Effect of Massage on Increasing Growth Parameters and Inducing Sleep among Premature Neonates

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Abstract

Massage therapy can be used in neonatal intensive care units for premature infants <37 weeks of gestation, which increase growth parameters with no harmful effects and help inducing sleep. **Aim**: This study aimed to determine the effect of massage on increasing growth parameters and inducing sleep among premature neonates. **Subjects and method:** A quasi-experimental research design was used on a purposive sample of 50 LBW premature neonates and their mothers who were admitted to NICU at Sohag University Hospital, Egypt, from August 2019, until January 2020. Premature neonates were randomly assigned into two groups with and without massage. **Tools**: **Tool (I):** A structured questionnaire was developed and consisted of two parts: part (1): Demographic characteristics of mothers of premature neonates, part (2): Demographic characteristics of premature neonates, **Tool (II):** Assessment of growth parameters, and **Tool (III):** Assessment of sleep behaviors before the intervention, after seven days and after one month of discharge. **Results**: There were no statistically significant differences between the mean of weight, length, and head circumference in the two groups before massage intervention. The majority of premature neonates in the intervention group had increased their growth parameters after seven days from the application of massage and after one month of discharge compared to those in the control group. **Conclusion:** massage was an effective and safe non-medical intervention used in improving growth parameters and sleeps behaviors and help premature neonates fall asleep faster after the massage than without massage. **Recommendations**: Massage should be involved in routine care in a neonatal intensive care unit (NICU), as standard care for premature neonates, health educational programs about massage and its effect should be taught to health care professional, especially pediatric nurses.

Keywords: Massage, growth parameters, sleep, premature neonates

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Introduction:

Low birth weight LBW neonates may be admitted in (NICU) for birth weight less than 1500 gram and required massage therapy hat is important in their growth outcome **(Waldemar and Carlo,** **2011). Liu et al., (2016)** reported that premature birth affected about one of every ten babies and the rate of premature birth among African and American women was about fifty percent higher than the rate of premature birth among white women. Also, **Gill and**

Boyle (2016) estimate that around 60,000 babies are born prematurely in the UK every year.

Massage is a non-medical intervention that may have a good effect on the physical growth of premature and LBW neonates as weight gain, promoting neurologic and neuro-motor development, better neonates-parent emotional bonding, and induced sleep. Massage has no harmful effect and can improve the growth of neonates more than 30 weeks of gestation and they are medically stable **(Sedighah et al., 2013).**

Promoting preterm neonates' environment can minimize the negative effects; developmental interventions can reduce neurodevelopment delay, weight gain deficit, and length on mechanical ventilation, physiological symptoms, and relevant side effects. Such modification includes the use of appropriate massage therapy **(Symington and Pinelli, 2006).**

Massage therapy, which means compression of soft tissue may result in stress reduction and calming of neonates who have massaged, shown less activity, reduces stress hormones, and may indirectly affect sleep **(Wang and Zhang, 2013).**

Massage therapy is considered one of the evidence-based nursing skills for increasing growth parameters for premature neonates (Fallah et al., 2013). Massage is a safe and effective technique that nurses can use for the care of premature neonates to improve their growth. Nurses play an effective role in applying massage for premature neonates. Nurses who are working in NICU must educate the mothers about how to practice massage for their premature neonates to enhance mothers'

child attachment to promote the increase of growth. The nurse must flow up with mothers and their neonates during the home visit schedule to educate the mother about the massage technique and its effect in promoting growth parameters **(Ramezani et al., 2017).**

Significance of the study:

According to World Health Organization Statistics, the rate of LBW is 17% in the whole world, 21% in developing countries. LBW is considered a result of preterm birth, intrauterine growth retardation, or both of them **(Islami et al., 2012)**. No previous studies were conducted in the faculty of nursing at the pediatric nursing, critical nursing department investigating the effect of massage on increasing growth parameters and inducing sleep among premature neonates. Hence, this study was conducted to achieve this aim. This study aimed to determine the effect of massage on increasing growth parameters and inducing sleep among premature neonates.

