

 <p>INNOVATIVE JOURNAL IÖNKIVT</p>	<p>Contents lists available at <a href="http://www.innovativejournal.in">www.innovativejournal.in</a></p> <p><b>INTERNATIONAL JOURNAL OF NURSING DIDACTICS</b></p> <p>Homepage: <a href="http://innovativejournal.in/index.php/ijnd">http://innovativejournal.in/index.php/ijnd</a></p>	 <p>IJND ISSN: 2231-5454</p>
---	---	---

## Effect of Eye Shield versus Massage on Preterm Infants' Pain Response during Venipuncture

<sup>1</sup>Eman Ali Moselhi Mater, <sup>2</sup>Huda Shawky Mahamud, <sup>3</sup>Mohamed Farouk Mohamed

<sup>1</sup>. Lecturer in Pediatric Nursing Department, Faculty of Nursing, Cairo University

<sup>2</sup>. Lecturer in Pediatric Nursing Department, Faculty of Nursing, Helwan University

<sup>3</sup>. Assistant Professor of Pediatrics and Neonatology, Faculty of medicine, Cairo University

DOI: <https://doi.org/10.15520/ijnd.v9i03.2476>

**Abstract: Background:** Evidence demonstrates that controlling pain in the preterm infants during the neonatal periods is improving physiological, behavioral and hormonal outcomes. Eye shield and massage may play an important role as a non-pharmacological pain management during venipuncture.

**Aim:** Is to investigate effect of eye shield and massage on preterm infants' pain response during venipuncture.

**Patients and Methods:** Time series quasi experimental research design was carried out on a randomized sample of 100 newborn infants attending the Neonatal Intensive Care Unit (NICU) of El Manial University Hospital (Kasr Al Ainy), (30 control group, 30 eye shield group and 30 massage group). Neonatal assessment tool and Preterm Infant Pain Profile (PIPP) were utilized for data collection.

**Results:** There was a significant mean difference between control, eye shield and massage groups regarding PIPP pain assessment scores in three time frames (before venipuncture  $T_0$ , during  $T_1$  and after  $T_2$ ) at  $P < 0.00$  but there wasn't a significant mean differences after 5 min ( $T_3$ ). Massage group had the fewest mean PIPP score during four time frames ( $3.50 \pm 0.97$  before venipuncture,  $8.16 \pm 1.91$  during venipuncture,  $4.30 \pm 4.30$  after venipuncture and  $3.22 \pm 0.81$  after 5 minutes of venipuncture).

**Conclusion:** ANOVA indicated that massage and eye shield groups showed a significant reduction in preterm infant's pain response than control group during venipuncture but massage was more effective than eye shield.

**Recommendations:** Further studies needed to evaluate the effect of massage in combination with eye shield on preterm infant pain response.

**Keywords:** Eye Shield, Massage, Preterm Infants, NICU, PIPP

### INTRODUCTION

Hospitalized preterm infants periodically experience procedural pain when admitted to the Neonatal Intensive Care Unit (NICU) [1,2]. Some infants might experience more than 3000 painful procedures during the entire course of their NICU stay. Venipunctures are commonly performed in NICUs to obtain blood samples for analyses [3,4,5]. Early procedural pain in very preterm infants may contribute to impaired brain development [6,7]. After painful procedures, some newborns have even suffered muscle spasms and urinary and gastrointestinal alterations [8]. NICU light may influence their pain response to a painful procedure and it was reduced by wearing eye shields. Non-pharmacological interventions should be further carried out [1,9].

Accurate pain assessment in preterm infants should be comprehensive including behavioral and physiological tools. Expert researchers in infant pain confirm that physiological parameters alone are not sufficient to measure pain response and that behavioral outcomes must also be considered [10]. Premature Infant Pain Profile (PIPP) is a widely used scale for evaluating acute pain in term and preterm neonates. It includes seven indicators: gestational age, behavioral state, maximum heart rate, minimum oxygen saturation, brow bulge, eye squeeze and naso-labial furrow [11,12]. Nurses play an important role in the control of pain among neonates by introducing a convenient method for relieving pain that can reduce adverse physical and psychological effects [13].

Few studies were conducted to investigate the efficacy of light control and massage on pain response [14]. In Egypt, there are no researches conducted to evaluate the effect of eye shield on preterm infants' pain response and scarce studies about massage so, the current study was conducted to investigate effect of eye shield and massage on preterm infants' pain response during venipuncture. Hopefully the findings of current study would help preterm infants to overcome the pain and providing evidence based data that can develop the neonatal nursing practice and research.

#### Hypothesis:

- 1- Preterm infants who wear eye shield before vein puncture will have a significant lower pain scores than control group.
- 2- Preterm infants who receive massage before vein puncture will have a significant lower pain scores than control group.

### METHODS

#### Research design:

Time series quasi experimental design was utilized to accept or reject research hypothesis.

