



ASSESSMENT OF NURSES' PERFORMANCE REGARDING INFANT SLEEP POSITION ON SUDDEN INFANT DEATH SYNDROME AT NEONATAL INTENSIVE CARE UNITS

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ABSTRACT: *Background:* Sudden infant death syndrome (SIDS) is the sudden unexplained death of an infant during sleep. It is the most common cause of post neonatal mortality. *Aim:* This study aimed to assess nurses' performance regarding infant sleep position on sudden infant death syndrome at Neonatal Intensive Care Units (NICUs). *Design:* A descriptive research design was used to conduct this study. *Settings:* This study was carried out at NICUs in Helwan General Hospital affiliated to Ministry of health and Mustafa Hassan Pediatric Hospital affiliated to Fayoum University Hospitals. *Sample:* A convenience sample of seventy nurses who providing care for preterm and low birth weight infants admitted to NICUs in the previous mentioned settings. *Tools:* Two tools were used for data collection; 1st tool: A structured interview questionnaire sheet consists of two parts: Part (1) to assess characteristics of studied sample, Part (2) to assess nurses' knowledge regarding infant sleep position on SIDS, 2nd tool: Observational checklist to assess nurses' practice regarding infant sleep position on SIDS. *Results:* The mean age of studied nurses was 25.47±4.26 years and the mean gestational age of infants was 32.43±2.71 weeks, 55.7% of the studied nurses had unsatisfactory level of knowledge regarding infant sleep position on SIDS. Also, the study proved that, 58.6% of studied nurses had incompetent level of practice regarding infant sleep positions at NICUs. *Conclusion:* It can be concluded that, more than half of the studied nurses had unsatisfactory total level of knowledge regarding infant sleep position on SIDS and more than half of them had incompetent practice. Additionally, there were statistically significant differences between nurses' total level of knowledge and their characteristics namely educational qualifications ($P = 0.033$) and attendance of previous educational courses about the infant sleeping position at the NICUs ($P = 0.005$), while there were highly statistically significant differences between nurses' total level of practice and their years of experience at NICUs ($P < 0.001$). *Recommendations:* Continuous training program for nurses to improve their performance regarding infant sleep position on sudden infant death syndrome.

KEYWORDS: Nurses' Performance, Sleep Position, Sudden Infant Death Syndrome.



INTRODUCTION

Sudden infant death syndrome (SIDS), known as cot death or crib death, is the sudden unexplained death of an infant less than one year of age. It usually occurs during sleep and is more common in boys than girls. Also, sudden infant death syndrome is oftentimes referred to as a “diagnosis of exclusion” because it is determined only after ruling out other causes of death, including suffocation, infection, or other illnesses (Newberry, 2019).

Sudden infant death syndrome is a complex and multifactorial disorder which its cause is still not fully understood. However, no specific cause of SIDS has been found, but a clear relationship has been established between both infant positioning and sleep environment and risk of SIDS. Although it's not likely to predict who infant will die from SIDS, the risk of an occurrence is increased by certain factors, such as premature birth, low birth weight, prone sleeping, male gender and exposure to tobacco smoke (*American Academy of Pediatrics (AAP), 2016, Stremler & Wolfson, 2017 & Kinney et al., 2018*).

Preterm delivery and low birth weight are characteristics associated with sudden infant death syndrome. Preterm infants or infants who are low birth weight are at increased risk for SIDS and risk increases with decreasing gestational age or birth weight. Furthermore, the risk increased when prematurely born infants slept prone so the prone sleeping has been shown to hold for infants of low birth weight as well as for those born with a normal birth weight (Malloy, 2019).

However, some of these factors, such as premature birth or low birth weight, cannot be changed but other environmental factors can be modified to prevent SIDS, which includes sleeping position, sleeping environment, and infants' care. So, the American Academy of Pediatrics (AAP) has improved suggestions for SIDS prevention and addressed Safe Sleep Practice (SSP) at Neonatal Intensive Care Units (NICUs). The health care provider's adherence to apply SSP guidelines is very important care to prevent SIDS (De Luca et al., 2017).

