

Effect of Evidence-Based Guidelines for Prevention of Nonsynostotic Plagiocephaly on Nurses and Parents' Knowledge and Occurrence Among Infants

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Abstract

Background: Nonsynostotic Plagiocephaly (NSP) is acquired cranial asymmetry that usually caused by external pressure on infant's skull. **The aims,** of this study were two folds: to evaluate the effect of Evidence-Based guidelines for prevention of nonsynostotic Plagiocephaly on nurses' and parent knowledge and to determine the effect of applying the Evidence-Based Guidelines on the occurrence rate of NSP. **Design,** A quasi experimental design was used in this study. **Setting,** the study was carried out in the following four health care centers in Menoufia Governorate in Egypt (the health center in Barakat Al-Sabaa, the health care unit in Barakat Al-Sabaa, and the health unit in the village of Al-Shaheed Fikry the health unit in the village of Al-Rawda). **Sample,** Convenience sample of 58 nurses and purposive sample of 295 mothers and their infants. **Tools,** three tools were used for data collection tool one: part one ,Nurses' Biosocial Characteristics Questionnaire, part two Nurses 'knowledge assessment Questionnaire. Tool two, the Parents knowledge assessment Questionnaire. Tool three, Part 1: Biosocial characteristics for infants, and Part 2: Cranium assessment scale. **Results,** this study showed improvements in nurses' and parents' knowledge about the prevention of NSP in the study group post-intervention compared to the control group. Therefore, there are high statistical significance differences between pre and post-intervention in the study group at a 1% level of significance. The occurrence of nonsynostotic plagiocephaly among study group was (18.2%) at 4 months, while it decreased at 6 months it reaches (7.3%) after implementing evidence-based guidelines, instead of the control group which the occurrence of NSP reach 27.5% and 22% at 4 and 6 months respectively. **Conclusions,** implementation of evidence-based guidelines regarding prevention of nonsynostotic plagiocephaly significantly increases parents' and nurses' knowledge, also, it decreased the occurrence rate of nonsynostotic plagiocephaly among infant. **Recommendation:** Continuous training of evidence-based guidelines should be established in each maternal and child health care centers to enhance parents adherence to evidence base regarding preventive measure of nonsynostotic plagiocephaly.

Keywords: Evidence based guideline, nonsynostotic plagiocephaly, parent & nurses' knowledge

Introduction

Nonsynostotic plagiocephaly (NSP) is acquired cranial asymmetry. It usually develops from external pressure on the moldable skull of infants, in which the shape of the back of an infant's head becomes altered as the result of external forces applied to the malleable cranium

over a while. It is a common diagnosis encountered by pediatricians in the first year of life (Amanda et al, 2012; Meyer et al., 2013; Watt et al., 2022).

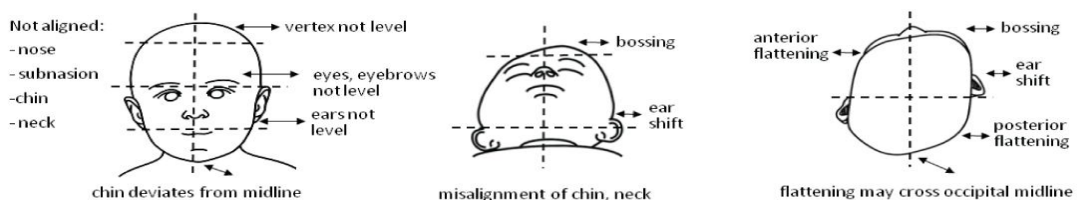
The incidence of NSP is varied according to the age of the population studied and the diagnostic criteria used. A recent study

found an incidence of 22.1 percent among infants (Lennartsson, & Nordin,2019). There is remarkable evidence of an increase in Nonsynostotic Plagiocephaly in recent years. This increase in incidence was usually attributed to parents' compliance with the American Academy of Pediatric recommendations of putting the infant in supine position during sleep for the first year of life to minimize the risk for sudden infant syndrome (Weissler, et al., 2016).

The main three types of NSP as shown in Figures 1 and 2 are Plagiocephaly (skewed occipital flattening), Brachycephaly (symmetric occipital flattening), and combined plagiocephaly/brachycephaly (Van Vlimmeren Et Al., 2007). Delayed detection of this condition is usually associated with neurological problems and may worsen over time (Bialocer kowskie et al,2008). The most common causes of nonsynostotic plagiocephaly were limited head rotation, lower infant's activity levels, torticollis, and supine sleeping position. Other studies suggest that 58% to 97% of new born infants with deformational plagiocephaly had a history of head rotational asymmetry or limited neck function . (Marchac et al, 2011).

Remarkable asymmetric head is often considered less attractive, that and can lead to psycho-social and developmental consequences. Plagiocephaly can expose young children to bullying, teasing, poor self-conception, and some time teacher bias. Also, in severe cases researchers reported major differences between NSP children and normal children in cognition, language, and parent-reported adaptive behavior (Collett et al ,2013). Early diagnosis, treatment, and distinction between synostotic Plagiocephaly and nonsynostotic Plagiocephaly are considered to be the best preventive approach and critical to achieve the best outcomes of deformational Plagiocephaly (Ditthakasem & Kolar 2017).