#### Sample and sample size:

Randomized sample of 90 preterm infant infants was selected according to the following inclusion criteria: gestational age from 30 to < 37 weeks, conscious and both

sexes. Exclusion criteria included preterm infants with severe neonatal sepsis and congenital anomalies (central nervous system and cardiovascular system) Simple Random Sample was used by using a SPSS program. 90 preterm infants randomly assigned into three groups, control group (30), eye shield group (30) and massage group (30)(figure 1). To determine a sample size, a power analysis was conducted using 0.05 as the level of significance, 0.95 as the power and effect size of 0.25. The minimum required sample size obtained was 90 preterm infants.

**Ethical consideration:**

Prior to data collection, permission was obtained from the research scientific board of hospital, the head of NICUs and faculty of nursing, Cairo University. The parents of preterm infants gave informed verbal consent prior to their preterm infants' participation in the study. The participation was voluntary and confidentiality of data was ensured.

**Setting:**

The study was conducted at the Neonatal Intensive Care Unit at El Manial University Hospital (Kasr Al Ainy).

**Instruments:**

1. Preterm infant assessment tool was developed by researcher to collect data about preterm infant's characteristics such as birth weight, gestational age, Apgar score and diagnosis).
2. The Premature Infant Pain Profile (PIPP) adopted from Stevens et al. [15]. It is currently the most validated clinical test to determine the level of pain among term and preterm infants. PIPP rating is on a score from 0 to 12, score from 0 – 6 indicate no or minimal pain, 7 – 12 indicate slight to moderate pain, scores >12 may indicate severe pain). It consists of 7 items; gestational age, behavioral state, heart rate, oxygen saturation, brow bulge, eye squeeze, and naso- labial furrow.
3. Eye shield was covered newborn infants' eyes before venipuncture 2 min (eye patches like used during phototherapy).
4. Limp massage technique adopted from Field's massage (1986) was applied for two minutes before vein puncture by holding the limb with in one hand and other hand in the "C" shape, start the stroke smoothly from the shoulder to the hand (6 strokes) followed by stroking up from the hand to the shoulder (6 strokes) [16].