According to the Centers for Disease Control and Prevention (CDC), the incidence of SIDS in 2017 was 35.4 per 100,000 live births in the United States. In 2018, there were about 1,300 deaths due to SIDS, about 1,300 deaths due to unknown causes, and about 800 deaths due to accidental suffocation and strangulation in bed (Roehler, Batra & Quinlan, 2019 & Hauck, Carlin, Moon & Hunt, 2020).

The recommendations of American Academy of Pediatrics (AAP) include supine positioning, use of a firm sleep surface, breastfeeding, room-sharing without bed sharing, routine immunization, a pacifier use during bed time, and avoidance of soft bedding, overheating, and exposure to tobacco smoking and alcohol. Parents' adherence to these recommendations depends on their knowledge and beliefs about SIDS that guided and modeled by nurses at NICUs before discharge (Randall, Thompson & Wilson, 2019 & Blix, 2020).

Consequently, neonatal nurses are the primary caregivers in the NICUs; they are in a key position to influence the environment of the developing neonate. Therefore, nurses must have the knowledge and professional practice to sleep the infants safely to minimize the risk of sudden infant death syndrome and sleeping accidents. Furthermore, the way an infant is positioned for sleep in the hospital has been shown to strongly influence parental practice at home. So, neonatal nurses are in a unique position to shape the right role and train caregivers



on SIDS prevention and advising how to sleep the infants safely. However, it is crucial to design effective training programs for all staff nurse at NICU to improve infant and family outcomes (Mason, Ahlers-Schmidt & Schunn, 2018).

Significance of the study:

Sudden infant death syndrome continues to be the leading cause of death in infants aged 1 to 12 months and is, therefore, still a significant concern. As that, rates of SIDS vary nearly tenfold in developed countries from one in a thousand to a thousand in ten thousand. In the USA, SIDS is the third leading cause of infant death. Worldwide, there were about 1,600 deaths due to SIDS (43%), 1,200 deaths due to unknown causes (32%), and about 900 deaths due to accidental suffocation and strangulation in bed (25%) (*The Centers for Disease Control and Prevention (CDC), 2018*). Furthermore, in Egypt, there were inadequately recorded statistics about incidences of infants' deaths which is due to unknown causes (World Health organization, 2020). Therefore, from the researcher point of view it is important to shed the light on nurses' performance regarding infant sleep position on sudden infant death syndrome at neonatal intensive care units.

Aim of the study:

The aim of this study was to assess nurses' performance regarding infant sleep position on sudden infant death syndrome at neonatal intensive care units.

Research questions:

The research answered the following questions:

- 1- What are nurses' level of performance regarding infant sleep position on sudden infant death syndrome at neonatal intensive care units?
- 2- Is there a relationship between nurses' performance regarding infant sleep position on sudden infant death syndrome and their characteristics?

Operational definition:

Nurses' performance means: Nurses' knowledge and practice.

Sample and Methods:

Design:

A descriptive research design was used to conduct this study.

Setting:

The study was carried out at Neonatal Intensive Care Units (NICUs) in Helwan General Hospital affiliated to Ministry of health and Mustafa Hassan Pediatric Hospital affiliated to Fayoum University Hospitals. Neonatal intensive care units in the previous mentioned settings were consisted of 71 incubators (53 in Helwan General Hospital & 18 in Mustafa Hassan Pediatric Hospital) and equipped with highly specialized apparatuses for the care of newborn infants who are preterm, critically ill or have other conditions requiring special care.



Subjects:

A convenience sample technique was used with a total number of seventy nurses who providing care for preterm and low birth weight infants admitted to NICUs in the previous mentioned settings within a period of six months from both sex and excluded infants who have any other disorders that may cause SIDS as congenital malformation, progressive respiratory failure and severe cardiovascular instability.

Research tools:

The data collected through using the following tools:

Tool (I): Structured interviewing questionnaire sheet:

It was designed by the researcher in simple Arabic language, after reviewing the related literature and references **Bullock et al., (2004)**, **American Academy of Pediatrics (AAP), (2016)** & **Aris et al., (2019)** and after reviewing from the researcher supervisors to assess nurses' knowledge regarding infant sleep position on sudden infant death syndrome (SIDS). It included 2 parts as the follows:

Part (I): it was including data about:

A. Characteristics of studied nurses include: age, gender, marital status, educational qualifications, current job, years of experience at NICUs and attendance of educational courses about infant sleeping position at NICUs.

