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Effect of Prefeeding Oral Stimulation Technique on Reaching to Full Oral Feeding in Preterm Newborn in Neonatal Intensive Care Units in Ismalia City

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Abstract
Background: *Oral stimulation is used as an effective treatment strategy to enhance oral feeding performance of preterm neonates with feeding problems to attain total oral feeding as soon as possible*. ***Aim:*** *was to assess the effect of prefeeding oral stimulation technique on reaching to full oral feeding in preterm neonates in neonatal intensive care units in Ismailia city. Quasi-experimental design was used.* ***Setting:*** *Neonatal intensive care unit of Suez Canal University Hospital in Ismailia city. A convenient sample of 60 preterm neonates, divided randomly into 30 for the study group and 30 for the control group.* ***Tools:*** *two tools used for data collection:1) Biophysiological assessment record to assess personal data, physiological measurement and feeding performance of preterm neonates. 2) Early feeding skills likert scale to assess oral feeding ability of preterm neonates.* ***Results:*** *revealed that the majority of the study group in the 3rd day was on oral feeding. In the 3rd day, study group had higher mean milk intake than the control group. Also, the control group had higher mean milk leakage and higher mean oral feeding duration than the study group. There was statistical positive correlation between preterm neonates ' total score of early feeding skills and their gestational age in the study group.* ***Conclusion:*** *the study group neonate started oral feeding early, received higher mean milk intake and had less mean milk leakage than the control group. All preterm neonates in both the study and control group had no adverse reactions during the three days of the study neither before nor after oral feeding.* ***Recommendations:*** *Start oral stimulation technique for preterm neonates immediately after his admission to NICU before developing feeding difficulties and replication of the study on larger sample of the preterm neonates and in other study setting to generalizability the results.*
Keywords: *Oral stimulation, nutritive sucking, nonnutritive sucking, preterm neonate*.

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I. Introduction

Feeding disorders affect 25% of all children. However, neonates born prematurely have a higher occurrence of feeding disorders than full term neonates. It is estimated that 30 - 40% of preterm neonates may encounter oral feeding problems. Oral feeding problems in the preterm population are a prominent public health concern because of their negative impact on children's health and quality of life ***(Fucile et al., 2011).*** However, neonatal oral feeding difficulties often delay discharge from the hospital, negatively impact parent-infant bonding and they may lead to long-term feeding disorders causing growth failure. Such consequences have enormous social and economic costs ***(Asadollahpour et al., 2015).***

Oral stimulation is used as an effective treatment strategy to enhance oral feeding performance of preterm neonates with feeding problems to attain total oral feeding as soon as possible ***(Harding et al, 2014).*** Also a preventative approach can reduce and/or prevent the occurrence of neonatal oral feeding difficulties, and thus ease the burden of care. Hence, development of early intervention strategies is urgently needed to facilitate appropriate development of oral feeding skills in preterm neonates ***(Fucile et al., 2011).*** Oral feeding is contingent on the coordinated interaction of complex processes. These include sucking, swallowing and respiration, which are associated with the musculoskeletal, cardio-respiratory, gastrointestinal, behavioral and neurological systems ***(Mousa et al., 2017).*** Pre-feeding oral sensorimotor intervention aimed at improving preterm infants' oral feeding skills ***(Fucile et al., 2011& Asadollahpour et al., 2015).*** The applied perioral stimulation increases oral motor organization, improve muscle contractility and sucking rate as a result

increases oral intake and minimize fluid loss, while applied intraoral stimulation and non-nutritive sucking (NNS) enhance the salivary secretions and facilitate swallowing ***(Green et al., 2012*** and ***Corbin-Lewis, & Liss, 2014).***