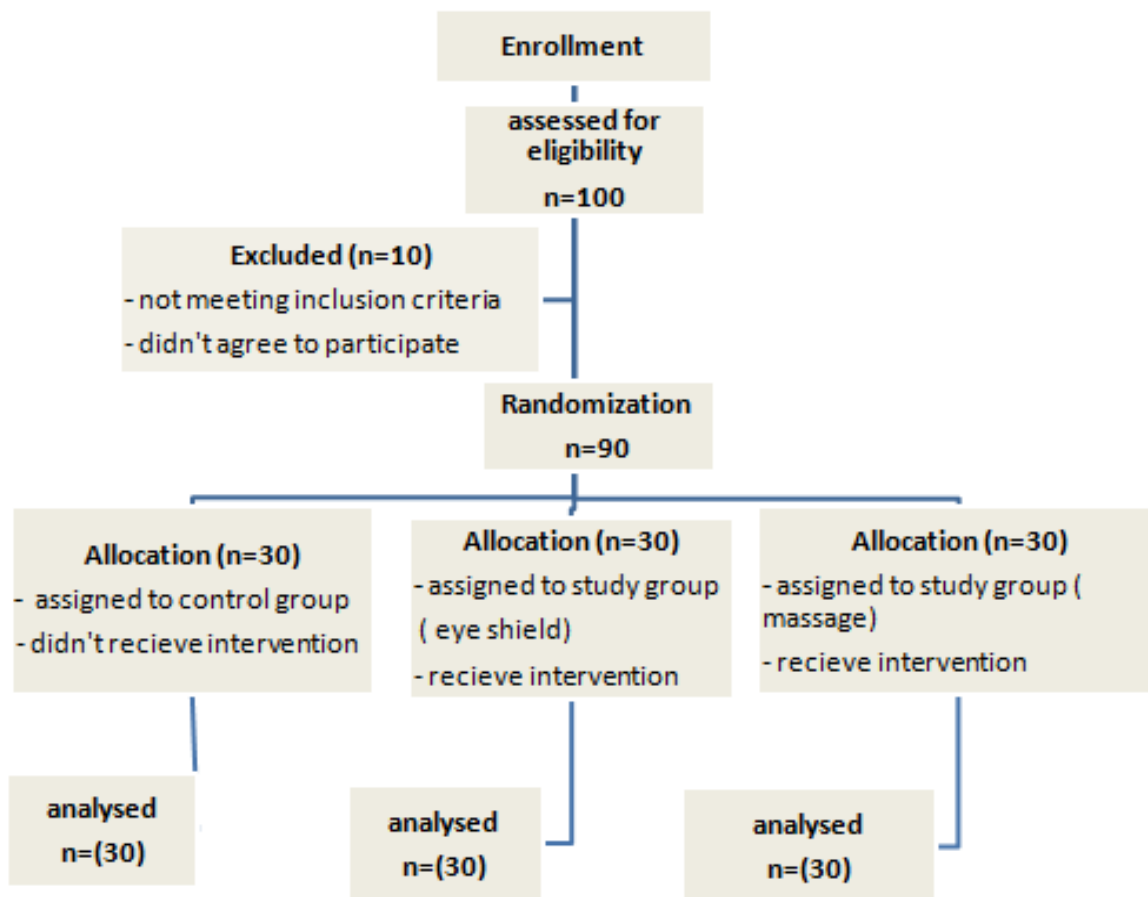


Figure 1 Selection of the study participants

**Pilot study:**

A pilot study was carried out on 10% of sample size (6 preterm infants) to ensure the clarity, applicability of the tools, test feasibility of the study and estimate sample size and the time needed for data collection. The result of pilot

study confirmed that the study was feasible. The sample of the pilot study was excluded from the total sample size.

**Validity and reliability:**

Preterm infant assessment tool was submitted to a panel of five experts in the field of neonates to examine the content validity (covering, clarity, wording, length, format and

overall appearance). Minor modification was performed was valid and reliable professional tool (Cronbach alpha was 0.84).

**Procedure:**

Before conducting the study an official approval was obtained from the Faculty of Nursing-Cairo University to get permission from the administrator of El Manial University Hospital (Kasr Al Aini), where a clear explanation was given to them about the nature, aim and expected outcomes of the current study. The researcher contacted the parents of preterm infants during the visiting hours in the unit to explain the nature and the purpose of the study, as well as to get an agreement and consent to involve preterm infants in the study.

Data was collected during the period from the beginning of July 2018 to the end of October 2018. The time spent for each neonate to collect the data ranged between 20-30 minutes. Every neonate was individually observed by the researchers throughout the determined time. Preterm infants' characteristics and biomedical data were obtained from neonatal records. Simple randomization was done by using SPSS program. The sample of the study consisted of 90 newborn infants randomly assigned into three groups, study

control group (30), eye shield group and massage group (30).

Pain level was assessed by assessors (researcher and two expert nurses) by using English version of PIPP pain assessment scale. After that, the researchers recorded the mean of the three readings and calculated the mean of pain score according to scoring system. It measured three times, the first measure for control group, the second measure for eye shield group and the third measure for massage group. Eye patches was used to cover eyes of preterm infants like used during phototherapy two minutes before venipuncture among eye shield group. Limb massage was done two minutes before venipuncture among massage group. Limb massage was applied according to the protocol that reported by Field's study in 1986 as follow: hold the limb with in one hand and other hand in the "C" shape, start the stroke smoothly from the shoulder to the hand (6 strokes) followed by stroking up from the hand to the shoulder (6 strokes).

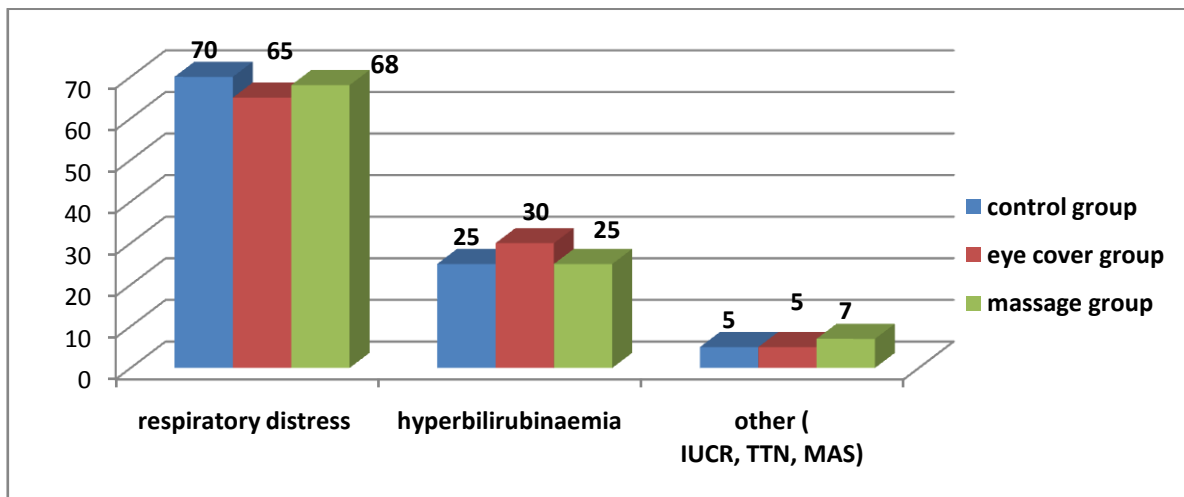
**Data analysis:**

The Statistical Package for the Social Science (SPSS) version 20 was utilized for data entry, tabulation and analysis. Descriptive statistics were computed to summarize the newborn infant's characteristics. ANOVA test was used to compare means scores.