B. Characteristics of studied premature infants include: age, gender, gestational age, birth weight, diagnosis on admission to NICU and length of stay at NICU.

Part (II): Nurses' knowledge regarding infant sleep position on SIDS at NICUs. It consisted of 28 multiple choice questions; 8 questions concerned with nurses' knowledge regarding SIDS, 3 questions concerned with nurses' knowledge regarding the recommendations of the American Academy of Pediatrics (AAP) regarding infant sleeping position & 17 questions concerned with nurses' knowledge regarding the sleep position of the premature infant on SIDS at neonatal intensive care units, which one response will be correct and there will be some questions have more than one correct answer.

Scoring system:

Knowledge of nurses was scored and calculated according to their answers, it was evaluated using the models answers sheet that was prepared by the researcher, each question had a score ranged 0-2 grades, whereas correct and complete answer had score 2 grades, correct but uncompleted answer had score 1 grade and score zero was for an incorrect or unknown answer. The total score was 56 grades (equal 100%). Studied nurse's answers were categorized into:

- Satisfactory ($\geq 75\%$).
- Unsatisfactory ($< 75\%$).



Tool (II): Observational Checklist:

It was adopted from **Coughlin et al, (2010) & Montrose et al, (2002)** to assess nurses' practice regarding infant sleep position on SIDS at NICUs as regards; supine position, prone position and side-lying (Lateral) position. Supine position checklist consists of 12 steps, prone position checklist consists of 9 steps and side-lying position checklist consists of 10 steps.

Scoring system:

Nurses' practice regarding infant sleep positions was scored and calculated according to their answers, each complete and accurate response was scored "one" and those done incorrectly or not done were scored "zero". The total score of nurses' practice was 31 scores (equal 100%) and categorized into:

- Competent ($\geq 85\%$).
- Incompetent ($< 85\%$).

Content validity and reliability:

Tool Validity:

The content validity of the tool was reviewed by 3 experts from faculty of Nursing - Helwan University and Ain-shams university (2 experts specialized in pediatrics health nursing and one expert in community health nursing to test the content validity of the tools for clarity, relevance, comprehensiveness, understanding and applicability. Minor modifications of the tools were done according to the expert's comments on clarity of sentences, appropriateness of content and sequences of items.

Tool Reliability:

Reliability of the tools was tested by using Cronbach's Alpha for testing internal consistency of the tools. The reliability was 0.856 for nurses' knowledge questionnaire sheet, 0.827 for nurses' practice and 0.85 for the all tool.

Pilot study:

A pilot study was carried out on 10% of the total study sample two months before data collection based on sample criteria to test the clarity, applicability and understand ability of the tool. little modification was done as replacing and arrangements of some items. The involved nurses of the pilot study were excluded later from the main study sample.

Field work:

The actual field work was carried out for data collection over 6 months started from (April 2021 years) till ended off (September2021years). The researcher was available two days/week by the rotation in the previously mentioned study settings during the morning shifts from 9 am to 12 pm, the purpose of the study was explained by the researcher to each nurse providing care for preterm and low birth weight infants at NICUs before data collection in addition to clear and brief idea about aim of the study and its expectation. The average time needed for completion of each questionnaire sheet was approximately 45 minutes, the



investigator taken 3 nurses each week consisting about 12 nurses per month, total number of nurses equals 70 nurses.

Ethical consideration:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee. Participation in the study was voluntary and subjects were given complete full information about the study and their role before signing the informed consent and they had the right to refuse to participate. The ethical considerations included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it was not accessed by any other party without taking permission of the participants. Ethics, values, culture and beliefs was respected.

Statistical Analysis:

Upon completion of data collection, data was organized, categorized, tabulated, entered and analyzed using Statistical Package for the Social Science (SPSS), IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. Statistical presentation and analysis of the present study was conducted, using the mean, standard deviation (SD), chi-square test (X^2) was used to compare between groups in qualitative and linear correlation coefficient was used for detection of correlation between two quantitative variables in one group. Statistical significance was considered at (P-value <0.05), P value >0.05 mean Non significant, while P value <0.001 mean High significant.