Across all studies, there is considerable evidence that oral stimulation through NNS or sensorimotor input to the oral structures has beneficial effects on oral feeding performance when applied before or during oral feedings in medically stable preterm neonates ***(Lau, 2014). Garber, 2013*** and ***Zhang et al., 2014,*** reported an enhanced sucking rate after stroking the cheeks during oral feeding session and ***Green et al, 2012*** and ***Zhang, et al, 2014,*** demonstrated an increase in intake volume when cheek and chin support was provided during oral feeding. Accelerated maturation of the sucking reflex and earlier readiness for bottle-feeding is reported when preterm neonates are presented with NNS opportunities during gavage feeding ***(Amer, 2015).*** Another recent evidence points to the fact that the sensory consequences associated with the production of NNS have beneficial effects on oral feeding performance and on the development of specific sucking skills ***(Barlow et al., 2008, Poore et al., 2008, Bingham et al., 2010, and Pinelli & Symington, 2010).*** Fostering successful oral feeding in preterm neonates requires consistently high levels of skilled nursing care, which must begin with accurate assessment of feeding readiness and thoughtful progression to full oral feeding ***(Mcgrath& Braescu, 2004).*** Nurses can play an important role on enhancing oral feeding skills through oral sensory stimulation during preterm neonates' routine care ***(Fucile, 2008).***

II. Significance of the study

Safe and successful suckle feeding, via breast or by bottle, is one requirements for hospital discharge and an ultimated goal for preterm newborn feeding ***(Fucile et al., 2011).*** Thus, facilitating oral feeding skills and helping preterm newborns transit to full oral feeding are a key focus for the medical staff of neonatal intensive care units. Nurses can play an important role on enhancing oral feeding skills through oral stimulation during preterm newborn routine care. So that, this study will be conducted to examine the effect of prefeeding oral stimulation technique on enhancing oral feeding in preterm newborns.

III. Aim of the study to

Assess the effect of prefeeding oral stimulation technique on reaching to full oral feeding in preterm newborn in neonatal intensive care units in Ismailia city.

IV. Research Objectives

1. Study the effect of prefeeding oral stimulation technique for preterm newborns on the onset of oral feeding.
2. Evaluate the effect of prefeeding oral stimulation technique on the efficiency of oral feeding.
3. Determine the effect of prefeeding oral stimulation technique on the timing to reach full oral feeding.

V. Research Hypothesis

1. Preterm newborn who will receive prefeeding oral stimulation technique will start early oral feeding than control group.

2. Preterm newborn who will receive prefeeding oral stimulation technique will take more amount of milk than control group.

3. Preterm newborn who will receive prefeeding oral stimulation technique will have less amount of milk leakage than control group.

4. Preterm newborn who will receive prefeeding oral stimulation technique will have less adverse reaction than control group.

VII. Subjects and Methods

6.1 Research design:

A quasi- experimental research design was utilized in the current study.

6.2 Subject:

A convenient sample of 60 preterm neonates who were divided randomly into 30 preterm neonates for the study group and 30 preterm neonates for the control group

6.3 Setting:

The present study was conducted at neonatal intensive care unit in the Suez Canal University.

6.4 Tools of data collection:
Two tools were used for data collection:
Tool I: Biophysiological assessment record. It composed of three parts (part I&II which developed by the research investigator).
Part (1): It included data about preterm neonate: sex, gestational age, postnatal age, diagnosis and duration of hospitalization
Part (2): It included the physiological measurement of the preterm neonate include: pulse, respiration and presence of adverse reactions (apnea, bradycardia and oxygen desaturation) of the preterm neonates.
Part (3): About feeding performance. It adopted from ***Fucile (2008)*** to assess post feeding performance. It include method of feeding, amount of milk taken, amount of milk leakage during feeding and oral feeding duration.
Tool II: Early feeding skills likert scale: It adopted from ***Suzanne et al. (2005).*** It consists of two main parts:
Part (1): Oral feeding readiness: which consisted from 2 items to assess the preterm neonates' ability to hold the body in a flexed position with arm/hands toward midline and demonstrate energy for feeding.

Scoring system: Regarding ability of oral feeding readiness of preterm neonate scores: unable was giving one score, some able was giving two scores, and able was giving three scores. The total number of recorded items for each neonate was 12. The total ability of oral feeding readiness of preterm neonate scores was 36 scores. The scores of the items were summed up and the total divided by the number of the items, theses scores were converted into a percent score. The ability was considered low were ability score <33.3%, moderate were ability scores 33.3% - <66.7%, and high were ability scores 66.7>.
Part (2): Oral feeding skills: It consists from three sections as the following:
Section A: Coordinate oral-motor functioning:
It consisted from 2 items (assessing the preterm neonates' ability to open mouth when lips stroked at feeding onset and ability to maintain a smooth, rhythmic pattern of sucking).
Section B: Coordinate swallowing & breathing pattern:
It consisted from 2 items (assessing the ability to engage in long sucking and maintaining stability of sucking and swallowing interval).
Section C: Maintenance of physiological stability:
It consisted from 3 items (assessing the ability to maintain oxygen saturation and absence of behavioral stress cues in the first 30 seconds after each feeding; stops to breathe before behavioral stress cues appear and ability to clear breath sounds and no grunting breath sounds).