Aim of the study

The study aimed to determine the effect of massage on increasing growth parameters and inducing sleep among premature neonates.

Research hypothesis:

1- Premature neonates who receive massage intervention will have increasing growth parameters than premature neonates who will not.
2- Premature neonates who will receive massage intervention will have inducing sleep than neonates who will not.

Subjects and Methods:

Research design:

A quasi-experimental research design was used, which used to establish a cause-and-effect relationship between an independent and dependent variable. It does not rely on random assignment. Instead, subjects are assigned to groups based on non-random criteria. It is a useful tool in situations where true experiments cannot be used for ethical or practical reasons (**Lauren, 2020**).

Setting:

The study was conducted in neonatal intensive care unit NICU affiliated to Sohag University Hospital, Egypt, this setting was selected due to the high prevalence of neonates on the selected setting and also it serves the biggest region of population from both rural and urban areas. Home visit was done for follow up with mothers and their premature neonates after hospital discharge.

Subjects:

A purposive sample of 50 premature neonates and their mothers was admitted to NICU at Sohag University Hospital, from August 2019 until January 2020. Premature neonates were randomly assigned into two equal groups with and without massage. Intervention group (25 neonates received massage and routine care) and control group (25 neonates received the routine care only) as evaluation for the need of resuscitation, administration of prophylactic medications and vaccines, adequate feedings, safe sleep, hygiene of the newborn, and other important areas for baby wellbeing. All the studied premature neonates meet the following inclusion criteria: their gestational age from 30 to 37 weeks, birth weight of 1500-2000 grams, who were medically stable and stayed in the hospital for at least 7 days after application of the intervention. Exclusion criteria were neonates with sepsis, congenital malformations, and small for gestational age, severe respiratory distress, intrauterine growth retardation, and necrotizing enterocolitis during the NICU admission period.

Tools of data collection:

Three tools were used to collect the data of the study as the following:

Tool (I): structured questionnaire was developed after reviewing the related literature and research studies and consisted of two parts:

Part (1): Demographic characteristics of mothers of premature neonates: It included age, educational level, occupation, and residence

Part (2): Demographic characteristics of premature neonates: It included gender, gestational age/week, birth weight/gm., and type of delivery.

Tool (II): Assessment of growth parameters which is used to record weight, length, and head circumference.

Tool (III): Assessment of sleep behaviors such as length of sleep during 24 hours and length of night sleep.

Designed manual booklet about massage: This booklet was contained the illustrative colored pictures and the main points of each training session

Title: Massage therapy among premature neonates.

Aim: The goal of to equip mothers with knowledge regarding massage, growth parameters and sleep behaviors among premature neonates.

Objectives:

- To improve the studied mothers' knowledge about massage therapy and its effect for their premature neonates.

- To help mothers how to demonstrate massage therapy.

- To help identify growth parameters and sleep behaviors among premature neonates

Outlines of the booklet:

1- Knowledge about massage (meaning, technique, causes and importance of it).

2- Growth parameters and sleep behaviors for premature neonates.

3- Steps of massage technique demonstration.

4- Mothers' role at home with their premature neonates regarding massage.

Methods and Phases of Data Collection:

Validity and reliability of the tool:

The content validity of the tool was reviewed by five experts in the pediatric nursing and community health nursing field before using it. The Reliability of the tool was assessed through Cronbach's alpha test α= 92%.

Administrative Approval

Official permission was obtained from the Dean of Faculty of Nursing, Sohag University to the chairmen of the Neonatal Intensive Care Unit at Sohag University Hospital to conduct this study. The aim of the study was explained to obtain permission to collect the research data from the hospital under his directorate.

Ethical considerations:

The purpose of the study was explained to the mothers of premature neonates. The researchers informed the participants that the study was voluntary, they were allowed to refuse to participate and they had the right to withdraw from the study at any time, without giving any reason. Moreover, they were assured that their information would be confidential and used for research purposes only.