RESULTS

Table 1: Numbers and percentage distribution of the studied nurses according to their characteristics (n=70)

Nurses characteristics	Total number= 70 (100%)	
	No	%
Age in years		
< 30	65	92.8
30 - <40	4	5.8
40 - <50	1	1.4
X ± SD	25.47± 4.26	
Gender		
Female	65	92.9
Male	5	7.1
Educational qualifications		
Diploma in Nursing	6	8.6
Technical nursing institute	57	81.4
Bachelor of Nursing sciences	7	10.0
Years of experience in NICUs		
< 5	53	75.7
5 - <10	11	15.7
10 - <15	2	2.9
≥15	4	5.7



X± SD	8.26 ± 5.3	
Attendance of previous educational courses about infant sleeping position at NICUs		
Yes	16	22.9
No	54	77.1

Table (1): Regarding the studied nurses' characteristics this Table (1) shows that, the majority (92.8%) of the studied nurses aged less than 30 years, with Mean \pm SD was 25.47 ± 4.26 years and 92.9% of them were females. As regarding to educational qualifications more than three quarters (81.4%) of them had technical institute of nursing. Also this table shows that, more than two third of the studied nurses (75.7 %) had years of experience less than 5 years, with Mean \pm SD was 8.26 ± 5.3 years. It is also indicated from the same table that, more than two third (77.1%) of them did not attend any previous educational courses about infant sleeping position at NICUs.

Table 2: Numbers and percentage distribution of the studied premature infants according to their characteristics (n=70)

Infant characteristics	Total number = 70 (100%)	
	No	%
Infant age(days)		
<5	19	27.1
5- <15	28	40.1
15- <25	11	15.7
≥ 25	12	17.1
X±SD	13.00 ±12.76	
Gender		
Male	44	62.9
Female	26	37.1
Birth weight (Grams)		
1000-<2000	13	18.6
2000-<3000	43	61.4
≥ 3000	14	20.0
X ± SD	2.06±0.56	
Gestational age (weeks)		
< 30	10	14.3
30-<32	20	28.6
32 -< 34	26	37.1
34- ≤ 36	14	20.0
X ± SD	32.43±2.71	

Infant diagnosis on admission to NICU		
Jaundice	5	7.1
Respiratory distress syndrome	52	74.3
Preterm birth	2	2.9
Renal failure	1	1.4
Severe dehydration	2	2.9
Transient tachypnea of neonates	4	5.7
Low birth weight	2	2.9
Intestinal obstruction	2	2.8

Table (2): shows that, less than half (40.1%) of the studied premature infants aged between 5- <15 days, with Mean \pm SD was 13.00 ± 12.76 days. Regarding their gender more than half (62.9%) of them were males. Also this table shows that, more than half (61.4%) of infants' weight at birth ranged between 2000- <3000 grams, with Mean \pm SD was 2.06 ± 0.56 grams. Also, as clarified from this table, the mean gestational age of the studied infants was 32.43 ± 2.71 weeks. As regarding the studied infants' diagnosis on admission to NICU, slightly less than three quarter (74.3%) of the studied infants' diagnosis was respiratory distress syndrome.