Scoring system: Regarding ability of oral feeding skills of preterm neonate scores: unable was giving one score, some able was giving two score, and able was giving three scores. The total number of recorded items for each neonate was 42. The total ability of oral feeding skills of preterm neonate scores were 126 scores; the scores of the items were summed up and the total divided by the number of the items, theses scores were converted into a percent score. The ability was considered low were ability score <33.3%, moderate were ability scores 33.3% - <66.7%, and high were ability scores 66.7>.
The response to early feeding skills likert scale was in form of unable, some able or able. It is recorded immediately after oral feeding twice daily (1st session& 2nd session) for three consecutive days for the two groups.

Oral stimulation technique
Prefeeding oral stimulation technique adopted from ***Fucile (2008)*** and ***Hwang et al. (2010)***. Prefeeding oral stimulation technique conducted only for the study group before feeding twice daily in the morning shift at 9 am (session 1) and at 12 pm (session 2) for three consecutive days. The control group exposed to the routine feeding in the hospital.

Table (1) Prefeeding Oral Stimulation Program

Structure	Stimulation steps	Frequency	Duration
Cheek	1. Compression from the corner of the lip toward the ear. 2. Return to the corner of the lip (C-pattern).	8xeach cheek	2min
Lip	Move the finger from the corner of the lip to the other corner.	8xeach lip	2min
Gum	Compression from the center of the gum toward the back of the mouth.	4xeach gum	2min
Internal Cheek	1. Place the finger at the inner corner of the lips. 2. Compress and move back toward the lateral molar. 3. Return to the corner of the lip.	4xeach cheek	2min
Tongue	1. Push the border of the tongue. 2. Compress the hard palate and tongue. 3. Stroke the palate to elicit a suck.	8 time	1min 2min 1min
Pacifier	Place pacifier in the mouth		3 min

6.5 Validity and reliability:
The two tools were reviewed by 3 experts (2 in Pediatric Nursing, 1 in Pediatric Medicine) to test the content validity of the tools and clarify the sentences as well as appropriateness of content. The reliability of the tools was determined by using Cornbrash's Alpha: biophysiological measurement (Tool I) equal 0.793 and reability of the early feeding skills likert scale (Tool II) equal 0.939

1. Pilot study:
A pilot study was conduct on 10% of the sample. Those included in the pilot study were excluded from the sample.

2. Data collection procedure:
After obtaining permissions from the Director of the Hospital and Neonatal Intensive Care Unit of the previous mentioned hospital to proceed with the proposal study, the researcher initiated the process of data collection. The actual field work was carried out over a period of seven months from the beginning of July, 2016 to the end of January, 2017.The preterm neonates who fulfilled inclusion criteria were submitted randomly into two equal groups one of them was the study and the other was the control group. Personal data was collected from the preterm neonates' file (Tool I, part 1). After changing neonatal diaper and the preterm neonate become in alert and quiet state, the preterm neonate's pulse, respiration and presence of adverse reaction (apnea, bradycardia and oxygen desaturation) (Tool I, part 2) was recorded from the monitor and documented by the research.

Prefeeding oral stimulation technique was carried out only for the preterm neonates in the study group twice daily in the morning shift at 9 am (1^{st} session) and at 12 pm (2^{nd} session) for three consecutive days. After finishing oral stimulation, the research investigator raised up the head of the preterm neonate and supports his cheek and jaw and feed the preterm neonate by bottle if the neonate is able, he will receive bottle feeding (artificial milk) orally and if the preterm neonate some able or unable he will continue feeding by gavage. The preterm neonates in the control group don't receive any prefeeding oral stimulation and only get their routine feeding. Daily physiological measurement (tool I, part 2) was assessed immediately before and after the feeding for twice daily in the morning shift at 9 am (1^{st} session) and at 12 pm (2^{nd} session) for three consecutive days for the two groups. Oral feeding performance (tool I, part 3) and early feeding skills likert scale (Tool II, part 1&2) were recorded only immediately after the feeding twice daily in the morning shift at 9 am (1^{st} session) and at 12 pm (2^{nd} session) for three consecutive days for the two groups. The amount of milk leakage were measured by weighing a peace of cotton before putting it under the chin of the preterm neonate and the cotton weight again to measure the amount of milk leakage by using electronic pocket scale. The amount was measured by centimeter (cm), each 1cm equal 1 gram (g).

