

## The Effect of Oral Sensory Motor Stimulation on Short Term Clinical Outcomes for Preterm Neonates

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**Abstract: Background:** Oral sensory motor stimulation is one of the widely strategies used for preterm neonates to improve oral feeding skill. **purpose:** purpose of the study is to assess the effect of oral sensory motor stimulation on short term clinical outcomes for preterm neonates. **Design:** Aquasi-experimental design was utilized. **Setting:** The study was conducted at Neonatal Intensive Care Units at Benha University Hospital. **Sample:** A purposive sample of 100 preterm neonates. A simple random sample was done to assign them into two groups, study group included 50 preterm neonates and control groups included 50 preterm neonates. **Instruments:** Two Instruments were used. Instrument one, A structured questionnaire sheet, Instrument two, Preterm clinical outcomes measurement sheet. **Results revealed that,** Length of hospital stay was significantly less in the study group than in the control group P-value <0.000. Likewise, the transition time from gavage feeding to full oral feeding was significantly earlier in the study group than in the control group P-value <0.000. Meanwhile, the preterm in the study group had significantly better weight gain than those in the control group P-value <0.000. Lastly, there was a significant positive correlation between transitional time and length of hospital stay in both groups P-value <0.03. **Conclusion:** Applying oral sensory motor stimulation had a positive effect in improving feeding performance, weight gain, and decrease length of hospital stay for preterm neonates. **Recommendations:** Oral sensory motor stimulation should be administered as integral part of routine daily care at Neonatal Intensive Care Units.

**Keywords:** Preterm neonates, Oral sensory motor stimulation.

### Introduction

Events leading to preterm birth are still not understood. Approximately 45 – 50 % of preterm births are idiopathic, 30 % are related to spontaneous preterm birth (spontaneous onset of labor or following premature rupture of membranes and

provider initiated preterm birth) and another 15 – 20 % are attributed to medically induction or elective caesarian birth before 37 completed weeks of gestation. The labor of preterm is often induced when there is a danger on

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mothers or fetus e.g. placental dysfunction, eclampsia, maternal diabetes, ante partum hemorrhage and fetal hypoxia (Goldenberg et al., 2012 and Buhimschi & Norman, 2013).

Moreover, it has been estimated that each year, 11% of all deliveries in the world are premature, every year approximately one in every eight children born before 37 weeks of gestation and one million out of six million child deaths are due to complications of prematurity (Harrison & Goldenberg, 2015). In Egypt, the number of preterm birth at 32 weeks to before 37 weeks were 123.131 (Abdelhady & AllaAbdelwahid, 2015). The percentage of under-five deaths from preterm birth complications is still high, where 28.5% of all preterm deaths in Egypt (Liu et al., 2013).

Preterm neonates have difficulty establishing oral feeding skills because their neurologic, cardio-respiratory, gastrointestinal, and oral-motor systems are functionally immature. So that, they require tube feeding in the weeks after birth, until they develop the necessary skills to feed by mouth and complete a successful transition from tube to independent oral feeding. (Kuschel, 2011).

Achieving oral feeding competence takes time, with the transition from tube feeding to full oral feedings reportedly taking from 10 to 14 days. Although breast feeding may present fewer physiologic challenges than bottle feeding for the preterm neonates, most of them are bottle fed (formula or expressed breast milk) at least some of the time while being in the hospital. so that, the management of oral feeding for preterm is a key aspect of hospital care (Pickler et al., 2015).

Oral sensory motor stimulation is a sensory stimulation or actions that manipulated the lips, jaw, tongue, soft palate, pharynx, larynx, and respiratory muscles before or during nutritive sucking (NS) or nonnutritive (NNS) events that intended to influence the oro- pharyngeal and respiratory sensor motor mechanisms in order to improve function for sucking and feeding in preterm infants (Greene et al., 2012).

