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Effect of Feeding guidelines intervention on premature low birth weight Infant Feeding Performance and their Growth parameters

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Abstract* :*Background: *Recently Neonatal intensive care unit has markedly improve the survival rates of premature infants, feeding difficulties often postpone the discharge, The ability of premature infant to master feeding is limited by infant developmental stage.Premature infant have special nutritional needs because they grow at a faster rate than full term neonates and their gastrointestinal systems are immature.Feeding guideline able to achieve the development of sucking, swallowing and breathing behavior and improve digestion.* ***The present study*** *aimed to evaluate the effect of feeding guidelinesintervention on premature infant feeding performance and their growth parameters.* ***Subjectsand Method:****The study was conducted at Neonatal Intensive Care Unit of Tanta university hospital and EI-Minshawy Neonatal Intensive Care Unit which affiliated to the Ministry of Health. During the period from November 2018 to March 2019.The sample were included fifty Premature low birth weight infants****Four tools*** *were used; Structured questionnaire sheet, Premature infant oral feeding readiness assessment, observation measure of oral feeding by using Early feeding skills assessment and Preterm Infant Breast feeding Behaviors.* ***Results:****Using of feeding guideline which involve measures such as non-nutritive sucking and touching can provide guidelines for staff and physicians for the introduction and management of oral feeding for premature infants and create positive feeding experiences while assisting infants to reduce the transition time from gavage to oral feeding in premature infant, Improve rate of growth and reduce the length of hospitalization.****Conclusions****The present study concludes that using of feeding guidelines intervention on premature low birth weight Infant will improve their Feeding Performance and Growth parameters****Recommendation:*** *Evaluating for growth parameters and sucking/swallowing ability is essential prior to discharge of preterm low birth weight infants; and appropriate counseling and continuous follow-up and monitoring after discharge will help achieve better long-term health outcomes.*

Key Words; P*remature low birth weight infant, feeding guideline, Feeding Performance,Growth parameters*

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I. Introduction

Recently World Health Organization (WHO) estimated that every year, about fifteen million babies are born as premature (before 37 completed weeks of gestation), and this number is rising. Across 184 countries, the rate of preterm birth ranges from 5% to 18% of neonates.Almost one million neonates die each year due to the complications of premature birth. Many survivors face a lifetime of disability, including learning disabilities as well as visual and hearing problems, lacking the neurologic ability to coordinate a suck/swallow/breath response for oral feeding. [(1-3).]

Premature birth occurs for a variety of reasons. The majority ofpremature births occurredwithout known causes, but certain predisposing factors including early induction of labor or caesarean birth, whether for medical or non-medical reasons.Most precipitating factors of preterm birth include multiple pregnancies, infections and chronic illness as diabetes and pregnant induced hypertension. There could also be a genetic influence. Effective determination of the predisposing factors and mechanisms of management will advance the development of solutions to prevent preterm birth. [(1, 4).]

The ability of preterm infant to master feeding is limited by infant developmental stage. It is a complex activity that requires a careful observation in order to understand the infant's readiness and challenges, and thus to make appropriate feeding guidelines [(5)].

Premature infants have special nutritional needs because they grow at a faster rate than full term babies and their digestive systems are immature. One of the challenges facing health care providers in managing the care of premature infants in the Neonatal Intensive Care Unit (NICU) is the safe provision of enteral nutrition [(6, 7).]

Survivors' of Preterm infant at a higher risk of growth and developmental disabilities compared to their full-term counterparts. Development of strategies to lower the complications of preterm birth forms the rising need of the hour. Effective feeding pattern is essential for the growth and development of preterm infants. Early administration of optimal nutrition to preterm birth survivors lowers the risk of adverse health outcomes and improves cognition in childhood period. [8]

WHO (2018) has developed new guidelines with recommendations for improving outcomes of preterm births. This set of key interventions can improve the chances of survival and health outcomes for preterm infants.The guidelines include interventions provided to the mother as steroid injections before birth, antibiotics to prevent infection before the onset of labour, and magnesium sulfate to prevent neurological problems as well as interventions for the newborn baby including thermal care, feeding support, kangaroo mother care, safe oxygen use, and other treatments to help newborn infants to breathe more easily. [1]