3. Statistical design:
The collected data were organized, revised, tabulated and analyzed using number and percentage distribution. Statistical analysis was done by computer using statistical package of social science (SPSS) program, version 22. Proper statistical tests were used to determine whether there was a significant statistical difference between variables of the study. The following statistical techniques were used: Percentage, Mean score degree ($\bar{X}$), standard Deviation (SD), T-Test (T), Chi-Square (X^2), Mann Whitney (Z). Statistical significance was considered at $P < 0.05$

4. Ethical consideration:
All ethical issue was ensured to all preterm neonates during dealing and implementing the prefeeding oral stimulation for them. Consent was taken from parents of preterm neonates in the study after explaining the aim and nature of the study to them. Parents have a right to withdrawn their preterm neonates from the study at any time without any effect on the daily routine care. The investigator assured anonymity and confidentiality of the collected data which used for the research only. In addition the research investigator reviewed the related literature, figures and videos before conducting the oral stimulation technique.

VII. Results:

Table (2): Personal data of preterm neonates among the study and control groups

Socio-demographic characteristics	Study group (n=30)		Control group (n=30)		Test / P
	No.	%	No.	%	
Gestational age/weeks					
34 weeks	12	40.0	6	20.0	
35 weeks	7	23.3	14	46.7	t=0.793
36 weeks	11	36.7	10	33.3	P=0.431
Mean±SD	34.9±0.9		35.1±0.7		
Gender					
Male	11	36.7	15	50.0	X^2=1.086
Female	19	63.3	15	50.0	P=0.297
Postnatal age/days					
One day	14	46.7	13	43.3	
Two days	16	53.3	17	56.7	t=0.255
Mean±SD (days)	1.5±0.5		1.6±0.5		P=0.799
Diagnosis					
Preterm-Poor Sucking	17	56.7	16	53.3	X^2=0.083
Preterm-Poor Sucking-•RDSI	13	43.3	14	46.7	MCP=1.0

• RDSI: Respiratory distress syndrome grade I

Table (2): Shows that less than half (40%) of the preterm neonates in the study group their age was 34 weeks and less than one quarter of them (23.3%) their age was 35 weeks, the mean age was 34.9±0.9 weeks. While less than half (46.7%)of the preterm neonates in the control group their age was 35 weeks and less than one quarter of them (20%) their age was 34 weeks, the mean age is 35.1±0.7 weeks. More than half of the preterm neonates in the study group (63.3%) were females, while half (50%) of the preterm neonates in the control group were females. More than two fifths (46.7%) of the study group their age was one day postnatal age, the mean age was 1.5±0.5 days. More than half (56.7%) of the preterm neonates in the control group had two days postnatal age, the mean age was 1.6±0.5 days. More than half of preterm neonates in the study and control groups diagnosed as preterm with poor sucking (56.7%, 53.3% respectively). There were no significant differences between the two groups regarding gestational age, gender, postnatal age and diagnosis

Table (3): Type of feeding methods among neonates in the study and control groups in the 3 days of the study

Days & sessions		Feeding method	Study group (n=3-0)		Control group (n=30)		Test Significant
			No.	%	No.	%	
1st day	**Session 1**	**Ryle**	30	100.0	30	100.0	---
		Oral	0	0.0	0	0.0	
	Session 2	**Ryle**	30	100.0	30	100.0	---
		Oral	0	0.0	0	0.0	
2nd day	**Session 1**	**Ryle**	14	46.7	28	93.3	X^2=15.556
		Oral	16	53.3	2	6.7	P<0.000***
	Session 2	**Ryle**	9	30.0	26	86.7	X^2=19.817
		Oral	21	70.0	4	13.3	P<0.000***
3rd day	**Session 1**	**Ryle**	4	13.3	13	43.3	X^2=6.648
		Oral	26	86.7	17	56.7	P=0.01**
	Session 2	**Ryle**	3	10.0	9	30.0	X^2=3.750
		Oral	27	90.0	21	70.0	P=0.05*

Table (3): Clarifies that in the 3rd day the majority of the study group in session 1&2 were on oral feeding (86.7%, 90.0% respectively). While more than half of the control group was on oral feeding (56.7%, 70.0% respectively). There were significant differences between the two groups in the 2nd day of the sessions 1&2 (X^2=15.556, P=0.000; X^2=19.817, P=0.000 respectively) and in the 3rd day session 1&2(X^2=6.648, P=0.01; X^2=3.750, P=0.05 respectively).