Nurses who work in NICUs should be aware of the feeding difficulty of the preterm neonates and knowledgeable about promoting safe and efficient oral feeding skills which requires the appropriate coordination of a number of physiologic functions that are not fully developed in the preterm neonates (Lau et al., 2012).

### **Purpose**

The purpose of the study was to evaluate the effect of oral sensory motor stimulation on short term clinical outcomes for preterm neonates.

### **Research hypotheses**

1) reterm's who receive oral sensory motor stimulation on the study group will have better feeding performance higher weight than preterm's who do not receive oral sensory motor stimulation on the control group.

2) reterm's who receive oral sensory motor stimulation on the study group will have shorter duration of hospital stay than preterm's who do not receive oral sensory motor stimulation on control group.

### **Methods**

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**Research design:**

A quasi-experimental research design was utilized to conduct the aim of this study.

**Research setting:**

This study was conducted at the Neonatal Intensive Care Units (NICUs) of Benha University Hospital.

**Sampling:**

A Purposive sample was used to collect data from 100 preterm neonates. A simple random sample was used to assign them into two groups:

Group (1) study group (50 preterm neonates who received oral sensory motor stimulation) and Group (2) (control group included 50 preterm neonates who received routine feeding care without applying oral sensory motor stimulation).

**Inclusion criteria:**

- Born before 37 weeks of gestational age.
- Feed by naso-gastric tube.
- Birth weight 1500 to less than 2500.
- With stable vital signs.

**Instruments of data collection:**

Two instruments were used for data collection.

**Instrument one: A Structured Questionnaire Sheet (SIQS):**

It was designed by the researcher after reviewing the current available literatures. It was divided into two parts:

▪ **Part I: Preterm assessment sheet:** It was used to collect data about preterm neonates such as; gestational age, gender, type of delivery, type of feeding, date on admission, birth weight, length of

hospital stay and Apgar score at the 1 and 5 minutes.

▪ **Part II: Physiological assessment record:** It was assessed through measuring heart rate, respiratory rate and oxygen saturation by using the pulse oximeter and cardiac monitor before, during and after the intervention.

**Instrument two: Preterm clinical outcomes measurement sheet:**

It was adapted from Fucile et al., (2002), Lyu et al., (2014) and Younesian et al., (2015) then modified by the researcher to assess the preterm outcomes and it consisted of two parts:

▪ **Part(1): Feeding performance:** It was divided into two subparts:

♦ **Subpart one: Oral feeding progression:** It was measured through the following:

- 1) The initiation of oral feeding.
- 2) The transition time..
- 3) Age at full oral feeding.

♦ **Subpart two: Oral feeding efficiency:**

It was measured through the following:

- 1) Volume of milk consumed/ feeding.
- 2) Duration in every oral feeding session/ minutes.
- 3) Frequency of oral feeding / day.

▪ **Part (2): Weight gain:** It was assessed through the measuring:

- ♦ Weight at introduction of oral feeding.
- ♦ Weight at the seventh day.
- ♦ Weight at independent oral feeding.
- ♦ Weight upon discharge.

**Pilot study:**

A pilot study was carried out on 10% of the study sample (5 preterm neonates from the study group and 5 preterm neonates from the control group) to examine the applicability, clarity, relevance, objectivity, feasibility of the study

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instruments and the time required to fill out it. The necessary modifications were done through adding or omitting the unnecessary or repeated items prior to data collection. The pilot study subjects were excluded from the sample of the study. This phase took one month from (October, 2016 to November, 2016).

**Content validity:**

Validity of instruments was determined by a panel of 3 experts in pediatric nursing field (one professor of pediatric nursing from faculty of nursing, Ain shams University and two assistance professors from pediatric and community health nursing from Faculty of Nursing, Benha University) to assess the instruments for clarity, relevance, comprehensiveness, simplicity and applicability. The experts agreed on the content, but recommended with minor language changes that would make the information clearer and more precise. The suggested changes were made. This phase took about one month from the beginning of September, 2016 till the end of September, 2016.