Nurses are front line care providers they are key persons involved with the care of the low birth weight neonates round the clock.The crucial role of the nurse on neonatal admission is to assess neonate's condition in order to identify one's needs, take accurate decisions for intervention, and evaluate neonate's progress. This includes physiological measurement, growth measurements and general appearance. Birth history has to be assessed for pertinent information to assist in determining the intensity of observation and the care that the neonate may require. It includes the gestational and postnatal age, sex, birth weight, and Apgar score one and five minutes after birth, the type of neonatal resuscitation required, any treatment or medication administered maternal history, such as history of maternal diabetes, and any medication or anesthesia the mother receives during labor should be recorded. Physical assessment and assessment of gestational age are done as like as the full term

Aim of the Study

The aim of this study was to evaluate theeffect offeeding guidelines intervention on premature low birth weight Infant Feeding Performance and their Growth parameters.

Hypothesis:-

Feeding guidelines intervention on premature low birth weight Infant will improve their Feeding Performance and Growth parameters

Subjects& Methods:-

Study Design

Aquasi-experimental researchdesign was utilized in this study.

Study Setting

The study was conducted at Neonatal Intensive Care unit (NICU) of Tanta university hospital and EI-Minshawy Neonatal Intensive Care Unit which affiliated to the Ministry of Health. During the period from November 2018to March 2019.

Subjects of the Study

Fiftyprematurelow birth weight infants of both sexes was randomlyselecteddivided into twenty five cases from Tanta university hospital and the other twenty fivecases were from EI-Minshawy in Tanta Neonatal Intensive Care Unitwhich are affiliated to the Ministry of Health according to the following criteria.

Inclusion Criteria

- Gestational age <37 weeks
- Both sex
- Birth Weight usually less than 2500 gram
- Stable infants with Fi02 requirements were<30% and respiratory rate was <60.
- Free from congenital anomalies as Cleft palate, Cleft lip, Chromosomal malformation)

Tool of Data Collection

Four tools were used for data collection:-

Tool (I): A structured interviewing schedule. It was developed by researcher and consists offiveparts.

Part One: Socio-demographic data of premature infants such as gestational age / weeks, gender, diagnosis, weight/kilogram, and age when the study started in days. Apgar score at one minute and after five minutes at birth.

Part two: Socio-demographic data of mothers such as age in years, educational level, occupation, and their residence.Parity, complications during pregnancy, methods of delivery.
Part three: Assessment of feeding parameters: it include types of feeding of premature (breast or bottle feeding or gavage feeding). Amount of every feeding per time and 24hour, frequency,administration of gavage feeding and IV fluids.
Part four: Growth parameters which includes weight, length, and chest circumference of premature infant daily.
Part five: physiological measurementswhich included assessment of temperature, pulse rate and respiratoryrate.

Tool II: Premature Infant Oral Feeding Readiness Assessment Scale. (POFRAS)[12]

Premature Infant Oral Feeding Readiness Assessment Scale:- It composed of five main categories with a total of eighteen (18) items that consist of: 1) corrected gestational age (≤ 32 weeks; 32-34 weeks and ≥ 34 weeks) , 2) behavioral organization (behavioral state, global posture and global tonus) , 3) oral posture (lips and tongue posture) , 4) oral reflexes (rooting, sucking, biting and gag reflexes) and 5) non-nutritive sucking (tongue movement, tongue cupping, jaw movement, sucking strain, sucking and pause, maintenance of sucking/pause, maintenance of alert state and stress signs). The preterm infant's performance in each item is assessed from 0 (zero) to 2 (two), with a total score ranging from 0 to 36.

Tool III: Early Feeding Skills (EFS**) AssessmentSchedule**[13]:

Observational measure of oral feeding skill usingEarly Feeding Skills Assessment Sheet (EFS) is a thirty six (36) item that can be used from the time of initiation of oral feeding through maturation of oral feeding skill. It divided into three sections.**Starting** section, "Oral Feeding Readiness," is performed to assess whether the infant has a sufficient energy for feeding, is in an optimal state, and has adequate baseline oxygen saturation.The **middle** section, "Oral Feeding Skill," has items to assess four skill domains which are critical to successful feeding. The **final** section, "Oral Feeding Recovery," is used to evaluate the impact of feeding on the infant's state of alertness, energy level, and physiological system. [13].
The researcher observed premature infants before feeding for Oral Feeding Readiness which assessed infant have a sufficient energy for feeding, an optimal state, and adequate baseline oxygen saturation.