Table (4): Mean amount of oral milk intake among the study and control groups

Milk amount (ml^3) / Days& Sessions		Study group Mean±SD	Control group Mean±SD	Test	p-value
2nd day	**Session 1**	15.2±5.2	13.7±5.1	**t=3.404**	**0.000*** **
	Session 2	17.2±5.8	14.3±4.5	**t=2.109**	**0.039***
3rd day	**Session 1**	17.2±4.5	15.8±6.6	t=0.917	0.363
	Session 2	19.5±5.6	18.0±6.4	t=0.966	0.338

Table (4): Represents that in the second day the higher mean milk intake among neonates in the study group than the control groups both in the session 1 (15.2±5.2, 13.7±5.1 ml^3 respectively) and in the 2nd session (17.2±5.8, 14.3±4.5 ml^3 respectively). There were significant differences between the two groups in the 2nd day in the first session (t=3.404, p=0.000) and in the second session (t=2.109, p=0.039). In the 3rd day the table shows that the higher mean milk intake among neonates in the study group than the control group both in the session 1 (17.2±4.5, 15.8±6.6 ml^3 respectively) and in the 2nd session (19.5±5.6, 18.0±6.4 ml^3 respectively).

Table (5): Percentage distribution of oral feeding preterm neonates with milk leakage among the study and control groups

Days &sessions		Groups	Milk leakage			Test	p-value
			No	%	Mean±SD (ml3)		
2nd day	**Session 1**	**Study N=16**	16	100.0	1.6±0.8	Z=1.84	0.209
		Control N=2	2	100.0	3.0±1.4		
	Session 2	**Study N=21**	21	100.0	1.4±0.9	Z=0.818	0.543
		Control N=4	4	100.0	2.0±1.6		
3rd day	**Session 1**	**Study N=26**	26	100.0	1.1±0.8	t=0.919	0.364
		Control N=17	17	100.0	1.4±1.2		
	Session 2	**Study N=27**	27	100.0	1.0±0.7	t=1.71	0.094
		Control N=21	21	100.0	1.6±1.4		

Table (5): shows that the higher mean milk leakage was detected between preterm neonates in the control group. No significant different between the two groups regarding the mean milk leakage during the 3 days of the study.

Table (6): Mean duration of oral feeding per feeding among the study and control groups

Feeding duration (minutes) / Days& sessions		Study group (n=30) Mean±SD	Control group (n=30) Mean±SD	T-Test	p-value
2nd day	**Session 1**	10.8±1.9	12.3±4.7	1.626	0.112
	Session 2	10.8±1.9	12.8±4.9	**2.101**	**0.042***
3rd day	**Session 1**	11.5±2.7	12.5±3.4	1.263	0.212
	Session 2	11.2±2.5	12.0±3.4	1.084	0.283

Table (6): Illustrated that preterm neonates in the control group had the higher mean oral feeding duration then the study group. There were no significant differences between the two groups in the 1 session of the day 2 and in the 1&2 sessions in the day 3 of the study. There was a significant difference between the two groups in 2nd day in session 2 (t=2.101, p=0.042).

Table (7): Apnea, bradycardia and oxygen desaturation among preterm neonates in the study and control groups in the 3rd of the study

Days &sessions		Apnea, bradycardia &oxygen desaturation		Study group (n=30)		Control group (n=30)	
				No	%	No	%
3rd day	Session 1	Pre	No	30	100.0	30	100.0
		Post	No	30	100.0	30	100.0
	Session 2	Pre	No	30	100.0	30	100.0
		Post	No	30	100.0	30	100.0

Table (7): Shows that all (100%) of preterm neonates in both the study and control groups had no apnea, bradycardia and oxygen desaturation in the third day of the study neither before nor after oral feeding.