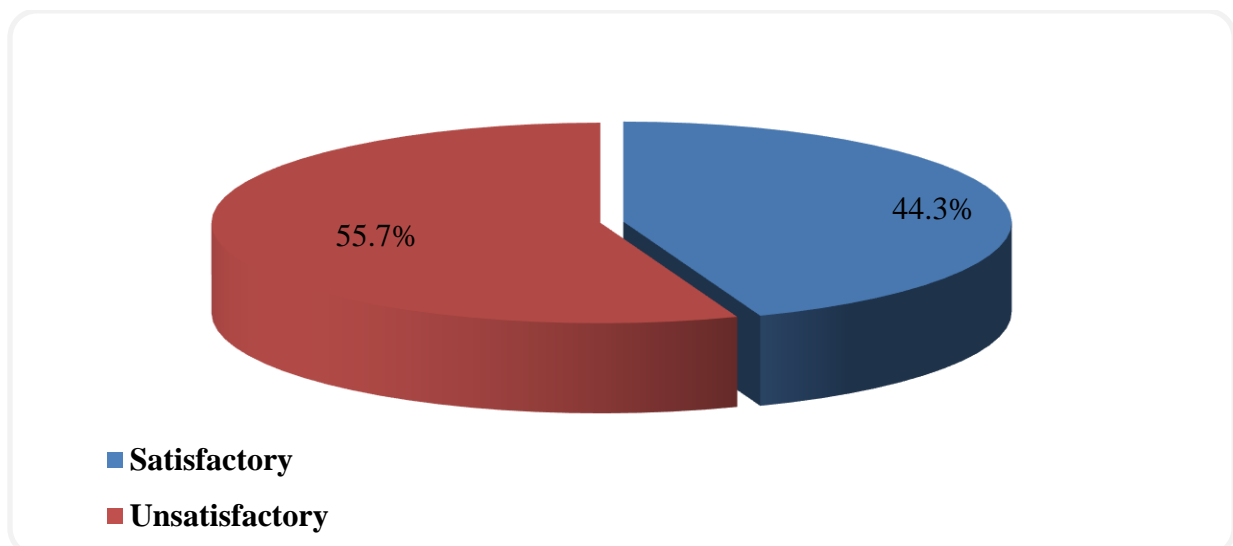


Figure 1: Percentage distribution of the studied nurses according to their total knowledge regarding infant sleep position on SIDS (n= 70)

Figure (1): reveals that, more than half (55.7%) of the studied nurses had unsatisfactory total level of knowledge regarding infant sleep position on SIDS, while 44.3% of them had satisfactory total level of knowledge.

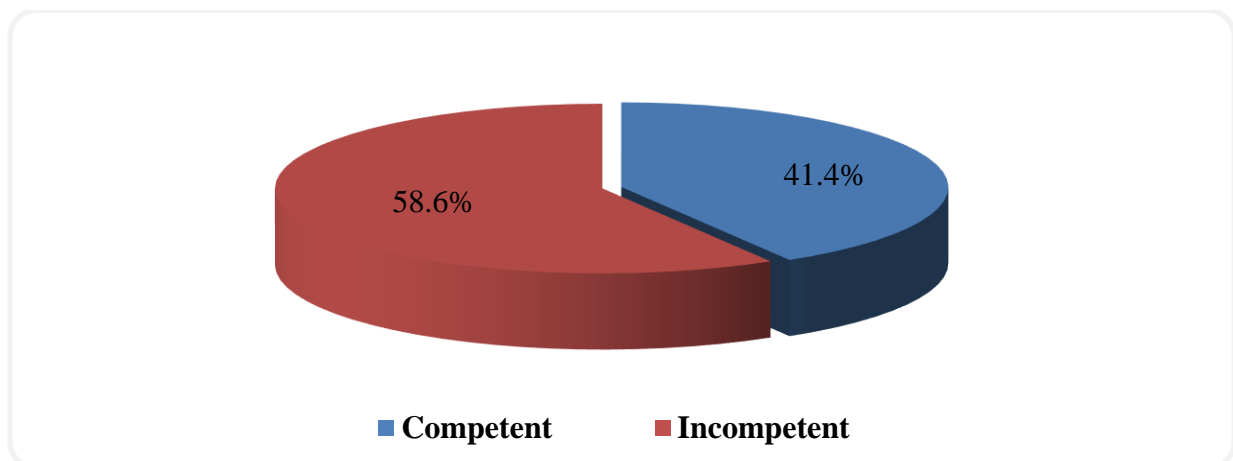


Figure (2): Percentage distribution of the studied nurses' total level of practice regarding infant sleep position at NICUs (n=70)

Figure (2): shows that, more than half (58.6%) of the studied nurses had incompetent total level of practice regarding infant sleep position at NICUs, while 41.4% of them were competent.

Table 3: Correlation between the studied nurses' total level of knowledge and total practice (n=70)

	Total Knowledge	
	R	P-value
Total Practice	0.786	<0.001**

Table (3): shows positive statistically significant correlation between nurses' total level of knowledge and total practice when $r= 0.786$ with $p\text{-value} <0.001^{**}$.

