect)
Cohen's D for perception of purple crying and SBS = 9.10 (large effect)
Cohen's D for perception of infant sleep pattern = 9.23 (large effect)

## DISCUSSION

Abusive head trauma is 100% preventable. A key aspect of prevention is increasing awareness of the potential dangers of shaking. Finding ways to alleviate the parent or caregiver's stress at the critical moments when a baby is crying can significantly reduce the risk to the child. Some hospital-based programs have helped new parents identify and prevent shaking injuries and understand how to respond when infants cry [19]. Meanwhile, there is an intense need for respective nursing initiatives for early prevention and health promotion of such fragile infants. The current study adopted a nursing initiative focusing on these prevention tips for parents: (a)-Never shake a baby. (b) Never slap or hit a baby of any age on the face or head. (c)-Learn about normal child development and behaviors so that your expectations are realistic. (d)-Learn stress relief and other healthy coping strategies. (e)-Screen your potential child care providers to find out their child care skills and abilities. (f)-Take a break when you are feeling overwhelmed [20].

For this reason, the present study aims to assess the effect of an awareness nursing initiative concerning shaken baby syndrome on parent's perception and infants' sleep pattern. The result of the current study covered five main areas as follows; *firstly*, socio-demographic characteristic of studied parents and their infants. *Secondly*, distribution of parents' knowledge about purple crying *thirdly*, distribution of parents' knowledge about shaking baby syndrome. *Fourthly*, likert scale of infants' sleep pattern from parent's perspectives. *Lastly,* likert scale about parent's perception of purple crying and shaken baby syndrome.

In relation to characters of studied caregivers, all care givers were educated. 64.0% of studied caregivers were mothers who provide care to their infants. These results were consistent with Lena & Paut [21]. Who studied A population-based study of inflicted traumatic brain injury in young children and found that, 93% of the caregivers were educated and all of the were mothers. Regarding characteristics of studied infants, the present study revealed that 86.0% of the studied infants were 37 - 40 weeks of gestation. 98.0 % were neonates compared with 2.0 % were infants. 38% were the third child regarding their birth order. These results are consistent with Taser *et al.* [22]. Who studied "Shaken Baby Syndrome Prevention Program: A Pilot Study in Turkey".

According distribution of parent knowledge about shaken baby syndrome pre, post and follow up intervention the present study revealed that, there was better improvement in caregivers' knowledge regarding shaken baby syndrome in posttest and follow up test respectively. This finding was supported by Bonnier [23]. who found that the total points measuring the levels of knowledge of shaking hazards changed from an average of $5.0 \pm 2.2$ pre-intervention to $6.4 \pm 1.7$ post-intervention ($p = 0.001$). There was no statistically significant difference between the groups in the pre-test score, whereas in the post-test score group one was significantly lower than the other groups ($p = 0.001$).

Consistently, Evans. [24]. who studied "What child welfare attorneys need to know about shaken baby syndrome" concluded that the training using the SBS Preventive Program was very useful for mothers; their level of knowledge about the dangers of shaking increased. Judson [25]. Added that the education for shaking baby syndrome is recommended to be given before the 2-4th month during which the frequency of crying is increased. It is important that education given in the early period is permanent until the period during which the frequency of crying is increased.

Concerning distribution of parent knowledge about purple crying pre , post and follow up the intervention, the current study represented that high percentage of caregivers had significant improvement in their knowledge in posttest and follow up test respectively. This result comes in agreement with Ornstein [26] who studied "The impact of an educational intervention on knowledge about infant crying and abusive head trauma" who found that Knowledge about infant crying increased significantly after program delivery ($P = 0.001$). Low baseline crying knowledge was a significant predictor of increased knowledge about infant crying ($P \leq 0.01$). Also, Dodds, [27]. Found that, an educational program for new parents appears to be warranted, especially with respect to improving knowledge about infant crying. This may have a positive benefit in prevention of many complications in early ages.

Regarding parents' perception about purple crying and SBS; the present study showed that highly significant statistical difference was found between pretest, posttest and follow up test respectively. 86.0 & 95% of caregivers had better perception of the importance of SBS intervention methods. In addition, 90% & 100% of them decided to could never shake their infants again. This finding is similar to Baykan, [28] who mentioned that the awareness campaigns should be aimed at informing the public of the dangers of shaking an infant. And with regards to Shaken Baby Syndrome an increased focus on evidence-based medicine is necessary to dissipate the uncertainty around the condition.