Figure 1:Plagiocephaly



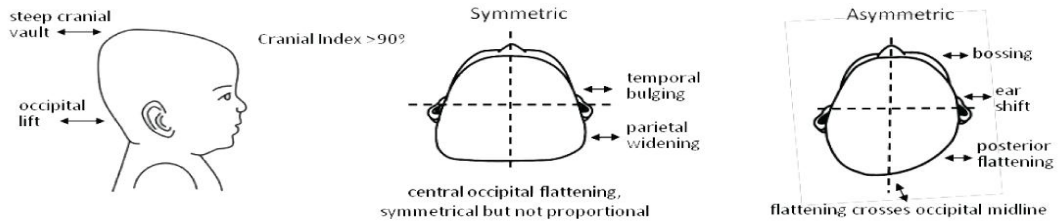
Accurate assessment and diagnostic skills may improve outcomes and decrease cost for families. The primary care providers and nurses should be competent to assess, diagnose , treat and give health education to the parent about this condition (Robinson & Proctor, 2009). The assessment should include using of clinical examination, anthropometric calipers, a molding devices, photography, radiologic imaging, and three dimensional scanning devices (McGarry et al., 2008)

Evidence based guidelines for prevention of nonsynostotic plagiocephaly includes minimizing pressure on the back of the infant's head by alternate the infants' head position (left and right occipital areas) when lying down to sleep and using a soft thick pillow in the first 3 to 4 months and then use soft thick pillow . Additionally, evidence-based guidelines confirm the role of the parent through the advice of positioning the infants' crib in a way that the infants' head turns opposite to the preferred position, placing toys on the side of the head where neck rotation is limited, encouraging head rotation in the non-preferred direction, put the infant on his stomach during play under the parents' supervision and encourage the parents minimize the time that infants spent in car seats (Amanda et al ,2012; Lennartsson et al,2016)

Nurses plays a major role in reducing the severity and prevalence of nonsynostotic Plagiocephaly and improve the infants' cervical range of motion . Pediatric nurse, maternity and community nurses have a responsibility to assess infant head and educate the parents about an evidence-based guidelines for prevention of nonsynostotic deformational Plagiocephaly and ask the parents to apply these guidelines to prevent nonsynostotic deformational Plagiocephaly (Ditthakasem, & Kolar, 2017).

Note: Plagiocephaly, asymmetric head shape, occipitoparietal flattening, ear misalignment. Steinmann, L. C., & Struthers, S. E. (2014). Nonsynostotic Deformational Plagiocephaly: Understand, Screen, and Intervene. Medscape

Figure 2 : Brachycephaly



Note: Brachycephaly: short skull, occiput flattened, widened; Steinmann, L. C., & Struthers, S. E. (2014). Nonsynostotic Deformational Plagiocephaly: Understand, Screen, and Intervene. Medsca

Significance of The Study:

In the last three decades, the incidence of positional cranial deformations in infants has increased. In a prospective cohort study from 2014, the researchers found that 47% of 440 healthy full-term infants 7 to 12 weeks of age in Calgary had NSP (Van Cruchten et al,2021; Mawji et al. ,2013). The best preventable measure for NSP is early recognition, diagnosis, and treatment (Ditthakasem & Kolar 2017). Based on this high prevalence, it's important that nurses understand, apply and teach the parents NSP evidence-based guidelines that can help to prevent its occurrence and decrease the complications.

Definition Of Variable :

Nonsynostotic Plagiocephaly (NSP): Asymmetrical of the skull resulting from external forces on the back of the head, Plagiocephaly, it skewed occipital flattening, (Rogers,2011). in the current study NSP it contains five variables (occipital flattening, a parallelogram head form, one-sided bald spot, head tilt, and side preference). Presence of flattened occipital spot and parallelogram head indicates that the child is having NSP

Evidence Based Guideline: it was adopted from Lennartsson et al., (2016) it consists of instructions the nurses should give to the child's parents on how to minimize the

pressure on the back of the head, it includes Suggestions to reduce pressure on the back of the head, how parents reduce pressure on the asymmetric flattened head, how parents can make tummy time more pleasant for infants, which pillow should be recommended?

The aims of the study were to:

- Evaluate the effect of Evidence-Based Guidelines of nonsynostotic Plagiocephaly prevention on nurses' and parents knowledge
- Determine the effect of Evidence-Based Guidelines of nonsynostotic Plagiocephaly prevention on the occurrence rate among infants

Research hypotheses:

1.Nurses in the study group who received the educational evidence-based guidelines intervention on the prevention of nonsynostotic plagiocephaly will have significant improvement in knowledge than the control group

2.Parents in the study group who received the educational evidence-based guide lines intervention on prevention nonsynostotic plagiocephaly will have significant improvement in knowledge than the control group

3. The occurrence of Nonsynostotic Plagiocephaly among the study group infants will be significantly less than the control group

Methods:

Design

A quasi experimental, nonequivalent groups design was used to test the study hypotheses.

Setting:

This study was conducted at Birket Elsabe City, Menofia Governorate Egypt. This city has four maternal and child health care centers. Two of those centers were chosen randomly to recruit the study group from them (the health center in Barakat Al-Sabaa, and the health unit in the village of Al-Rawda). The control group participants were recruited from the other two centers (the health care unit in Barakat Al-Sabaa, and the health unit in the village of Al-Shaheed Fikry).

Sample size: The actual prevalence of NSP in Egypt is unknown; the probability of its occurrence was estimated to be equal to that of its nonoccurrence ($p=q = 0.5$) and a value of 0.05 was chosen as the acceptable limit of precision (D). Using the following equation: $n = (z^2 \times p \times q) / D^2$, the sample size was estimated to be 295 parents and their infants.

Sample:

A convenience sample of 58 nurses participated in the study. The sample was randomly assigned to intervention (30 nurses) and control (28 nurses). Also, a purposive sample of 295 parents and their infants were randomly assigned to intervention (150 parent-infant pairs) and control (145 parent-infant pairs). The inclusion criteria for infants were age at 2 months, have no dysmorphic features, have no craniosynostosis or congenital Torticollis.