DISCUSSION

Regarding the characteristics of the studied nurses, the results of the present study show that the majority of the studied nurses aged less than 30 years, with mean \pm SD was 25.47 ± 4.26 years. These findings are similar to the findings of *Elwasefy et al., (2019)*, who carried out a study entitled "Effect of preventive updating guidelines on improving nurses' knowledge and practice toward sudden infant death syndrome in neonatal intensive care unit in Mansoura University, Egypt." and found that, the majority of the studied nurses were between 20-30 years old. This may be due to the majority of nurses are newly work at NICU. Meanwhile,



these findings were contradicted with the findings of *Efe et al., (2018)* who studied “Nurses and pediatricians' knowledge about infant sleeping positions and the risk of sudden infant death syndrome.” and found that more than half of the nurses were in age group between 21 and 35 years old.

As regards nurses' gender, the results of the current study illustrated the majority of the studied nurses were females. This finding is consistent with *Hodges et al., (2018)* who studied “Certified nurse-midwives' knowledge, attitudes, and behaviors about infant safe sleep in Columbus, Ohio.” and reported that the majority of NICU nurses were female.

On studying nurses' educational qualifications, it was observed in the present study that, more than three quarters of nurses had technical institute of nursing and the minority of them had diploma in nursing and bachelor of nursing sciences. This may be due to the fact that technical nursing institutes provided the community with large number of graduates than other agencies such as faculties of nursing. These findings were contradicted with the findings of *Abd Elrazek & Ahmed, (2020)* who conducted a study about “Nurses' adherence to safe sleep position recommendation for preterm and term neonate in Menoufia University, Egypt.” and found that near half of nurses had a diploma degree. Meanwhile, this result disagreed with *Yildiz, (2021)* who studied “What do the midwives and nurses know about safe sleep in Turkey.” and revealed that, more than half of nurses had a bachelor's degree.

As regards years of experience of the studied nurses, the current study showed that, more than two third of the studied nurses had years of experience at NICUs less than 5 years, where Mean \pm SD was 8.26 ± 5.3 years. This finding was in agreement with the finding of *Essa & Atta (2019)*, who studied “Infant sleep position and risk for sudden infant death syndrome: knowledge and practice of health professionals and care givers in Alexandria University, Egypt.” and found that, the majority of studied nurses had experience at NICUs less than five years. These findings were contradicted with *Abd Elrazek & Ahmed, (2020)* who found that, the majority of nurses had less than 2 years of experience.

Regarding the nurses' attendance of previous educational courses about infant sleeping position at NICUs, it was found that more than two third of them did not attend any previous educational courses about infant sleeping position and SIDS at NICUs. The finding of the present study were similar to the findings of *De Luca et al., (2017)* who conducted a study entitled “Pediatricians' Practice about Sudden Infant Death Syndrome in Catalonia, Spain.” and found that, the majority of the studied nurses had insufficient training about SIDS. These finding shed the light about importance of regular trainings and educational courses, so as to ensure that healthcare personnel deliver the latest evidence-based care especially among the junior staff nurses. Meanwhile, these results were contrast to the findings of *Cho et al., (2020)* who studied “Knowledge on sudden unexplained infant death-related safe sleep practices and infant cardio-pulmonary resuscitation in pediatric nurses in Korea.” and reported that, more than half of the nurses had received education on SUID prevention.

As regard characteristics of the studied premature infants, the results of the current study showed that, more than half of studied infants were males. This confirmed a scientific review about higher incidence of SIDS in males than females could be due to the greater biological vulnerability of male infants than females as the males are at greater risk of prematurity which is the main risk factor of SIDS. This finding was in the same line with that of *Mohamed et al., (2021)* who found in her study about “Assessment of mothers' knowledge



and practices about the prevention of sudden infant death syndrome in Egypt.” and reported that more than half of infants were males. Meanwhile, this finding was disagreed with *Miladinia et al., (2019)* who studied “Sudden infant death syndrome: risk factors and the relationship between them in Ahvaz, Iran.” and noted that, more than half of the infants were female.