**Reliability:**

Internal consistency reliability of all items of the instruments was assessed using Cronbach's alpha coefficient and it was 0.83 for SIQS and 0.87 for premature outcomes measurement sheet.

**Ethical considerations:**

The purpose of the study was explained for the directors of the hospitals to take their permission to conduct the study. Oral consent was obtained from the mothers and all mothers were informed that they had right to withdraw from the study at

any time without explanation of their rationale and their data was secure.

**Procedure:**

- letter was sent from the Dean of the Faculty of Nursing to the Administrator of Benha University hospital explaining the purpose of the study and methods of data collection.

- he process of data collection was carried out over a period of 6 months from the end of November, 2016 to the end of April, 2017. The researcher was available seven days per week from (Saturday to Friday) in the morning shift. The study tools were filled out by the researcher and the average time required for completion of each tool was around 15 – 20 minutes.

- electing the preterm neonates according to inclusion criteria by using SIQS. A simple random sample was done to classify the preterm neonates into study and control group through serial numbers of cases. Whereas, the preterm neonates who had single numbers were chosen in the study group (who received oral sensory motor stimulation), while the preterm neonates who had double numbers were chosen in the control group (received routine feeding care) administered by nurses at NICU.

- An oral sensory motor stimulation was done approximately half an hour before feeding by a tube.

- Each preterm neonate received two oral sensory motor stimulation sessions daily for 7 consecutive days. The first session of oral sensory motor stimulation was performed before the morning feeding at 9 am and the second session was performed at 12 pm.

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Duration of session was 15 minutes stimulation, the first 9 minutes included stroking the preterm cheeks, lips, gums, and tongue, the preterm sucking on an index finger was continued for 3 minutes.

The procedure of oral sensory motor stimulation was performed as the following:

- Placing the preterm neonate gently and comfortable in semi-upright position. The researcher support the preterm head with one hand and Place index finger of the other hand at the base of the nose. Compress the tissue, move finger toward the ear, then down and toward the corner of the lip. Repeat for other side for 2 minutes.
- Place index finger at the corner of the upper lip. Compress the tissue, move the finger away in circular motion from the corner and other corner this done for 1 min.
- Place index finger at the corner of the lower lip. Compress the tissue move the finger away in circular motion from the corner and other, corner this done for 1min.
- Place index finger at center of lip. Apply sustain pressure, stretch downward toward the med line this done for 1min.
- Place finger at the center of the gum, with firm sustained pressure slowly move toward the back of the mouth. Return to the center o the mouth. Repeat for the opposite side this done for 1min.
- Place finger at the center of the gum, with firm sustained pressure slowly move toward the back of the mouth. Return to the center of the mouth. Repeat for the opposite side this done for 1min.
- Place finger at inner corner of lip. Compress the tissue, move back toward

the molars and return to corner of lip. Repeat for other side this done for 2 min.

**The preterm in the control group** received routine feeding care by nurses. No oral sensory motor stimulation was done.

**For study group:** Assess the preterm heart rate, respiratory rate, oxygen saturation was done before, during, and after applying oral sensory motor stimulation.

- ◆ An assessment of feeding performance after applying oral sensory motor stimulation.
- ◆ For control group, an assessment of physiological functioning (HR, RR) and Oxygen saturation before, during, after routine feeding care.
- ◆ Assess feeding performance after routine feeding care.

**For both study and control group:** Assess weight at introduction of oral feeding, at 7<sup>th</sup> day, at independent oral feeding and weight upon discharge, as well as length of hospital stay.

**Statistical design:**

The data were collected, organized, coded, computerized, analyzed and tabulated by using the Statistical Package for Social Science (SPSS) version 20. Quantitative data was expressed as mean and stander deviation. While Qualitative data was expressed as frequency and percentage. Statistical test as Chi-square (X<sup>2</sup>) used for determining statistical significant differences between study and control groups. Paired t- test was used for comparison between means of two groups. Pearson correlation coefficient (r)

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was used for correlation analysis. Statistical significant differences was at P-value <0.05, highly statistical significant differences was considered at P-value <0.001, and no statistical significant differences was considered at P-value >0.05.