**RESULT**

**Table 1: Preterm infant's characteristics in percentage distribution (n= 90).**

Variable	Control (n=30)	Eyecover(n=30)	Massage(n=30)	F	P
Birth weight (g)	1828.03±685.91	1599.66±543.05	1401.43±199.14	3.392	0.02
Age (days)	8.50±6.81	7.43±6.68	8.32±5.43	0.321	0.73
Gestational age(weeks)	32.46±3.21	30.21±3.19	31.52±3.22	0.115	0.89
Apgar score at 1 min	2.035±1.79	2.06±1.77	3.30±1.36	3.761	0.01
Apgar score at 5min	5.64±1.92	5.50±1.88	6.26±1.57	1.196	0.31
Apgar score at 10 min	8.14±1.14	8.16±1.11	8.40±1.24	0.421	0.73



**Figure (2) percentage distribution of preterm infants according to their diagnosis in control, eye cover and massage groups ( n=90).**

IUGR: Intrauterine Growth Retardation, TTN: Transient Tachypnea of Neonates

MAS: Meconium Aspiration Syndrome

Table (1) and figure (2) indicated that there was no statistically significant difference between control and study groups (eye shield and massage) regarding to preterm infants' characteristics and diagnosis. The mean of gestational age was 32.46±3.21, 30.21±3.19, and 31.52±3.22weeks respectively, the mean of birth weight was

1828.03±685.91, 1599.66±543.05, and 1401.43±199.14 grams respectively, Apgar score at 10 minute was 8.14±1.14, 8.16±1.11 and 8.40±1.24 and the majority of the neonates in the three groups were diagnosed on admission with respiratory distress syndrome (RDS) (68, 65, and 70%) respectively.

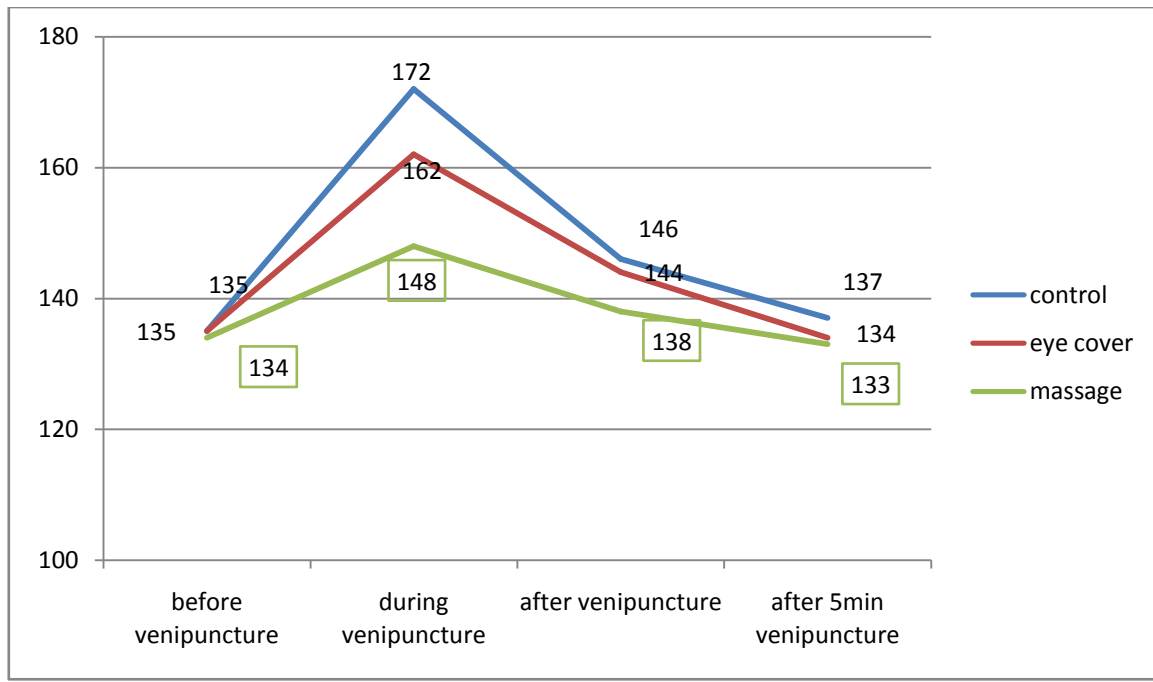
**Table 2: Mean differences in PIPP scores between control, eye cover and massage groups in four time frames (before venipuncture T<sub>0</sub>, during T<sub>1</sub>, after T<sub>2</sub> and after 5 min T<sub>3</sub>) (n= 90).**