Regarding to the birth weight of the studied premature infants, the present study revealed that, more than half of infant' weight at birth ranged between 2000-<3000 grams with mean birth weight 2.06 ± 0.56 grams. This result was in agreement with the study of *Gamal El-deen et al., (2021)* who carried out a study about “Effect of educational intervention based on health belief model for mothers about prevention of sudden infant death syndrome in Tanta, Egypt.” and found that more than half of the studied infants' weight at birth was from 2 to less than 3 kg with mean birth weight 3.01 ± 0.493 . As regards infants' gestational age, the present study revealed that infants' mean gestational age was 32.43 ± 2.71 weeks and ranged between 32- < 34 weeks. These findings were inconsistent with the findings of *Rohana et al., (2018)* who studied “Sudden infant death syndrome: Knowledge and practice in parents of preterm infants in Malaysia.” and found that, infants' gestational age ranged between 32 to 35 weeks. According to *Malloy & Hoffman, 2018* who studied “Prematurity, sudden infant death syndrome and age of death.” and reported that preterm infants or infants who are low birth weight are at increased risk for SIDS compared with term born infants and risk increases with decreasing gestational age or birth weight.

On investigating total nurses' level of knowledge regarding infant sleep position on SIDS, the present study illustrated that, more than half of nurses had unsatisfactory knowledge. These results answered the research question of the study and this may be attributed to that, the majority of the study nurses didn't attended any educational program or workshops about SIDS due to lack of feedback and motivation of nurses to update their knowledge. These results was confirmed by *Price et al., (2018)* who studied “Changing hospital newborn nursery practice: results from a statewide “Back to Sleep” nurses training program.” and proved that, more than half of the studied nurses showed poor level of knowledge about SIDS and up-dated recommendations about SIDS prevention. On the contrary, *Yildiz, (2021)* found that, more than three quarters of the nurses had good knowledge about SIDS and safe sleeping environment.

In the current study, it was observed that, more than half of the studied nurses had incompetent total level of practice regarding infant sleep position at NICUs. These results answered the research question of the study and this may be due to lack of training program about proper positioning at NICUs and AAP recommendations regarding the infant sleep position. These findings were consistent with the result of a study carried out by *Elwasefy et al., (2019)* who reported that, more than half of nurses showed unsatisfactory practice and did not place infants in correct position. On the other hand, these findings were contradicted with the result of a study carried out by *Helaly, (2020)* who studied "Assessment of neonatal nurse' knowledge and practice about sudden infant death syndrome risk reduction in Alexandria University, Egypt." and reported that, more than three quarters of the studied nurses had competent safety sleep practice about prevention of SIDS.

In relation to nurses' total knowledge and total practice, the current study results showed positive statistically significant correlation between nurses' total level of knowledge and total practice when $r = 0.786$ with p-value < 0.001 . This finding was in the same line with the



finding of the study conducted by *Bono-Neri, (2021)* who found that, there were statistically significant strong positive correlation between total nurses' knowledge and their practice. On the other hand, the study findings was disagreed with the finding of *Helaly, (2020)* who found that, there were moderate statistical significance correlation between total nurses' knowledge scores with their practice scores.

CONCLUSION

Based upon the results of the current study, it can be concluded that more than half of the studied nurses had unsatisfactory total level of knowledge regarding infant sleep position on sudden infant death syndrome and more than half of them had incompetent practice. Additionally, there were statistically significant differences between nurses' total level of knowledge and their characteristics namely educational qualifications and attendance of previous educational courses, while there were highly statistically significant differences between nurses' total level of practice and their years of experience at NICUs. Also, there were highly statistically significant differences between nurses' total level of knowledge and total practice as regards infant sleep position on SIDS at NICUs.

RECOMMENDATIONS

Based on the previous findings, the following recommendations are suggested:

1. In-service training educational programs are needed to upgrade nurses' knowledge and practice about SIDS and safe sleep recommendations.
2. Standardized checklists for sleep position should be provided to guide the nurses at NICUs regarding the correct infant sleep positions.
3. Providing pamphlets and booklets for nurses at NICUs to get adequate information about up-dated recommendations about SIDS prevention.
4. Further studies should be conducted to improve nurses' knowledge and practice regarding infant sleep position on sudden infant death syndrome.

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