## **RESULTS**

**Table 1** represents personal data of the studied preterm neonates, it was found that, the gestational age of the studied preterm neonates  $32.87 \pm 1.57$  weeks among the study group and  $30.95 \pm 1.51$  weeks of the control group. As regards to their birth weight; it was  $1590.8 \pm 209.30$  gram and  $1645.3 \pm 180.13$  gram, respectively. Apgar scores at 1 minute and 5 minutes in both study and control groups were ( $7.58 \pm 1.322$ ,  $8.44 \pm 1.829$  and  $7.34 \pm 2.420$  and  $8.34 \pm 1.987$ ).

**Table 2** clarifies the preterm's in the study group were discharged earlier than controls. Where the mean  $\pm$ SD length of hospital stay was  $18.5 \pm 6.13$  day in the study group and  $25.7 \pm 6.10$  day in the control group.

**Table 3** shows initiation of oral feeding during first 5 minutes. Preterm's in the study group developed of oral feeding earlier than preterm's than in the control group.

**Table 4** illustrates the transition time of the studied preterm neonates from gavage feeding to full oral feeding after applying oral sensory motor stimulation. It was ( $8.9 \pm 3.50$  days and  $15.2 \pm 3.82$  day, respectively). In addition, age at full oral feeding in the study group was  $34.0 \pm 1.50$  weeks versus  $36.0 \pm 1.51$  weeks in the control group.

**Table 5** clarifies total volume of oral milk consumed per day after applying oral sensory motor stimulation was

significantly higher in the study group than in the control group from 2nd day till 7th day.

**Table 6** demonstrates duration of oral feeding after applying oral sensory motor stimulation. There were no statistical significant differences regarding duration of oral feeding in both study and control groups from 1st to 4th day, while from day 5 till day 7 day the duration of oral feeding was significantly decreased among study group than in the control group.

**Table 7** shows percentage distribution of studied preterm neonates regarding frequency of oral feeding after applying oral sensory motor stimulation within 7 days. It was found that highly statistical significant differences regarding frequency of oral feeding among seven days in the study group than in the control group. The majority of preterm in the study group achieved more than seven oral feeding per day in the 7th day and P-value <0.000.

**Table 8** illustrates weight gain of the studied preterm neonates after applying oral sensory motor stimulation. It was found that there were statistical significant differences regarding to preterm weight gain started at the seventh day, independent oral feeding and upon discharge in the study group compared to the control group.

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**Table (1):** Distribution of the studied preterm neonates according to their personal data (No= 100).

Personal data	Study group n=(50)	Control group n=(50)
Gestational age/ weeks	32.87±1.57	30.95±1.51
Birth weight/gram	1590.8±209.30	1645.3±180.13
Apgar scores within		
1 minute	7.58±1.322	7.34±2.420
5 minute	8.44±1.829	8.34±1.987

**Table (2):** Duration of hospitalization of preterm neonates in the study and control group(No= 100).

Items	Study Group n=(50)	Control Group n=(50)	t. test	P- value
	$\bar{X}\pm SD$	$\bar{X}\pm SD$		
Length of hospital stay/day	18.5±6.13	25.7±6.10	5.91	0.000**

\*\* Highly statistical significant differences P-value <0.000

**Table (3):** Distribution of studied preterm neonates regarding initiation of oral feeding during first 5 minutes after applying oral sensory motor stimulation(No= 100).