Total PIPP scores	Mean±SD	Minimum	Maximum	F	P
<b>before venipuncture (T<sub>0</sub>)</b>					
Control	2.21±1.166	0	4	9.16	**0.00
Eye cover	3.50±0.97	1	5		
Massage	3.46±1.07	1	5		
Total	3.08±1.21	0	5		
<b>during venipuncture (T<sub>1</sub>)</b>					
Control	15.75±1.57	13	20	68.04	**0.00
Eye cover	12.73±2.57	9	18		
Massage	8.16±1.91	6	13		
Total	12.19±3.74	6	20		
<b>after venipuncture (T<sub>2</sub>)</b>					
Control	7.39±1.95	4	10	14.63	**0.00
Eye cover	6.73±2.09	3	11		
Massage	4.30±4.30	2	8		
Total	6.13±2.30	2	11		
<b>After 5 min of venipuncture (T<sub>3</sub>)</b>					
Control	3.18±1.73	1	8	0.54	**0.65
Eye cover	3.32±1.88	0	8		
Massage	3.22±0.81	1	5		
Total	3.81±1.53	0	8		

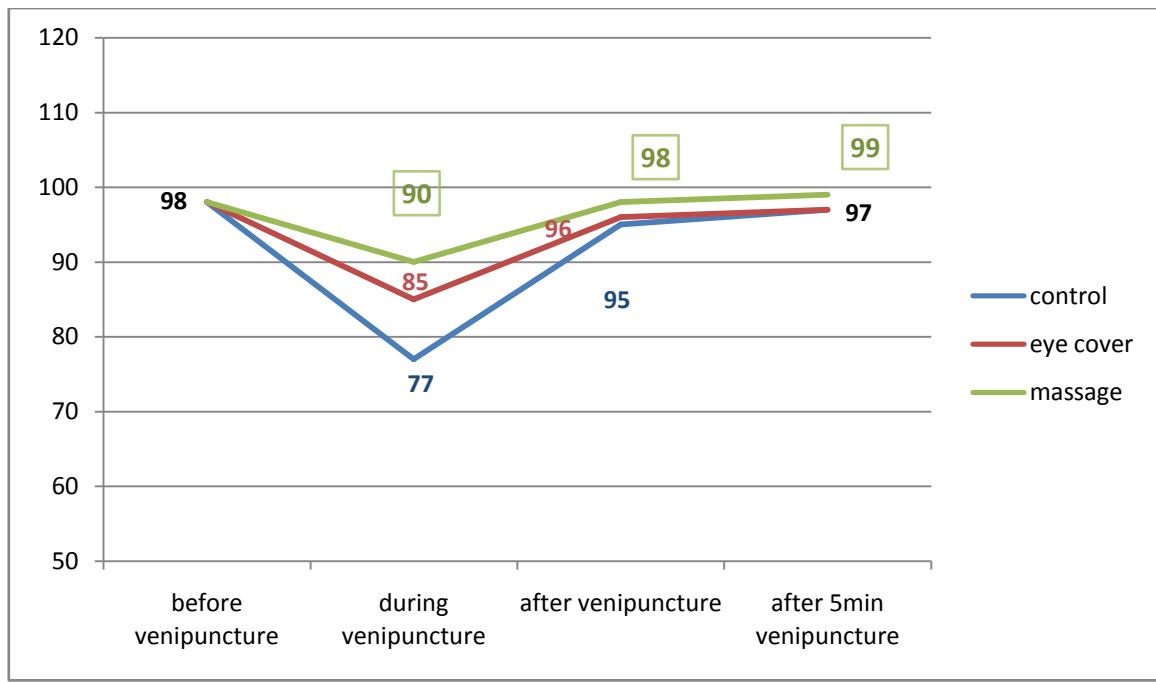
\*\*P≤0.00

**Table 3: Mean differences in physiological and behavioral PIPP scores between control, eye cover and massage groups in four time frames (before venipuncture T<sub>0</sub>, during T<sub>1</sub>, after T<sub>2</sub> and after 5 min T<sub>3</sub>) (n= 90).**

Variable	before T <sub>0</sub>		during T <sub>1</sub>		after T <sub>2</sub>		after 5 min T <sub>3</sub>	
	F	P	F	P	F	P	F	P
Gestational age	8.89	0.00						
Behavioral state	8.43	0.00	1.41	0.24	6.38	0.03	1.55	0.21
Heart rate	-	-	70.97	0.00	9.84	0.00	12.50	0.00
Oxygen saturation	-	-	17.28	0.00	3.22	0.04	1	0.37
Brow bulge	7.81	0.00	135.8	0.00	48.79	0.00	3.95	0.02
Eye squeeze	2.03	0.13	107.28	0.00	30.32	0.00	3.13	0.04
Nasolabial furrow	5.05	0.08	80.25	0.00	14.78	0.00	0.36	0.69