VIII. Discussion

The short- and long-term impact of neonatal oral feeding difficulties points to the critical need for more efficacious early interventions to facilitate the appropriate development of oral feeding skills in preterm infants ***(Green et al., 2012).*** Oral stimulation is the most commonly utilized and researched sensorimotor intervention to improve preterm neonates' oral feeding skills. The overall goals of oral stimulation are to maintain oral-motor skills, facilitate normal oral- motor developmental pattern, and enhance oral muscle tone and movement ***(Fucile, 2010).*** The present study aim was to assess the effect of prefeeding oral stimulation technique on reaching to full oral feeding in preterm newborn in neonatal intensive care units in Ismailia city.

Regarding preterm neonate's gestational age it was found that the highest mean age (35.1±0.7days) among the preterm neonates in the control group. This finding contraindicated with ***Zayed (2013)*** who conducted a study to assess the effect of pre-feeding sensorimotor stimulation strategy on enhancing oral feeding skills in preterm infants, and found that the highest mean age (31.57±2.99 days) was detected among preterm neonates in the study group. Concerning preterm neonate's gender the current study revealed that in the study group, more than half of the studied preterm neonates (63.3%) were females. The result supported by ***Amer (2015)*** who studied the effect of prefeeding oral stimulation program on preterm infant feeding performance, and found that more than half of the studied preterm neonates (63%) in the study group were females. The finding of the current study in contrary by ***Danielle &Sheila (2017)*** who conducted a study about oral feeding performance in premature infants stimulated by swallowing technical training and mentioned that more than half of the studied preterm neonates were males.

The present study showed that half (50%) of the studied preterm neonates in the control group were females and the other half of them (50%) were males. This finding goes on line with ***Zayed (2013)*** who reported that half (50%) of the studied preterm neonates in the control group were females and the other half of them (50%) were males. While this finding was in contrast with ***Amer (2015)*** who reported that more than half (57.1%) of the studied preterm neonates in the control group were females. In relation to postnatal age, the result of the current study showed that, the highest mean age (1.6±0.5 days) was found among the preterm neonates in the control group. This finding was in agreement with ***Zayed (2013)*** who reported that the highest mean age (5.07±4.37 days) was detected among preterm neonates in the control group. Concerning diagnosis, it was found that more than half (56.7%) of the studied preterm neonates in the study group and in the control group (53.3%) diagnosed as preterm and had poor sucking. This finding contradicted with many authers: ***Zayed (2013)*** who found that more than two fifths (46.7%) of the studied preterm neonates in the study group and the majority (73.3%) of the studied preterm neonates in the control group were preterm and had respiratory distress syndrome grade I. ***Anand et al., (2009)*** in their study about respiratory distress syndrome in neonates found that respiratory distress syndrome was the most common health problem in preterm neonates. Also; ***Younis (2011)*** conducted a study about Effect of massage therapy on weight and duration of stay of low birth weight preterm neonates in some neonatal intensive care units at Shebin El-Koom Town and found that respiratory distress syndrome was the most common health problem in preterm neonates.

The result of the present study revealed that there were statistical significance differences between the two groups in the 2nd day and in 3rd day (session 1&2) regarding type of feeding method. From the researcher point of view this result may be due to the intervention which improves the preterm ability to receive oral feeding. This finding was consistent with ***Amer (2015)*** who reported that there were statistical significance differences between the two groups regarding type of feeding method. Concerning the 3rd day the majority of the study group in session 1&2 were on oral feeding (86.7%, 90.0% respectively). While more than half of the control group was on oral feeding (56.7%, 70.0% respectively). This result supported with ***Gennattasio et al., (2015)*** who conducted a study about oral feeding readiness assessment in premature infants and he found that

the majority of preterm neonates in the study group depended on oral feeding. In contrast, ***Hwang, et al, (2010)*** who conducted a study about effects of prefeeding oral stimulation on feeding performance of preterm infants and reported that more than two fifths (47.9%) of preterm neonates in the study group depended on oral feeding by the end of the study sessions.