Items	Study Group n=(50)	Control Group n=(50)	t. test	p- value
	$\bar{X}\pm SD$	$\bar{X}\pm SD$		
Initiation of oral feeding during 1 <sup>st</sup> 5 minutes	5.2±1.3	3.4±0.62	8.73	<0.000**

**Table (4):** Mean scores of the preterm neonates according to their transition time and age at full oral feeding after applying oral sensory motor stimulation (No= 100)

Items	Study Group n=(50)	Control Group n=(50)	t. test	p- value
	$\bar{X}\pm SD$	$\bar{X}\pm SD$		
Transition time/day	8.9±3.50	15.2±3.82	8.47	0.000**
Age at full oral feeding/weeks	34.0±1.50	36.1±1.51	3.26	0.004*

\*\* Highly statistical significant differences P-value <0.000

\*Statistical significant differences P-value <0.05

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**Table (5):** Mean scores of the studied preterm neonates regarding total volume of oral milk consumed per day after applying oral sensory motor stimulation (No= 100).

Day	Study Group n=(50)	Control Group n=(50)	T. test	p- value
	$\bar{X}\pm SD$	$\bar{X}\pm SD$		
1 <sup>st</sup> day	11.3±3.86	8.5±3.11	2.013	0.12
2 <sup>nd</sup> day	25.6±9.05	13.0±4.55	4.012	0.05*
3 <sup>rd</sup> day	51.3±18.44	30.28±5.49	8.743	0.000**
4 <sup>th</sup> day	91.9±34.53	37.8±5.84	8.387	0.000**
5 <sup>th</sup> day	145.9±54.46	66.9±9.77	8.304	0.000**
6 <sup>th</sup> day	204.8±75.07	113.68±16.44	10.925	0.000**
7 <sup>th</sup> day	238.2±86.67	132.8±23.01	10.096	0.000**

\*\* Highly statistical significant differences P-value <0.000

\* Statistical significant differences P-value <0.05

**Table (6):** Mean scores of studied preterm neonates regarding to duration of oral feeding after applying oral sensory motor stimulation (No= 100)

Day	Study group n=(50)	Control group n=(50)	t. test	P. value
	$\bar{X}\pm SD$	$\bar{X}\pm SD$		
1st day	18.4±3.41	18.6±1.63	1.528	>0.05
2nd day	18.4±2.88	19.1±1.33	3.425	>0.05
3rd day	18.2±3.06	19.6±1.06	5.465	>0.05
4th day	19.7±4.47	19.1±.97	6.567	>0.05
5th day	16.9±2.65	20.9±1.83	8.10	<0.05*
6th day	17.1±4.73	23.4±1.70	10.11	<0.05*
7th day	14.9±5.51	25.3±3.32	11.78	<0.05*

\* Statistical significant differences P-value <0.05

No statistical significant differences P-value >0.05



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**Table (7):** Percentage distribution of studied preterm neonates regarding frequency of oral feeding after applying oral sensory motor stimulation (No= 100)

Number of oral feeding	Study Group n=(50)		Control Group n=(50)		X <sup>2</sup>	P-value
	No.	%	No.	%		
<b>1<sup>st</sup> day</b>						
No oral feeding	35	70.0	40	80.0	1.97	0.31
1-3	15	30.0	10	20.0		
4 - 6	0	0.0	0	0.0		
<b>2<sup>nd</sup> day</b>						
No oral feeding	20	40.0	38	76.0	3.30	0.12
1-3	28	56.0	12	24.0		
4 - 6	2	4.0	0	0.0		
<b>3<sup>rd</sup> day</b>						
No oral feeding	6	12.0	36	72.0	37.73	0.000**
1-3	28	56.0	11	22.0		
4 - 6	16	32.0	3	6.0		
<b>4<sup>th</sup> day</b>						
No oral feeding	3	6.0	25	50.0	45.44	0.000**
1-3	11	22.0	20	40.0		
4 - 6	17	34.0	5	10.0		
≥7	19	38.0	0	0.0		
<b>5<sup>th</sup> day</b>						
No oral feeding	4	8.0	10	20.0	54.13	0.000**
1-3	6	12.0	36	72.0		
4 - 6	20	40.0	4	8.0		
≥7	20	40.0	0	0.0		
<b>6<sup>th</sup> day</b>						
No oral feeding	0	0.0	10	20.0	50.84	0.000**
1-3	4	8.0	29	58.0		
4 - 6	23	46.0	7	14.0		
≥7	23	46.0	4	8.0		
<b>7<sup>th</sup> day</b>						
No oral feeding	0	0.0	6	12.0	44.36	0.000**
1-3	1	2.0	23	46.0		
4 - 6	9	18.0	11	22.0		
≥7	40	80.0	10	20.0		