**Figure 3: Mean difference in heart rate between control, eye cover and massage groups in four time frames (before venipuncture T<sub>0</sub>, during T<sub>1</sub>, after T<sub>2</sub> and after 5 min T<sub>3</sub>) (n= 90).**



**Figure4: Mean differences in oxygen saturation between control, eye cover and massage groups in four time frames (before venipuncture T<sub>0</sub>, during T<sub>1</sub>, after T<sub>2</sub> and after 5 min T<sub>3</sub>) (n= 90).**

Table (2) revealed that there was a significant mean differences between control, eye shield and massage groups regarding PIPP pain assessment scores in three time frames (before venipuncture T<sub>0</sub>, during T<sub>1</sub> and after T<sub>2</sub>) at  $P < 0.00$  but there wasn't a significant mean differences after 5 min (T<sub>3</sub>). Massage group had the lowest mean PIPP score during four time frames ( $3.50 \pm 0.97$  before venipuncture,  $8.16 \pm 1.91$  during venipuncture,  $4.30 \pm 4.30$  after venipuncture and  $3.22 \pm 0.81$  after 5 minutes of venipuncture). The total PIPP score was  $3.08 \pm 1.21$  before venipuncture,  $12.19 \pm 3.74$  during venipuncture,  $6.13 \pm 2.30$  after venipuncture and  $3.81 \pm 1.53$  after 5 minutes of venipuncture. All groups before the venipuncture had no pain according to PIPP ( $2.21 \pm 1.166$ ,  $3.50 \pm 0.97$ ,  $3.46 \pm 1.07$ ) but all of them in pain during venipuncture ( $15.75 \pm 1.57$ ,  $12.73 \pm 2.57$ ,  $8.16 \pm 1.91$ ) but the massage group with less score and control group with the highest score of pain on PIPP scale.

Table (3) and figure (3&4) show the mean differences in physiological and behavioral PIPP scores between control, eye cover and massage groups in four time frames (before venipuncture T<sub>0</sub>, during T<sub>1</sub>, after T<sub>2</sub> and after 5 min T<sub>3</sub>). There was a significant difference between control, eye shield and massage groups regarding heart rate at  $P < 0.00$  and brow bulge and eye squeeze at  $P < 0.05$  but there wasn't a significant difference between the three groups regarding oxygen saturation, behavioral state and nasolabial furrow. The mean change of heart rate and oxygen saturation during, after and after 5 minutes of venipuncture among massage group was the fewest mean changes. The highest mean change of heart rate was in the control group (146b/min) compared to eye cover and massage groups (144 and 138 b/min respectively) after vein puncture. The lowest mean change of oxygen saturation was in the massage group (98%) compared to eye cover and control groups (96% and 95% respectively) during vein puncture.

## DISCUSSION

The study was conducted to investigate the effect of eye shield and massage on preterm infants' pain response during vein puncture. The studied sample was a homogenous group recruited from the same NICU, the mean of gestational age was  $32.46 \pm 3.21$  weeks,  $30.21 \pm 3.19$  weeks and  $31.52 \pm 3.22$  respectively, the mean of birth weight was  $1828.03 \pm 685.91$ ,  $1599.66 \pm 543.05$ , and  $1401.43 \pm 199.14$  grams respectively, Apgar score at 10 minute was  $8.14 \pm 1.14$ ,  $8.16 \pm 1.11$  and  $8.40 \pm 1.24$  and the majority of the neonates in the three groups were diagnosed on admission with Respiratory Distress Syndrome (RDS) (68, 65, and 70% respectively).

The study provided further evidence that eye shield and massage groups provided lower pain scores than control group during venipuncture regarding PIPP pain assessment scores. Massage group had the fewest mean of PIPP score during four time frames as before venipuncture (T<sub>0</sub>), during venipuncture (T<sub>1</sub>), after venipuncture (T<sub>2</sub>) and after 5 minutes of venipuncture (T<sub>3</sub>). Results from other studies strengthen our findings by recorded that the practice of eye shield or massage before venipuncture among preterm infants positively affected their pain score during and after venipuncture (T<sub>1</sub> & T<sub>2</sub>) [17, 18, 19, 20]. This result is consistent with Chik et al., [21] reported that limb massage reduced pain level during venipuncture among high risk neonates and recommended it may be a method of non-pharmacological pain management.

Also, Alemdar and Ozdemir, [9] who investigated the effects of covering the eyes versus playing intrauterine sounds on premature infants' pain and physiological parameters during venipuncture reported that the practice of covering preterm infants' eyes during venipuncture positively affected their pain scores after venipuncture. Researchers thought that despite the development in the knowledge of pain management in NICU but there is a gap still remains

between knowledge and practice leading to inadequate non pharmacological pain management.