Data Collection Instruments:

The researchers used three instruments/tools to collect the data for this study

Tool I:

Part 1: Nurses Biosocial Characteristics Questionnaire. This questionnaire includes questions about age, gender, educational level, and years of experience of participating nurses.

Part 2: Nurses knowledge Assessment Questionnaire. This questionnaire was adapted from Lennartsson et al (2016) and modified by the researchers to assess nurses' knowledge about evidence-based guidelines for prevention of NSP. The questionnaire contains 11 questions about how to prevent NSP, how to refer to doctor and what to teach parents. Each incorrect response is scored 0, and each correct response is scored 1. The scoring system for the nurses' knowledge is divided to: poor knowledge $\leq 60\%$, fair Knowledge 60-80%, and good knowledge $>80\%$. The reliability of this instrument was done to determine the extent to which items in the questionnaire were related to each other by Cronbachs co-efficiency alpha. It was ($\alpha = 0.87$) which indicates that the instrument was high reliable to meet the objectives of the study. Pearson correlation co-efficiency was used to test the internal consistency ($r=0.02-0.98$) for all items of the questionnaire.

Tool two: Parent knowledge Assessment Questionnaire: This questionnaire was adapted from Lennartsson et al., (2016) and modified by the researchers to assess parents' knowledge about evidence-based guidelines for NSP. The questionnaire contains 18 questions such as (What information have you gotten from your child health nurse, type of information nurse provided, which pillow is appropriate to us, when to remove pillow, why the baby should lay on his/her tummy under surveillance, when he/she is awake, parent opinion about tummy time, infant car seat safety, limit bouncer time for sake of infant's head form). Each incorrect response is scored 0, and each correct response is scored 1. The scoring system for the parents' knowledge is divided to: poor knowledge $\leq 60\%$, fair Knowledge 60-80%, and good knowledge $>80\%$.

The reliability of this instrument was done to determine the extent to which items in the questionnaire were related to each other by Cronbachs co-efficiency alpha. It was ($\alpha = 0.88$) which indicates that the instrument was high reliable to meet the objectives of the study. Pearson correlation co-efficiency was used to

test the internal consistency ($r=0.02-0.98$) for all items of the questionnaire.

Tool three:

Part 1: Infant Biosocial Characteristics Questionnaire. It included questions about the infant's gender, age, weight, type of delivery and ordering

Part 2: Cranium Assessment scale. This scale was adopted from Lennartsson et al. (2011b) and designed to assess the infants' head to detect NSP. It contains five variables: occipital flattening, a parallelogram head form, one-sided bald spot, head tilt, and side preference. Presence of flattened occipital spot and parallelogram head indicates that the child is having NSP, while presence of asymmetric head tilt, bald spot and side preference are considered as high risk factors for NSP. Cronbach's co-efficiency alpha for the questionnaire was (0.97) and Pearson correlation co-efficiency was ($r=0.02-0.98$).

Instruments Validity

Content validity was confirmed by giving all the study instruments to a jury of experts including one professor of pediatric nursing, two assistant professors of pediatric nursing, and two assistant professors in pediatrics. The recommended modifications were done to ascertain their relevance and completeness.

Ethical Consideration

An approval from Faculty of Nursing Institution of Ethical Research Committee, Menoufia University was obtained. In addition, a written informed consent was obtained from the nurses and parents who agreed to participate in the study. An initial interview was conducted with nurses and parents to inform them about the purpose, benefits of the study and to assure them that their participation is voluntarily and they can withdraw from the study at any time without any risk.

Pilot study

A pilot study was conducted on 10% of the nurses and parents (6 nurses and 30 parents

and their infants) to test the applicability of the instruments and to detect any obstacles or concerns that they may have. The pilot study helped the researchers to estimate the time needed to fill in the instruments. The pilot sample was excluded from the total sample in the analysis.

Procedure:

Preparatory Phase.

- Data collection for this study was conducted for a period of 1 year extending from the 1st of July 2021 to the end of July 2022.

- A formal letter was sent from the Dean of the Faculty of Nursing, Menoufia University to the directors of maternal and child health centers in Birket Elsabaa city MCH and Health Care Units informing them about the study objectives and procedures.

- The researcher introduced herself to the nurses who agreed to participate in the study and explained the purpose of the study and methods of data collection.

Implementation Phase:

Intervention group of nurses:

- Tool one which include Nurses Biosocial Characteristics Questionnaire and Nurses knowledge Assessment Questionnaire were given to the intervention group nurses during an interview that lasted for 15-20 minutes.

- Nurses were divided into small groups. Each group consists of 3-5 nurses, and received one educational session for 2 weeks. Each session was 30-45 minutes long.

- The researcher used several teaching strategies during the health education sessions such as group discussions, oral presentations, and booklet. All the sessions were conducted in the nursing room in the previously mentioned settings.

- The first session included information about NSP definition, risk factors, causes and classifications, and methods of assessment infant head (teach nurses how to make infant cranium assessment).

- The second session included description of the evidence-based guidelines, the aim of the guidelines and how to apply them. These guidelines consist of instructions the nurses should give to the child's parents on how

to minimize the pressure on the back of the infant's head by doing the following:

- Change the position of the infant's head each day by rotating the head sleeping position, one day on the left side of the head one day on the right head side.

- Place the infant's head on a soft, thick pillow in the first 3 to 4 months when sleeping on his back.

- The pillow should be placed under both the head and shoulders

- When the infant begins to turn over on his stomach, take the soft, thick pillow away and replace it with a firm flat pillow.