\*\* Highly statistical significant differences P-value <0.000

**Table (8):** Mean scores of the studied preterm weight after applying oral sensory motor stimulation (No= 100).

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Day	Study Group n=(50)	Control Group n=(50)	t. test	p-value
	$\bar{X}\pm SD$	$\bar{X}\pm SD$		
Weight at introduction of oral feeding	1915.2±201.28	1894.6±188.56	0.528	0.599
Weight at 7 <sup>th</sup> day	2104.4±219.20	2024.8±206.44	1.869	<0.05*
Weight at independent oral feeding	2207.5±295	2103.7±251	2.81	<0.05*
Weight upon discharge	2787.8±349.69	2305.6±264.58	7.775	0.000**

\*\* Highly statistical significant differences P-value <0.000

\*Statistical significant differences P-value <0.05

## DISCUSSION

Feeding disorders are extremely common in preterm neonates especially those who are born before 32 weeks of gestational age due to hypotonia, immature oral motor skills, lack of sucking, swallowing and breathing coordination or due to presence of assistive ventilation devices. As well as, these difficulties may negatively affect their ability to reach full oral feeding and lead to prolonged hospital stay. Measures that have been shown that oral sensory motor stimulation intervention for at least 15 minutes per day for 10 days improves oral feeding performance in preterm infants (*Bache et al., 2014*).

Regarding length of hospital stay, the present study showed that, the preterm in the study group was discharged earlier an average 7 days than the preterm in the control group This result was supported with a study carried out by *Younesian et al., (2015)* in Iran, aimed to "Assess Impact of Oral Sensory Motor Stimulation on Feeding Performance, Length of Hospital Stay, and Weight Gain of Preterm Infants in NICU" who showed that, the infants in the experimental group were discharged one

week earlier after they attain full oral feeding. This could be due to oral stimulation helps in the activation of the oral muscles, improving its efficiency. As well as, the suckling rate and the volume of ingested milk increase, favoring weight gain and reducing the transition time from tube to oral feeding, which decreases hospitalization time.

Concerning initiation of oral feeding during first 5 minutes, the present study illustrated that, there was statistical significantly increase in amount of oral milk during the first 5 minutes in the study group than in the control group. This result is consistent with a study carried out by *Zayed (2013)* who found that, the preterm infants in the study group had greater amount of milk in the first five minutes than the preterm infants in the control group. Additionally, this result agree with a study carried out by *Hwang et al., (2010)* who found that, the intervention group achieved a greater oral intake rate in the initial 5 minutes of the feeding after applying oral stimulation.

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Regarding transition time from gavage feeding to full oral feeding, the present study showed that, the preterm in the study group after applying oral sensory motor stimulation attained full oral feeding on average 8 days earlier than the preterm in the control group. This could be attributed to the effectiveness of oral sensory motor stimulation which improve oral feeding skills and enhanced the function of one or more of the systems involved in the oral feeding process.

This result is in the same context t with a study carried out by ***Otto & Almeida (2017)*** in Brazil, aimed to "Assess Oral Feeding Performance in Premature Infants Stimulated by Swallowing Technical Training" who found that the gastric tube was removed approximately 7 days after beginning oral feeding in the experimental group.

Apparently the present study illustrates that, the preterm in the study group had lower gestational age when reach full oral feeding after applying oral sensory motor stimulation than those in the control group. From the researcher point of view, oral sensory motor stimulation help the preterm to improve their feeding skills and oral feeding efficiency, therefore, achieving independent oral feeding earlier than the preterm in the control group.