Results of the current study detected that in the 3rd day of the study the highest mean amount of milk intake among neonates in the study group than the control group both in the session 1&2. This finding could be attributed to the fact that the intra-oral stimulation applied to the upper and lower gum of the study group may have improved the range of motion of tongue, supported suck to strengthen suction, stimulate swallow so increase the amount of milk intake per suck. This result goes on line with many authers: ***Amer (2015)*** who reported that the highest mean milk intake was reported by preterm neonates in the intervention group, while the lowest mean were detected among preterm neonates in control group. Also; ***Hwang (2008)*** conducted a study about effects of prefeeding oral stimulation on feeding performance of preterm feeding and who found that a 5-minute prefeeding oral stimulation had significantly increased total oral intake rate in the study group at the end of the study. The finding supported by ***Lau et al., (2012)*** who conducted a study about impact of nonnutritive oral motor stimulation and infant massage therapy on oral feeding skills of preterm infants, and clarified that nonnutritive oral motor stimulation combined with infant massage therapy accelerated the maturation of infants' oral feeding skills which was characterized by greater amount of formula intake during the first five minutes of starting the feeding.

However the present study showed that there were no significant differences between the two groups in the 1&2 sessions in the 3rd day regarding amount of milk intake. This finding goes in line with ***Hwang, et al, (2010)*** who reported that over the entire feeding sessions, no significant differences between the two groups were found in total oral intake rate. The result of the present study illustrated that in the 3rd day; both in the 1&2 session preterm neonates of control group had highest mean milk leakage than the study group. However, there was no significance difference between the two groups regarding the mean milk leakage during the 3 days of the study. From the point of view of the researcher this result may be due to time progressed and by the repetition of prefeeding oral stimulation the infant's net leakage was beneficially affected where the compression applied to the tissues of cheeks, upper and lower lips improved lip range of motion, increased cheek and jaw stability and promoted lip seal on the nipple so decreased net leakage from both sides of the mouth. The research investigator observed that nurses just record the method of feeding, amount of milk intake and did not record amount of milk leakage. This finding comes in agreement with ***Amer (2015)*** who found that the amount of milk leakage in preterm neonates in the control group more than amount of milk leakage found by preterm neonates in the study group. The result contradicted with ***Hwang (2008)*** who found that a 5- min prefeeding oral stimulation had significantly decreased percentage of net milk leakage in the study group.

Regarding duration of oral feeding in the third day of the study, the finding showed that the highest mean oral feeding duration among control group than the study groups in the session 1&2. While there were no significant differences between the two groups in the 1&2 sessions in the day 3 of the study. The decrease in oral feeding duration among the study group could be attributed to the fact that prefeeding oral stimulation assisted the upward movement of the jaw to decrease the effort required by the infant to suck from a bottle, as a result decreased the oral feeding duration. This finding were consistent with ***Hwang et al, (2010)*** who reported that over the entire feeding sessions, no significant differences between the two groups were found in oral feeding duration. These findings were in contrast with ***Hwang (2008),*** who reported that a 5- minute prefeeding oral stimulation had significantly shortened oral feeding duration in the intervention group than in control.

The finding of the present study illustrated that all (100%) of preterm neonates in both the study and control groups had no apnea, bradycardia and oxygen desaturation during the three days of the study neither before nor after implementation of the prefeeding oral stimulation technique. This result goes on line with ***Hwang (2008) & Hwang et al., (2010)*** who clarified that there was no change in the peripheral oxygen saturation levels in the initial 5 minutes after feeding following the intervention. In contrast ***Mousa et al., (2017)*** who conducted a study about the effect of non-nutritive sucking on transcutaneous oxygen saturation in neonates under the nasal continuous positive airway pressure (CPAP) and reported that the mean oxygen saturation values before performing non-nutritive sucking was (96.31±2.88), which was changed to (98.35±1.6) after intervention, and this increase was statistically significant.

IX. Conclusion

In the light of the current study, it can be concluded that, the study group preterm neonate started oral feeding early since the first session of the 2nd day of the study. In the 3rd day of the study, the study group received higher mean milk intake and had less mean milk leakage than the control group. All preterm neonates in both the study and control group had no adverse reactions during the three days of the study neither before nor after oral feeding.

X. Recommendations

The researchers propose to start oral stimulation technique for preterm neonates immediately after his admission to NICU before developing feeding difficulties. Each NICU must have standard prefeeding oral stimulation programme needed for preterm neonates with oral feeding difficulties. Neonatal intensive care units' polices should include the provision of prefeeding oral stimulation technique as a part of routine daily care for preterm neonates with oral feeding difficulties. Booklets and electronic media about prefeeding oral stimulation technique should be available at NICUs.

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