- The infant should be placed stomach-side down several time a day under parental supervision.

- Tummy time should start with short periods and increase the time successively.

- It is important to make tummy time acceptable to the child

- The situations in which the infant cannot hold his or her head upright should be avoided, for example, in an infant chair or swing in an infant, car seat, otherwise, a side preference can quickly develop

Intervention group of parents:

- Face-to-face interview was conducted to collect the pretest data from the parents using tool 2 (Parent knowledge Assessment questionnaire). when the parents come to the health care centers for regular 2- months infant's vaccine.

- parent divided into small groups from (5-10) Parents, the number of parents usually depend on the frequency rate of health care centers.

- The interview was done on waiting rooms.

- The interview last for 20 minutes.

- The evidence-based guidelines educational sessions were given to parents by the researcher & study nurses group who have the same previous guidelines sessions

- Researcher & study nurses group used several teaching strategies during the health education sessions such as group discussions, oral presentations.

- Every parent has booklet about guidelines for prevention NSP.

Infants in the study group:

- Infant Biosocial characteristics and Cranial asymmetry assessments was assessed by using tool three, at (2) month by researchers, nurses and in the presence of physician.

- The assessment was done in the health care centers clinics.

Evaluation phase:

- Nurses were reassessing after implementation of program for knowledge and ability to assess infant cranium

- Parent's knowledge was reassessing after implementing the educational guidelines.

- For follow up evaluation, assess infant cranium at (4& 6) months .

Control groups:

- The researchers used tool 1 and tool 2 to assess the nurses and the parent's knowledge in the control group

- The cranium assessment was done by researchers in the presence of physician for the control group infants at (2, 4 and 6 month) by tool three.

- No educational sessions were given to the intervention groups, they received the standard routine care that provided in the Health Care Centers (vaccination, assessment of growth, health education about feeding).

Data Analysis.

The collected data were tabulated and analyzed by Statistical Package for the Social Science Software (SPSS) version 22 . Graphics were done using Excel program. Descriptive statistics were expressed as mean and standard deviation ($X+SD$) for quantitative data or number and percentage (No & %) for qualitative data. Inferential statistics were done and expressed as mean & standard deviation ($X \pm SD$). Paired sample t-test was used to compare the means of pre and post intervention groups. Independent t-test was used for comparing the mean of different groups. Chi-Squared (χ^2) was used for qualitative variables. The significance level was set at $p \leq 0.05$.

Results:

Table 1: Table 1 shows the socio-demographic characteristics of the nurses in the study and control groups. The mean age of the nurses in the study and control groups was (35.40 ± 4.23 & 36.13 ± 4.53) respectively. The educational level of most of the nurses in the study and control groups was diploma in nursing (80.0% and 85.7%) respectively. More than two third of the participants (70.0% and 67.9%) in both groups are having less than 15 years of working experience. Also, more than two third of study participants (66.7% and 71.4%) in both groups were living in rural areas.

Table 2: Table 2 represents the number and percentage of nurses who responded correctly to the Nurses knowledge Assessment Questionnaire. Before the intervention, there was no significant difference in the knowledge between the intervention and the control group in all items of the questionnaire ($p \geq 0.5$). As indicated in the table, there is a highly significant improve at ($p = 0.001$) in the study group knowledge after the intervention compared to the control group.

Table 3: Shows the total mean score of nurses' knowledge about NSP evidence-based guidelines prevention. There was significant difference in the mean score of the study group before ($M=1.36$, $SD \pm 1.90$) and after the intervention ($M= 9.23$, $SD \pm 2.37$). In addition, after the intervention, there was a significant difference between the study group ($M= 9.23$, $SD \pm 2.37$) and the control group ($M=1.30$, $SD \pm 1.46$) indicating that the education was effective.

Table 4: Show the knowledge levels of nurses in the study and control groups, respectively. As shown, both nurses groups had similar levels of knowledge prior to the intervention. When compared to both the study group's level prior to the intervention and the level of the control group, the study group's knowledge has improved after the intervention. By mean, more than two third (70.0%) of the studied nurses in the study group have good knowledge compared to none of nurses in the control group.

Table 5: Represent the number and percentage of parents who responded correctly to the Parent knowledge Assessment Questionnaire pre and post intervention for the study (150) and control groups ($n=145$). The results indicated that there was significant improvement in the parents' knowledge in the study group after the intervention compared to their knowledge before the intervention and to the control group ($p = 0.001$).

Table 6: Represent the distribution of parents' opinions regarding evidence-based guidelines for NPS prevention pre and post intervention in the study and control groups ($n=295$). As indicated in the table, there are changes of parents' opinions in the study group on post intervention compared to pre intervention. There is highly statistical significance differences between pre and post intervention at $p = 0.001$. Meanwhile, there is no significant difference in the control parents' who received the standard intervention.

Table 7: Indicates the total mean score of parents' knowledge about evidence based guideline for prevention NSP of the study and control group nurses. There was significant different of the total mean score of parents' knowledge in the study group ($M=16.57$, $SDD \pm 1.05$) after the compared to their pre intervention ($M=0.64$, $SD \pm 1.46$) and compared to the control group ($M=0.64$, $SD \pm 1.34$).