A pilot study

A pilot study was conducted on 10% of the mothers (5 premature neonates) to test the clarity and the feasibility of the research process and needed time for data collection. No modifications were required in the pilot study. The sample of the pilot study was included in the total sample.

Fieldwork:

- Permissions for data collection were generated from the hospital directors and head managers of the NICU, and by the submission of a formal letter from the Faculty of Nursing, Sohag University. Once the researcher was granted approval, the sheet was adapted.

- Before conducting the study, an exploratory visit was done to NICU to evaluate the rate of admission and suitable time for collecting data. Moreover, personal communication

was done with nurses and mothers of neonate to explain the purpose of the study and gain their best possible cooperation.

- Data were collected from August 2019 until January 2020.

- Researches were attended the previously mentioned setting for collected data one day per week (Saturday), from 9 Am to 1 Pm.

- Premature neonates were randomly assigned into two equal groups with and without massage

- The interview took around 2hour including training session according to the mothers' level of understanding and comfort.

- The proposed training session conducted on 2 mothers /day. The sessions were performed in the training unit with the permission of the responsible supervisor nurse at the selected hospital.

- A writing consent was obtained from mothers after explaining the purpose of the study

- Teaching methods included group discussion,role-playing, demonstration and re-demonstration, models, and pictures (massage use).

- The intervention group which included 25 premature neonates was received massage three times each day for 7 days by the researchers and routine care and the control group included 25 neonates who received the routine care only.

- The massage was done by the researchers in the presence of nurses and mother and it take about ten

minutes and the researchers perform three times per day (in the morning and at noon) it was done for 7 days in NICU and after one month of discharge for newborn during home visit in follow up by trained mothers.

- The massage was applied to neonates in a prone and supine position it was carried out from the neck and over both shoulders, upper back, and then each of the two upper and lower limbs was separately massaged (except for the face and head). Then massage was done in a supine position included chest, abdomen, upper limb, lower limb, palms, and sole massaged separately ten gentle strokes were used in each area of the massage **(Sankaranarayanan et al., 2005).**

- Growth parameters such as weight, length, and head circumference of all premature neonates were measured 7 days after starting of massage by the researchers and after one month of discharge for newborn during home visit in follow up by researchers.

- All premature neonates and newborn were weighed by using a digital weighing scale. The weighing scale was calibrated at regular intervals.

- Head circumference was measured using a flexible non-stretchable tape measure which runs from the supraorbital ridge to the occiput in the path as the maximum occipitofrontal circumference.

- Sleep behaviors were assessed by measuring time using the watch for length of sleep during 24 hours, and length of night sleep that the preterm neonate was sleep after massage

technique compared to the control group.

- The researchers were distributing the designed manual booklet on each participant to clarify how to apply the massage.

Statistical analysis:

Data entry and statistical analysis were performed using SPSS for Windows, version 20. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and mean and SDs for quantitative variables and mean values were compared using an independent Student t-test. Differences were considered significant at p-values of less than 0.05. Chi-square (x2) test of significance was used to compare proportions between qualitative parameters.

Results:

Table (1): Reflected that the mothers of premature neonates were between 18 < 23 years in the intervention group (48%) and their mean age was (19.10 ± 3.68) and (46%) in the control group which their mean age was (20.10 ± 1. 88). Nearly one-third (28%) of them had secondary education in the intervention group compared to (35%) in the control group, more than two-thirds of mothers (70%) were housewives in the intervention group compared to (80%) in the control group. most mothers (83%) were living in rural areas in the intervention group compared to (76%) in the control group.

In the **table (2)** a total of 50 premature neonates participated in this study, 55.3% were female in the intervention group compared to (66%) in the control group. Concerning gestational age/ week 76.0% of the

intervention group and 63.0of the control group was born 30 to 34 weeks of gestation in the control group. Additionally, 66.0% of premature neonates in the intervention group their birth weight/gm. was from 1500-2000 gm. compared to 63.0% in the control group. More than two-thirds of premature neonates (70%) were born by cesarean in the intervention group compared to (57%) in the control group.