This result is in the same line with a study carried out by ***Lyu et al., (2014)*** in China, aimed to "Assess the Effect of An Early Oral Stimulation Program on Oral Feeding of Preterm Infant" who identified that, the postmenstrual age in the experimental group was significantly

lower than that in the control group upon reaching independent oral feeding.

The current study clarified that, total volume of oral milk consumed per day after applying oral sensory motor stimulation was significantly higher in the study group than in the control group. From the researcher point of view, this stimulation helps in the activation of the oral muscles and enhancement of sucking rate lead to improvement of feeding efficiency and the volume of ingested milk increase.

This result was agree with a study carried out by ***Zhang et al., (2014)*** in China, aimed to "Assess Effect of Nonnutritive Sucking and Oral Stimulation on Feeding Performance in Preterm Infants" who mentioned that, the overall intake in the study group was significantly greater than the control group ( $p < 0.0002$ ).

In relation to oral feeding duration, the result of current study revealed that, oral feeding duration was significantly decreased in study group than in the control group. This result in the same line with a study conducted by ***Amer (2015)*** in Cairo, aimed to "Assess Effect of Pre-feeding Oral Stimulation Program on Preterm Infants Feeding Performance" who showed that, there was a significant decreased mean oral feeding duration between the intervention than the control groups in the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> sessions.

Additionally, these results supported with a study conducted by ***Kao & chang (2010)*** in Taiwan, aimed to "Assess Feeding with Cross-cut Teats has Better Sucking Effect and Oxygenation in Preterm Infants with Chronic Lung

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Disease" who reported that there was significantly less feeding time and a faster feeding rate in the intervention group than in the control group.

Apparently the present study reflected that, the majority of the preterm neonates in the study group achieved more than seven oral feeding per day faster after applying oral sensory motor stimulation than the preterm in the control group. From the researcher point of view, this could be due to oral sensory motor stimulation had benefits on the feeding efficiency at the introduction of oral feeding.

This result agree with a study carried out by *Fucile et al., (2011)* in Canada, aimed to "Assess Oral and Non-Oral Sensory-motor Interventions Enhance Oral Feeding Performance in Preterm Infants" who showed that, experimental group had a higher oral feeding efficiency compared to the control group upon reaching 1–2, 3–4 and 6–8 successful oral feedings per day.

Based on the result of study findings, there were a statistical significant differences between the study and control groups regarding weight after applying oral sensory motor stimulation. This mean that, the preterm in the study group had higher weight gain at seventh day, independent oral feeding and upon discharge compared to the control group. This could be due to effectiveness of oral sensory motor stimulation (peri-and intra-oral stimulation with nonnutritive sucking) that, applied to preterm neonates during gavage feeding can improve sucking abilities, volume transfer (percent total volume taken) and improving weight gain.

Results of present study were consistent with the study carried out by *Khalessi et al., (2015)* who found that, there were no statistical significant differences regarding weight at introducing oral feeding in both study and control group, while the preterm infants in the study group who receive pre-feeding oral stimulation had better weight at discharge.

### **CONCLUSION**

In the light of the study findings, it can be concluded that, the preterm neonates in the study group who received oral sensory motor stimulation experienced better oral feeding performance, have shorter length of hospital stay, decreased transition time from gavage feeding to full oral feeding. As well as, they had better weight gain compared to preterm neonates in the control group who received routine feeding care without applying oral sensory motor stimulation.

### **RECOMMENDATIONS**

**Based on the current study findings the following recommendation was suggested that:**

- Oral sensory motor stimulation should be provided as integral part of routine daily care at NICUs for preterm neonates.
- Replication of the study on a larger probability sample is highly

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recommended to achieve generalizable results

**Recommendation for further researches:**

- Further studies needed to evaluate the effect of oral sensory motor stimulation intervention on neurobehavioral state of preterm neonates.

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