Table 8: Shows socio-demographic characteristics of the study and control group infants. The mean age per weeks of the infants in the study and control groups were ($M=4.39$, $SD \pm 1.79$ and $M= 4.41$, $SD \pm 1.69$) respectively. The mean of infants' weight per grams of the study and control groups were ($M=3025.33$, $SD \pm 416.31$ and $M= 3055.17$, $SD \pm 416.73$) respectively. More than two thirds (71.3% and 66.9%) of the infants in the study and control groups were females. A total of 61.3% and 69.0 % of the infants in the study and control groups were delivered by cesarean section. More than two thirds of the infants in the study and control groups were resident in rural areas (68.7% & 69.7%) respectively. There was no statistical significance difference between study

and control groups in their socio-demographic characteristics

Figure 1: Illustrates percentage distribution of studied infant presenting high risk signs for NSP of in the study and control groups. as indicated in the figure (16%&245%) of infants have flattened area while(15%& 20%) have Side preference irrespectively during 4 months assessment of study group and control group. These signs were decreased at 6 months of age for the study group infants compared to the control group.

Figure2: Represent Percentage of occurrence of infant NSP at 2 and 4 months and 6 months for study and control groups: As shown, the occurrence percentage of NSP in the study group was (8.6%, and 18.2%) at 2 and 4 months, while it decreased at 6 months (7.3%). instead of the control group that there are marked increases in the occurrence of NSP (6,2% 27.5% & 22%) at 2, 4 and 6 months respectively

Table (1): Socio-demographic characteristics of the studied nurses in the study and control groups (n=58).

Socio-Demographic Characteristics	Study group (n=30)		Control group (n=28)		X ²	p-value
	No	%	No	%		
Age group						
≥20-30	4	13.3%	5	17.9%	1.043 ^{ns}	>0.05
≥30-40	20	66.7%	15	53.6%		
≥40	6	20.0%	8	28.6%		
Age						
X ± SD	35.40 ±4.23		36.13 ±4.53		t test	-0.648 ^{ns} >0.05
Qualification						
Diploma of nursing	24	80.0%	24	85.7%	.598 ^{ns}	>0.05
Institute of nursing	4	13.3%	2	7.1%		
Bachelor of nursing	2	6.7%	2	7.1%		
Experience						
< 15 years	21	70.0%	19	67.9%	.031 ^{ns}	>0.05
≥ 15 years	9	30.0%	9	32.1%		
Residence						
Rural	20	66.7%	20	71.4%	.153 ^{ns}	>0.05
Urban	10	33.3%	8	28.6%		

Table (2):- Distribution of number and percentage of nurses who responded correctly to the Nurses knowledge Assessment Questionnaire pre and post intervention for the study (30) and control groups (n=28).

Desired responses regarding cranial asymmetry prevention information	Pre intervention					Post intervention				
	Study group (n=30)		Control group (n=28)		X ² 1	Study group (n=30)		Control group (n=28)		X ² 2
	No.	%	No.	%		No.	%	No.	%	
You need to inform the parents about										
a) Advantages of placing the infant on his/her back during sleep to prevent SIDS combined with information that gives an understanding of the vulnerability of the infant's head shape	4	13.3	3	10.7	.094 .760	24	80.0	3	10.7	27.79** .000
b) Minimize pressure on the back of the infant's head	4	13.3	4	14.3	.011 .916	26	86.7	2	7.1	36.68** .000
c) The infant's head should be placed in alternating directions when put to bed, for example, face to the right side one day and to the left side the next day.	3	10.0	3	10.7	.008 .929	27	90.0	3	10.7	36.46** .000
d) The infant should use a soft thick pillow the first 3 to 4 months for cushioning and support when sleeping on his or her back.	5	16.7	1	3.6	2.96 .102	28	93.3	5	17.9	36.67** .000
e) The pillow should be placed under both the head and shoulders, so the head does not become bent forward.	3	10.0	0	0.0	2.95 .086	26	86.7	4	14.3	30.38** .000
f) Take the soft thick pillow away when the infant begins to turn over! This pillow can be replaced with a firm flat pillow.	3	10.0	3	10.7%	.008 .929	27	90.0	6	21.4	30.69** .000
g) When awake, the infant should be placed stomach-side down several time daily and kept under parental supervision.	4	13.3	2	7.1	.598 .439	27	90.0	5	17.9	29.78** .000
h) It is advantageous for the infant to get accustomed to "tummy time" early. Start with short periods and increase the time successively.	5	16.7	2	7.1	1.24 .266	29	96.7	3	10.7	43.26** .000
i) It is important to make tummy time acceptable to the child	2	6.7	4	14.3	.906 .341	24	80.0	3	10.7	27.85** .000
j) Demonstrate correct positioning at the clinic.	2	6.7	2	7.1	.008 .929	25	83.3	2	7.1	33.43** .000
k) Avoid situations in which the infant cannot hold his or her head upright.	4	13.3	3	10.7	.094 .760	29	96.7	3	10.7	44.31** .000

Note. **p < . 001

X²1 & P1: comparison between study and control groups on pre intervention.

X²2 & P2: comparison between study and control groups on post intervention

Table (3): Total mean score of Nurses' knowledge about evidence base guide line for prevention Nonsynostotic Plagiocephaly Nursing interventions of studied nurses in the study and control group on pre and post intervention.

Group	Study group	Control group	T test	P - value
	X ± SD	X ± SD		
Pre intervention	1.36 ±1.90	1.00 ±1.61	.804	.425
Post intervention	9.23 ±2.37	1.30 ±1.46	15.57**	.000
Paired t test p-value	98.44**	2.040		
	.000	.136		

Note: **p<0.001

Table (4): level of knowledge of the study and control group nurses about evidence-based guideline for prevention of Nonsynostotic Plagiocephaly before and after the intervention

Items	Study group(n=30)				Control group(n=28)				X ² P2
	Pre intervention		Post intervention		Pre intervention		Post intervention		
	No	%	No	%	No	%	No	%	
Poor knowledge	30	100.0	3	10.0	28	100.0	28	100.0	
Fair knowledge	0	0.0	6	20.0	0	0.0	0	0.0	49.061
Good knowledge	0	0.0	21	70.0	0	0.0	0	0.0	.000
X ² 1	56.311**				NA				
P1	.000								

Note: **p<0.001

X²1& P1: comparison between pre and post intervention for the same group.