Scavarda, [29] Come in agreement with the previous results and mentioned that, informing the parents about neurodevelopmental characteristic and crying pattern of a baby and appropriate soothing technique when the baby cries is important from during the neonatal period, especially for angry mothers and less educated ones. Foley, [30] added that caring for young infants can be stressful. Non-accidental brain or head injury (shaken baby syndrome) is a result of parental stress and a lack of knowledge of how to respond to a crying infant and the dangers of shaking a child.

In the same line, Burger [31] found that the PURPLE education materials seem to lead to higher scores in perception about early infant crying and the dangers of shaking and in sharing of information behaviors considered to be important for the prevention of shaking.

In relation to distribution of Infants' sleep pattern from Parent's perspectives pre, post and follow up the intervention. the present study revealed that the high percentage of Parent's 100 % were agree about infant cry less, infant calm faster, infant sooth easily, infant sleep quickly & infant sleep better and long these previous criteria indicate noticeable improvement in their infants' sleep pattern in post and follow up test respectively.

This finding was supported by Smarius [32] who finding that no significant differences between the groups in the amount of fuss/crying, which gradually reduced during the 12 weeks. At 12 weeks of age, more mothers in the behavioral group reported their babies to have had seven interruption-free nights (61%), compared with the educational (53%) and the control groups (50%). This was significant at the $P < 0.05$ level. The educational and control groups did not significantly differ at any age. At 6 and 12 weeks, mothers allocated to the behavioral policy were more structured in their approach to parenting and rated it more highly for convenience. At 9 months, their babies were more likely to have a regular bedtime routine. Where mothers followed a behavioral program, 10% more babies slept for a minimum of 5 hours at night without disturbing their parents at 12 weeks of age. This improved sleeping pattern persisted up to 9 months of age. Mothers in this group also reported a greater feeling of control and increased confidence in their ability to cope. Consistently and based on the researcher opinion, increasing parents awareness about good handling techniques and danger of SBS. Which supplemented by proper parental intervention, it is an effective tool in eliminating bedtime crying as well as the disruptive sleeping pattern of the infant.

Regarding, Correlation between caregivers' knowledge and perception of shaking baby syndrome and infant sleep pattern post intervention. The present study clarifies that, positive correlation was found between caregivers' knowledge and their perception of shaking baby syndrome and their infants' sleep pattern where r equals 0.946. This finding was consistent with Gillham, [33] who concluded that the Period of PURPLE crying program is useful and effective in teaching mothers about normal infant crying, the dangers of shaking an infant, soothing/coping techniques and how to improve sleep pattern of their infants. So, The value of an international collaboration in projects focusing on preventing child maltreatment is importantly need required.

Regarding effect size of shaken baby syndrome intervention program. The current study revealed that the SBS awareness program was highly effective in improving caregivers' knowledge about purple crying and health hazards of SBS where Cohen's D were (8.63 & 8.25) respectively. In addition, there was large effect size of the program on parent perception of purple crying, health hazards of SBS and their infant sleep pattern where Cohen's D was (9.10 & 9.23) respectively. This finding comes in agreement with Besides *et al*. [34] who concluded that following the education program, the mothers were asked about the effect of the SBS program in a number of 545 mothers. 495 (90.8%) stated that the SBS program was useful. Although the behaviors were significantly increased (improved) after training ($p < 0.05$).

Barant *et al*. [35] mentioned that the knowledge about infant crying increased significantly after program delivery ($P = 0.001$). Low baseline crying knowledge was a significant predictor of increased knowledge about infant crying ($P \leq 0.01$). There was an insignificant decrease in shaking knowledge ($P = 0.5$), which may have been the consequence of high baseline knowledge. Babies can cry a lot in the first few months of life and this can be frustrating. But it will get better. Finally and based on the results of the present study nursing initiative had a highly significant better effect on parent's perception and infants' sleep pattern.

## CONCLUSIONS

It was concluded that, implementation of an awareness nursing initiative about shaken baby syndrome had a highly significant effect on parent's perception and infants' sleep pattern.

## RECOMMENDATION

- Nursing initiatives awareness concerning Shaken baby syndrome should be importantly reinforced during infancy period at each well baby visit to the Motherhood and Childhood Health Center to enhance children safety and wellbeing.
- To prevent potential SBS health problems, parents and caregivers need to learn how to respond to their own stress.
- Developmental assessments can assist in improving education outcomes as well as the overall well-being of the child
- Further studies are needed to determine whether other caregivers such as fathers, nurses, or grandparents could provide similar benefits.

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