According to the mean differences in the physiological parameter of PIPP, the study illustrated that the mean change of heart rate and oxygen saturation after venipuncture among massage group was the fewest mean changes. This result in agreement with Abdallah et al. [22] who evaluated the efficacy of massage in reducing pain reported that preterm infants who received massage therapy had significantly decreased mean changes of heart rate and oxygen saturation and reduced pain level after a heel prick when compared to the control group. Some previous studies reported that the SpO<sub>2</sub> levels of all neonates increased after feet massage compared to before intervention [23, 1]. In contrast, Ibrahim et al. [20] documented that SpO<sub>2</sub> decreased significantly after heel stick.

Concerning, the mean differences in the behavioral PIPP scores between control, eye shield and massage groups in four time frames (before venipuncture T<sub>0</sub>, during T<sub>1</sub>, after T<sub>2</sub> and after 5 min T<sub>3</sub>), the study showed that there was a significant difference between control, eye shield and massage groups regarding brow bulge and eye squeeze but there wasn't a significant difference between them regarding behavioral state and nasolabial furrow.

In contrary, one study was done in Egypt by Ibrahim et al. [20] who studied effect of foot massage on pain responses to heel stick in preterm infants reported that preterm infants who received foot massage prior to heel stick had statistically significant stabled behavioral state than who did not receive. Another study by Donia and Tolba [24] who studied effect of early procedural pain experience on subsequent pain responses among premature infants reported that the behavioral pain response of premature infants were lower scores during and after the heel stick procedure. This habituation reflects the ability of the central nervous system of the preterm to regulate pain pathways to adapt to procedural pain especially if repeated [25]. Bayomi and El-Nagger [26] concluded that applying massage therapy had a positive effect on premature neonates' physical, physiological and behavioral states. In our point of view, number of repeated venipuncture is a confounding factor of pain response that affected pain level.

#### **Limitation:**

Interpretation of the results should acknowledge some limitation; measurements of behavioral items in the PIPP are more subjective than other variables and small sample size. Future studies should try to ensure that research should be performed in a facility that will offer an adequate sample size in order to validate findings.

#### **COCLUSION**

ANOVA indicated that massage and eye shield groups showed a significant reduction in preterm infant's pain response than control group during venipuncture but massage was more effective than eye shield. The mean change of heart rate and oxygen saturation during, after and after 5 minutes of venipuncture among massage group was the fewest mean changes.

#### **Recommendation:**

Based on the study results, the following recommendations are proposed:

- 1- Massage and eye shield should be applied as a routine care for controlling pain among preterm infants in NICU.
- 2- An educational program is needed to raise awareness among nurses and other health care providers about effect of massage and eye shield on preterm infant pain response.
- 3- Further studies needed to evaluate the effect of massage in combination with eye shield on preterm infant pain response.

#### **Implications for practice:**

Massage and eye shield during venipuncture have been shown to be valuable in reducing preterm infants' pain so, it should be performed while infants are undergoing painful procedures and should be routinely performed.

#### **Implications for neonatal research:**

Findings of this study infer that that massage and eye shield are effective methods of pain management than eye shield, thereby the combination between them should be considered in future interventions studies.

#### **Note:**

The authors confirm that there is no conflict of interest and the study was not supported by any grant.

#### **REFERENCES**

- [1]. Roofthoof D, Simons S, Anand K, Tibboel D, Dij K. Eight Years Later, Are We Still Hurting Newborn Infants? *Neonatology*, 2014;105(3),218-226. doi:10.1159/000357207
- [2]. Lagunas A, Hall H, Improving Pain Management in Neonates Exposed to Intravenous Insertions: A Quality Improvement Initiative *Journal of Neonatal Nursing*, 2016; 22, 277-283.
- [3]. Bueno M, Yamada J, Harrison D, et al. A systematic Review and Meta-analyses of Non sucrose Sweet Solutions for Pain Relief in Neonates. *Pain Res Management*; 2013, 18:153–161.
- [4]. Maxwell L, Malavolta C, Fraga M. Assessment of Pain in the Neonate. *Clinical Perinatol* ; 2013, 40:457–69.
- [5]. Rachel Y. Pain Management in the NICU by Oral Sucrose. *Procedural Pain and Brain Development in Premature Newborns*. Nu.RJ.2016.
- [6]. Brummelte S, Grunau R., Chau V, Poskitt K, Brant R, Vinall, J Gover, A, Synnes A, Miller S. *Procedural Pain and Brain Development in Premature Newborns*. American Neurological Association, 2012;71:385–396.
- [7]. Vinall J, Miller SP, Chau V, Brummelte S, Synnes AR, Grunau RE. Neonatal Pain in relation to Postnatal Growth in Infants Born Very Preterm. *Pain* 2012;153(7):1374–81.
- [8]. Cortes E, Rizo M, Aguilar MJ, Rizo J, Gil V. Maternal Age as Risk Factor of Prematurity in Spain; Mediterranean area. *Nutr Hosp*. 2013; 28(5): 1536-1540.
- [9]. Alemdar D, Ozdemir F. Effects of Covering the Eyes versus Playing Intrauterine Sounds on Premature Infants'