X²2 & P2: comparison between study and control groups on post intervention

Table (5): Distribution of number and percentage of parents who responded correctly to the Parent knowledge Assessment Questionnaire pre and post intervention for the study (150) and control groups (n=145).

Items	Study group (n=150)					Control group (n=145)				
	Pre intervention		Post intervention		X ² 1	Pre intervention		Post intervention		X ² 1
	No.	%	No.	%		No.	%	No.	%	
Type of information					P1					P1
Verbal information	2	1.3	147	98.0	280.3**	1	0.7	4	2.8	3.66 (.056)
Written information	0	0.0	148	98.7	284.0**	0	0.0	0	0.0	NA
I have received information from my CH nurse about:										
a) Which pillow is appropriate for my baby to use while sleeping to prevent flattened areas on the baby's head?	5	3.3	147	98.0	262.1**	3	2.1	0	0.0	2.06 (.152)
b) Why the pillow should be taken away?	8	5.3	149	99.3	257.0**	2	1.4	0	0.0	2.36 (.124)
c) Alternating the baby's head from right to left when putting the baby to bed	5	3.3	148	98.7	272.0**	3	2.1	0	0.0	2.06 (.152)
Please answer this if your infant has only been bottle fed the past 2 months or longer.										
I have received information about alternating how I hold the baby (right and left arms) when I bottle feed.	6	4.0	100	100.0	285.3**	4	2.8	5	3.4	.204 (.652)
have received information from my CH nurse about:										
a) Why the baby should lay on his/her tummy under surveillance when he/she is awake?	4	2.7	149	99.3	280.5**	3	2.1	0	0.0	2.06 (.152)
b) That even short periods of tummy time several times a day help a lot	4	2.7	144	96.0	261.4**	4	2.8	4	2.8	.000
c) That we should increase tummy time gradually when the baby is awake	4	2.7	146	97.3	266.9**	2	1.4	4	2.8	1.87 (.176)
d) That we should start getting the baby used to tummy time by the time he/she is 2 weeks old	5	3.3	146	97.3	265.1**	2	1.4	5	3.4	.194 (.265)
I have received information from my CH nurse about										
a) The baby should only be in the infant car seat while we are riding in a car	5	3.3	148	98.7	272.8**	3	2.1	2	1.4	.204 (.652)
b) Time spent in a baby bouncer should be limited for the sake of the baby's head form	4	2.7	143	95.3	240.1**	6	4.1	3	2.1	.681 (.409)
c) Time spent on his/her back on a hard surface (for example a "baby gym" on the floor) can influence the baby's head shape	5	3.3	143	95.3	235.8**	4	2.8	3	2.1	.145 (.702)

Note: **p<0.001

X²1 & P1: comparison between pre and post intervention for the same group.

Table (6): Distribution of parents' opinions regarding evidence base guides line for prevention nonsynostotic Plagiocephaly Nursing interventions on pre and post intervention in the study and control groups (n=295).

Items	Pre intervention					Post intervention					
	Study group (n=150)		Control group (n=145)		X ² 1 P1	Study group (n=150)		Control group (n=145)		X ² 1 P1	
	No.	%	No.	%		No.	%	No.	%		
In my opinion:											
a) Tummy time is dangerous, so I avoid placing my baby on his tummy	4	2.7	6	4.8	.831 (.356)	3	2.8	146	97.3	268.9**	
b) Put my baby on his/her tummy when he/she is awake	9	6.0	3	2.8	.185 (.753)	4	3.4	143	95.3	239.5**	
c) My baby is unhappy on his/her tummy so I avoid placing my baby on his/her tummy	7	4.7	0	0.0	6.17 * (.009)	6	4.8	143	95.3	246.6**	
d) My baby is unhappy on his/her tummy but I try to get the baby accustomed to tummy position anyway.	11	7.3	0	0.0	9.57*(.003)	6	4.1	147	98.0	247.3**	

Note: *p<0.05, **p<0.001

X²1& P1: comparison between pre and post intervention for the study and control groups

Table (7): Total mean score of parents' knowledge about evidence base guide line for prevention Nonsynostotic plagiocephaly of studied nurses in the study and control group on pre and post intervention.

Group	Study group	Control group	t test	P - value
	X ± SD	X ± SD		
Total score of parents' knowledge				
Pre intervention	0.64 ±1.46	0.37 ±0.92	.804	.425
Post intervention	16.57 ±1.05	0.46 ±1.13	155.26**	.000
Paired t test	124.07**	0.419		
p-value	.000	.675		

Note: **p<0.001

Table (8): Socio-demographic Characteristics of the studied infants in the study and control groups (n=395).

Socio-demographic Characteristics	Study group (n=150)		Control group (n=145)		Test	p-value
	No	%	No	%		
Age per weeks					t test	
X ± SD	4.39 ± 1.79		4.41 ± 1.69		-0.067	.947
Infants' weight per grams					t test	
X ± SD	3025.33 ± 416.31		3055.17 ± 416.73		-0.615	.539
Sex					X²	
Male	43	28.7	48	33.1	.680	.409
Female	107	71.3	97	66.9		
Type of delivery					X²	
Normal	58	38.7	45	31.0	1.89	.169
Cesarean section	92	61.3	100	69.0		
Residence					X	
Rural	103	68.7	101	69.7	.034	.854
Urban	47	31.3	44	30.3		

Figure (1): Percentage distribution of infant presenting high risk signs for NSP of the studied infants in the study and control groups (n=395).