Table (3) pointed out that there were no statistically significant differences found between premature neonates in the intervention group and in the control group regarding their some growth parameters mean such as weight, length, and head circumference before massage intervention.

Table (4) pointed out that there was a statistically significant increase in the intervention group more than the control group regarding weight after massage intervention. No statistically significant differences were found between the intervention group and the control group regarding length and head circumference.

Regarding weight, length, and head circumference there was a statistically significant increase in the intervention group more than the control group **(table 5).**

From **table (6)** illustrated that there was a mean increase regarding the length of sleep during 24 hours in the massage intervention group was 62.3 ± 21.6 minutes and in the control group, it was 11.25 ± 7.4 minutes. There was a mean increase in the length of night sleep among premature neonates in the intervention group was 95.7 ± 27.9 and in the control group, it was 27.5 ± 13.6 minutes.

Table (1): Percentage distribution of the studied mothers regarding their demographic characteristics (n=50)

Item	Intervention group (25)		The control group (25)	
	No.	%	No	%
women ' age in years				
18 < 23	12	48.0	11	46.0
23 < 28	5	20.0	3	10.0.0
28 < 33	6	24.0	5	20.0
33 < 35	2	8.0	6	24.0
Mean ±Stander deviation	19.10 ± 3.68		20.10 ± 1. 88	
- women ' education				
- Illiterate	6	23.0	5	20.0
-Read and write	5	20.0	6	25.0
-Primary education	6	24.0	3	10.0
-Secondary education	7	28.0	8	35.0
-University education	1	5.0	3	10.0
Occupation				
- Employee	7	30.0	5	20
- Housewife	18	70.0	20	80
-Residence				
-Rural	21	83.0	19	76.0
-Urban	4	17.0	6	24.0

Table (2): Frequency and percentage distribution of premature neonate regarding their demographic data (N=50)

Demographic data	Intervention group (25)		The control group (25)		X2	P-value
	No.	%	No	%		
Gender :						
- Male	11	44.7	9	34.0	.41	0.515 ns
- Female	12	55.3	16	66.0		
Gestational age/week						
- 30 < 34	19	76.0	15	63.0	.90	0.345 ns
- 34 ≤ 37	6	23.0	10	37.0		
Birth weight/gm.						
- 1000-1500	9	34.0	10	37.0	2.7	0.355 ns
- 1500-2000	16	66.0	15	63.0		
Type of delivery						
- Normal delivery	7	30.0	11	43.0	.80	0.675 ns
- Caesarean	18	70.0	14	57.0		

Table (3): Comparison of growth parameters of premature neonates as weight, length, and head circumference before intervention for both groups

Growth parameters(mean±SD)	Intervention group (25)	The control group (25)	P-value
Weight (gm.)	1811±121	1539±513	0.405
Length (cm)	42.52±0.39	42.03±0.31	0.968
Head circumference (cm)	30.48±0.56	30.5±0.93	0.742

Table (4): Comparison of growth parameters of premature neonates as weight, length, and head circumference after one week of massage intervention

Growth parameters (mean±SD)	Intervention group (25)	The control group (25)	P-value
Weight (gm.)	1889 ± 204	1680 ± 305	P<0.001
Length (cm)	42.92±1.39	42.53±1.30	0.950
Head circumference (cm)	31.98±1.16	31.15±0.43	0.213

* Used statistical test: T-test

Table (5): Comparison of growth parameters of premature neonates as weight, length, and head circumference after one month of massage intervention

Growth parameters (mean±SD)	Intervention group (25)	The control group (25)	P-value
Weight (gm.)	2279 ± 204	2100 ± 305	P<0.01
Length (cm)	44.62±1.39	43.13±1.30	P<0.01
Head circumference (cm)	33.58±1.16	32.25±0.43	P<0.05

* Used statistical test: T-test

Table (6): Comparison of sleep behaviors such as length of sleep during 24 hours and length of night sleep after one month of massage intervention