- Pain and Physiological Parameters during Venipuncture, *Journal of Pediatric Nursing*, 2017;37:e30-e36.. doi: 10.1016/j.pedn.2017.06.016. Epub 2017 Jul 24.
- [10]. Raeside L. Physiological Measures of Assessing infant Pain: a literature Review. *Br. J. Nurs.* 2011;20, e1370-e1376.
- [11]. American Academy of Pediatrics, Committee on Fetus and Newborn and Section on Anesthesiology and Pain Medicine. Prevention and Management of Procedural Pain in the Neonate: An Update. *Pediatrics*, 2016;137(2):e201-271. DOI: 10.1542/peds.2015-4271, ISSN Numbers: Print, 0031-4005; Online, 1098-4275.
- [12]. Hockenberry MJ, Wilson D. The High Risk Infant and Growth Measurement Appendix, Wong's, *Essentials of Pediatric Nursing*, 2013, 9<sup>th</sup> ed. 1121- 1126, Mosby, USA.
- [13]. Sahraeian F, Kalani N, Shakeri A. Pharmacological and Non-pharmacological Methods of Pain Relief in Venipuncture and Help to Maintain the Artery Flow in Children, with Tools such as Smart iv, *IIOABJ*, 2016, 7 (5),53-61.
- [14]. Parry S. Acute Pain Management in the Neonate. *Anesthesia and Intensive care Medicine*, 2011, 12:4
- [15]. Sevens B, Johanston C, Petryshin P, Taddio A. Premature Infant Pain Profile: Development and Initial Validation. *Clinical. J.* 2015, 12 (1): 13-22.
- [16]. Field T. Touch for Socioemotional and Physical Well Being: Developmental Review, 2010;30:367 383.
- [17]. Jain S, Kumar P, Douglas D, Mcmillan D. Prior Leg Massage Decreases Pain Responses to Heel Stick in Preterm Babies. *Journal of Pediatrics and Child Health*, 2013, 42: 505-508.
- [18]. Mirzarahimi E, Mehronush W, Shahizadeh A, Samadi S, Aman D. Effect of Non-Nutritive Sucking and leg Massage on Physiological and Behavioral Indicators of Pain Following Heel Blood Sampling in Term Neonates. *International Journal of Advanced Nursing Studies*, 2013 (2): 74-79.
- [19]. Aita M, Goulet C, Oberlander TF, Laurie S, Celeste J. A Randomized Controlled Trial of Eye shields and Earmuffs to Reduce Pain Response of Preterm Infants, *Journal of Neonatal Nursing*, 2015; 21, 93e103.
- [20]. Ibrahim E, EL-Giundy S, Rashad H, Mebed M. Effect of Foot Massage on Pain Responses to Heel Stick in Preterm Infants. *Medical Journal of Cairo University*, 2016, 84(2), 25-31. [www.medicaljournalofcairouniversity.net](http://www.medicaljournalofcairouniversity.net)
- [21]. Chick Y, Yim W, Choi K. The Effect of Upper Limb Massage on Infants' Venipuncture Pain, *Pain management nursing: official journal of the American Society of Pain Management Nurses*, 2016;18(1). DOI: 10.1016/j.pmn.2016.10.001
- [22]. Abdallah B, Badr L, Hawwari M. The Efficacy of Massage on Short and Long Term Outcomes in Preterm Infants. *Infant Behavior and Development*, 2013, 36(4).
- [23]. Samadi N, Allahyari I, Mazaheri E, Tamnejad M, Mehrnoush N, Namadi M, Naseri R., Nahamin M. Effect of Foot Reflexology on Physiologic Index of Neonates Iranian *Journal of Neonatology*,2014;1, 51-32.
- [24]. Donia A, Tolba A. Effect of Early Procedural Pain Experience on Subsequent Pain Responses among Premature Infants. *Egyptian Pediatric Association Gazette*, 2016, 64, 74–80, [www.medicaljournalofcairouniversity.net](http://www.medicaljournalofcairouniversity.net).
- [25]. Valeri B, Linhares M. Pain in Preterm Infants: Effects of Sex, Gestational Age, and Neonatal Illness Severity. *PsycholNeurosci.*, 2012;5(1):11–19.
- [26]. Bayomi O, El-Nagger N. Effect of Applying Massage Therapy on Physical, Physiological and Behavioral States of Premature Neonates. *Journal of Nursing Education and Practice*, 2015, 5(10); 105-114. URL: <http://dx.doi.org/10.5430/jnep.v5n10p105>.