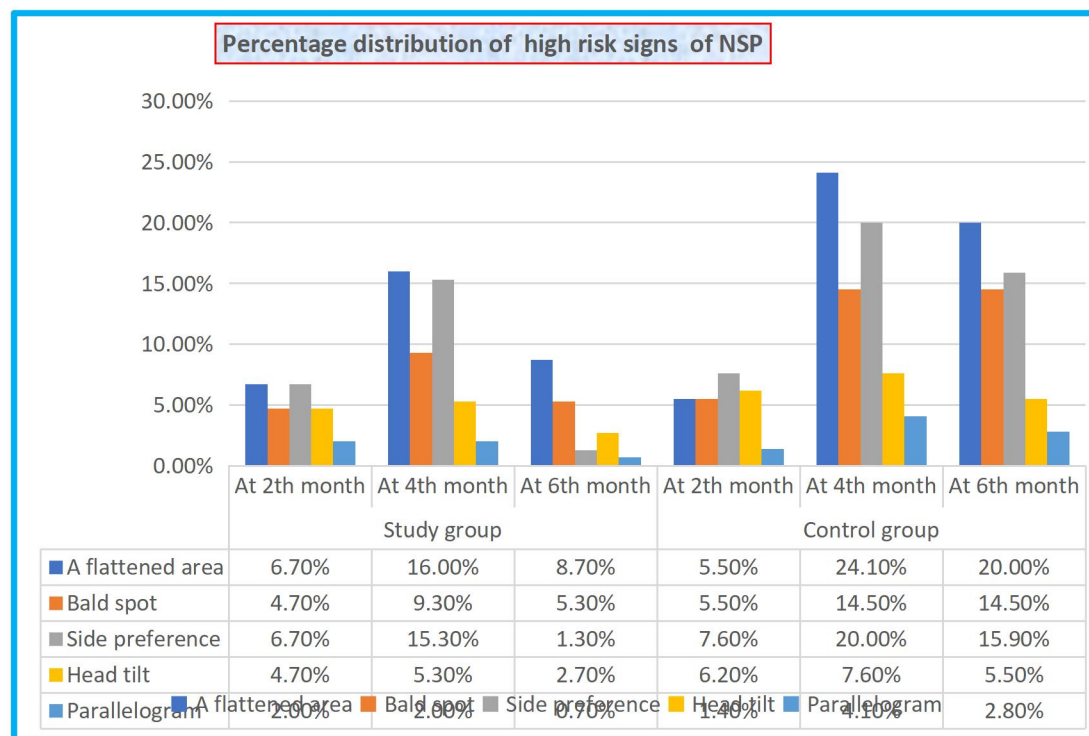
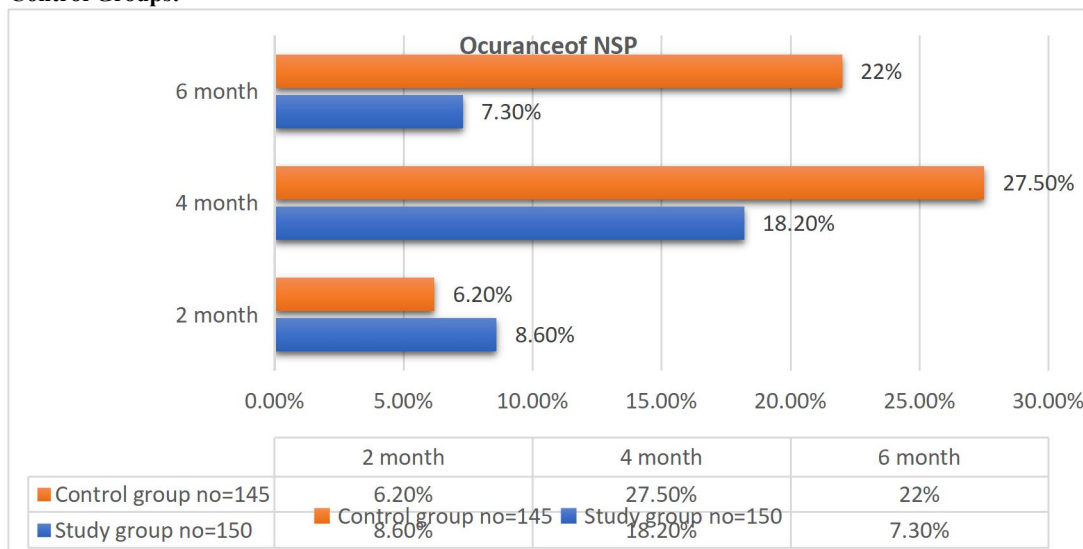


Figure (2): Percentage of Occurrence of Infant NSP At 2,4and 6 Months For Study and Control Groups:



Discussion:

Nonsynostotic Plagiocephaly (NSP) is an acquired cranial asymmetry that develops from external pressure on the infant’s cranium. The current study proposed three hypothesis: hypothesis one states that “nurses in the study group who received the educational evidence-based guidelines intervention on the prevention of Nonsynostotic Plagiocephaly will have significant improvement in knowledge than the control group”, hypothesis two was “parents in the study group who received the educational evidence-based guide lines intervention on prevention Nonsynostotic Plagiocephaly will have significant improvement in knowledge than the control group” and hypothesis three was the occurrence of Nonsynostotic Plagiocephaly among the study group infants will be significantly less than the control group

In relation to hypothesis one, the results of the current study supported this hypothesis. The level of the knowledge of nurses in the study were higher than the nurses in the control group after educational interventional. The improvement of the nurses’ knowledge was related to how to minimize the pressure on the infant’s back of the head, types of pillows should be used according to the infant’s age and

proper head position. This result was consistent with **Simons, Lathlean, & Squire, (2008)** Who reported that there is increase in the knowledge of the nurses in the intervention group and they actively applied their new knowledge in the clinical settings more than nurses in the control group.