Growth parameters (mean±SD)	Intervention group (25)	The control group (25)	P-value
length of sleep during 24 hours	62.3 ± 21.6	11.25 ± 7.4	P<0.001
length of night sleep	95.7 ± 27.9	27.5 ± 13.6	P<0.001

* Used statistical test: T-test

Discussion:

Massage is a gentle touch and relaxation technique to improve care in intensive care neonates. It is considered central in nursing knowledge and practice **(Smith, 2013)**. Hence, the current study was aimed to determine the effect of massage on increasing growth parameters and inducing sleep among premature neonates. This aim was significantly achieved because there were statistically significantly improved post-intervention regarding growth parameters and inducing sleep among premature neonates.

The findings of the current study revealed that there was a statistically significant increase in the intervention group more than the control group regarding weight; these results were in the same line with **Ahmed and Thabet**

(2018) who found in their study about "Effect of Massage Therapy on Weight Gain and Hospital Stay for Premature Neonates" that the majority of neonates in the intervention group, their weight increased after five days of applying massage than in the control group.

The findings of the current study reported that no significant differences were found between premature neonates in the intervention group and the control group before intervention regarding their growth parameters' means scores such as weight, length, and head circumference. It is indicated the importance and effectiveness of massage implementation increasing growth parameters. The result of the present study is supported by **Fayed (2016)** who studied the effect of Physical stimulation on premature infants and found the same result. These findings are also supported by **Ahmed and Thabet (2018)** who reported in their study about "Effect of Massage Therapy on Weight Gain and Hospital Stay for Premature Neonates" that no significant increase found between premature neonates in the intervention group and the control group before the intervention. **Field, (2018)** reported in his study about postnatal anxiety prevalence, predictors and effects on development that massage has a positive effect on increasing growth parameters among premature neonates.

This study agrees with **Saeadi et al., (2015)** who studied the effect of massage with medium-chain triglyceride oil on weight gain in premature neonates and reported a significant weight gain to the group who received massage than the control group. Many studies have reported the positive effects and safety of premature massage for the preterm neonates receiving massage **(Diego et al., 2014).** Also, the study results were supported by the findings of **Tekgündüz et al., (2014)** who reported in their study about "Effect of abdomen massage for prevention of feeding intolerance in preterm infants" that weight gain is accompanied by massage among neonates.

Results of the present study reflected that there was an increase regarding the mean length of sleep during 24 hours in the massage intervention group was 62.3 ± 21.6 minutes and in the control group; it was 11.25 ± 7.4 minutes. Also, showed that mean of the length of night sleep among premature neonates increase in the intervention group was 95.7 ± 27.9 than in the control group it was 27.5 ± 13.6 minutes. These findings are following the results of the study done by **Narenji and Rosbahany, (2008)** about "The Effects of Massage Therapy on Weight Gain And Sleep Behaviors in Infants" who reported that massage could improve sleep behaviors. This is in agreement with **Yates et al., (2014)** who conduct a study about the effects of massage for inducing sleep among premature neonates who found that massage is a good technique for **premature neonates** who did not get asleep. This indicates that the mothers of premature neonates required information. And nurse ability to communicate information about the massage to improve growth parameters of premature neonates.

Conclusion:

The massage was an effective and safe non-medical intervention used in

improving growth parameters and sleeps behaviors and help premature neonates fall asleep faster after the massage than without massage. Regarding weight, length, and head circumference there was a statistically significant increase in the intervention group more than the control group. Mean of the length of night sleep among premature neonates increase in the intervention group was 95.7 ± 27.9 than in the control group it was 27.5 ± 13.6 minutes.

Recommendations:

Massage should be involved in routine care in a neonatal intensive care unit (NICU), as standard care for premature neonates, health educational programs about massage and its effect should be taught to health care professional, especially pediatric nurses. Further studies are needed about the effects of massage on outcomes such as neurodevelopment and pain tolerance.

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