In addition, the current study results were congruent with **Moon et al., (2022)** who found that after NSP training, the mean knowledge score of the participating nurses improved significantly and the performance score was increased after receiving training on NSP prevention.

From the researchers' point of view, this is may be due to the NSP subject not included in the care program of the health care center, while improvement in knowledge was related to the educational intervention that was given.

Concerning the second hypothesis. The results of the current study supported this hypothesis, The current study revealed that there was a highly statistically significant improvement in parents’ knowledge of prevention of NSP in the study group post-intervention on items such as (changing positions or promoting activities such as tummy time and using a pillow) Meanwhile, there are no changes in parents’ knowledge about

guidelines for the prevention of NSP in the control group pre and post-intervention.. These results were consistent with **Martiniuk, et al., (2016)** who reported that some parents were more concerned about preventing measures of NSP because NSP was real and occurred more often than SIDS.

Moreover, these findings were similar to the findings of the study conducted by **Ellwood et al., (2020)**. They found that knowledge and support were likely to reassure and assist parents in the prevention of NSP, the nurse interventions, and gaining written material support parents remembering understanding, and cognition about NSP.

From the researchers' point of view, this is could be due to important factors, the ability of the researchers and nurses to transfer the information about NSP to the parents, as well as the effect of using the evidence-based guidelines on supporting parents with newly advanced knowledge.

Regarding parents' opinions about NSP evidence-based guidelines in the study and control groups, there was an improvement in parents' opinions in the study group post-intervention. and there were highly statistical significance differences between pre and post-intervention. Meanwhile, there were no changes in parents' opinions regarding NSP prevention guidelines, in the control group. These results go on the same line with **Pastor-Pons et al., (2021)**, who stated that caregiver education increased knowledge and abilities, resulting in parental satisfaction.

Also, this result was consistent with the result of a study carried out by **Lennartsson, (2020)**. Who stated that parent's skills improved when guidance sessions were implemented and helped to reduce the strain on the infant's malleable occiput, and there was a significantly higher percentage of parents in the intervention group compared to the control group, were aware of national recommendations for the prevention of NSP, through the alternate direction of the infant's head, when to remove the pillow, and which pillow to use .

As regarding to the effect of evidence-based guidelines on the nurses' performance of cranium assessment for NSP in the study and control groups among the studied infants. The present study showed that all studied infants in the study group were assessed at the 2nd, 4th and 6th months to assess any NSP. Meanwhile, the studied infants in the control group weren't assessed at the 2nd, 4th, and 6th months. As well as, the nurses in the study group started to inform and educate the parents on the instructions which should be followed to prevent NSP.

These results were congruent with **Moon et al., (2022)**. They indicated that, after NSP training, the performance score was increased after receiving training which indicated a high-performance score after NSP training. Furthermore, this result was consistent with the result of a study carried out by **Lennartsson, (2019)**. Who stated that, the substantial strength of assessor agreement when assessors were trained how to assess cranial asymmetry. Additionally, assessors showed excellent ability to detect NSP in the clinical setting. This indicates that their assessments in the clinical intervention can be considered reliable.

About hypothesis three. The results of the current study support the third hypothesis. Concerning the effect of evidence-based guidelines on the occurrence of NSP among the study and control groups of the studied infants. It illustrates that the development of cranial NSP as flattened area, bald spot, side preference, head tilt, and parallelogram has been decreased in the 4th and 6th month in the study group compared to the control group. the occurrence of nonsynostotic plagiocephaly was (16.2%) at 4 months, while it decreased at 6 months it reach (7.3%) after implementing evidence-based guidelines, instead of the control group which the occurrence of NSP reach 27% and 22% at 4 and 6 months.

This result comes in agreement with the finding of the randomized controlled trial (RCT) carried out by **Aarnivala , et al (2015)** Who showed that the prevalence of NSP was 23% in the intervention group instead of 32% in the control group at four months. Also, this finding

was constant with **Flannery et al., 2012**. They stated that early and continued assessment of infants is essential for the prevention of NSP. Additionally, they concluded that many cases of NSP will improve over time, and evidence-based instructions and conservative management such as repositioning, and physical therapy can safely and effectively minimize the degree of skull asymmetry when implemented in early life.

Along the same line **Lennartsson, (2020)** reported that the risk for persistent asymmetry was significantly decreased for the intervention group than the control group infants. This indicates that intervention group nurses' and parents' collaboration were efficient in lowering infants' risk of having persistent asymmetry. This might be due to that, the efficacy of evidence base guidelines for the prevention of NSP. Through the commitment of parents to the recommended evidence-based guidelines.

Conclusion:

Based on the finding of the present study and the research hypotheses, it was concluded that the implementation of evidence-based guidelines for the prevention of nonsynostotic plagiocephaly significantly increase nurses' knowledge who in turn educate parents about NSP prevention, Also, it increases parents' awareness about what to do and how to do it safely.

Also, it contributed to a decrease in the occurrence rate of cranial plagiocephaly signs such as flattened area, bald spot, side preference, head tilt, and Parallelogram

Recommendation:

Based on the findings of the present study, the recommendation is suggested: continuous training should be established in every health care center to enhance nurses' and parent's adherence to evidence-based guidelines of prevention nonsynostotic plagiocephaly.

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