- During feeding for Oral feeding skill which assessed the infant's four skills domains which are critical to successful feeding.
- After feeding for Oral Feeding Recovery which evaluated the impact of feeding on the infant's state of alertness, energy level, and physiologic system.

Tool IV: Preterm Infant Breast-feeding Behaviors Scale (PIBBS). [14]

The PIBBS can be used to describe the development of breast feeding behaviors in preterm infants (HedBerg. 1999).PIBBS has been specially developed for preterm infants from 26 weeks gestation. Six items (rooting, areolar grasp, latch, sucking, longest sucking burst and swallowing) are assessed with a score being attributed to each item, with a total score ranging from 0 to 22.

Field of Work:
1-An official permission was obtained from the administrator responsible for Neonatal Intensive Care Unit at Tanta University and El-Minshawy Hospital which are affiliated to the Ministry of Health after explanation the purposeof the study.
2-Informed Consent: Parents of the studied neonates agreed to participate in this study after explaining the purpose of the study.
4-Content validity the face of the questionnaire was calculated based on expert'sopinion in pediatric nursing after calculating content validity index (%) of its items
5- Content reliability: to assess reliability the study tool was tested by the pilot subjects for calculating Cronbach's Alpha which was 0.891
6- A pilot study was carried out on 10% of the study sample to test tool for its clarity,applicability, feasibility and the necessary modification was done, pilot study was excluded from the study.

7-The study was conducted through three phases

I- Assessment Phase:-It was developed to obtain information about socio-demographic data of premature low birth weight infants and mothers through interview with each neonate's parent individually to obtain information with time limit to answering the questionnaire sheet was 30-40 min.

Assessment premature infant oral feeding readiness.

- **Assessment of premature Infant Early Feeding Skill Assessment**.
- **Assessment of Preterm Infant Breast Feeding Behaviors**.

II- Implementation Phase

Implementation of the feeding guidelines intervention it includes;

- Monitoring physiological measurement
- Measurement of growth parameters such as weight, length ,chest circumference
- Using measures to improve sucking by using developmental care, pacifier,and kangaroo care to improve behavioral organization, minimize negative oral stimulation and promoting non- nutritive sucking,physiological stability forfacilitating the transition to complete oral feeding by enhancing physiologic stability.

III- Evaluation phase:-

- Overview on premature low birth weight infants feeding performance through:-

1) Non-oral stages

- Pre-oral Stimulation Stage
- Non-nutritive Sucking Stage

2) Nutritive Sucking Stages

- Stage I: Minimal oral intake (<10% oral)
- Stage II: Moderate oral intake (10 to <80% oral)
- Stage III: Full oral intake (>80% oral)

Statistical analysis:

Data were collected, computed and statistically analyzed using the mean, standard error paired t-test and chi-square. Linear correlation coefficient of the significance was adopted at 5% level (P-value).

II. Results

Table 1: Distribution of premature low birth weight infants according to their socio-demographic characteristics.

Socio-demographic characteristics	**(n=50)** **No**	**%**
Gestational age (weeks)		
33w-<34 34w	24 26	48% 52%
Gender		
Male Female	24 26	48% 52%
Diagnosis		
Respiratory distress syndrome Sepsis None	26 13 11	52% 26% 22%
Birth Weight(gm.)		
1100 1200 1300	1 18 31	2% 36% 62%
Age when the study started		
<7day	11	22%
7:10 day	32	64%
>10 day	7	14%

Table (1) shows the percentage distribution of premature infants according to their socio-demographic characteristics. It was noticed that 48% of premature infants ranged from 33to <34 weeks of gestation while 52% of them had 34 weeks of gestational age. More than half of them (52%) were females while 48% were males. Regarding diagnosis, it was observed that 52%of preterm infants had respiratory distress syndrome while 26% had sepsis. According to birth weight two thirds of them (62%) weighed 1300gm, while 36% weighed 1200gm.As regard to age when study started more than half (64%) ranged from 7:10day, were 22 % of them <7day and only 14% >10day

Table 2: Distribution of mothers according to their socio-demographic characteristics.

Socio-demographic characteristics of mothers	**(n=50)** **No**	**%**
Mother's age		
<20y	12	24%
20-24	14	28%
25-29	15	30%
>30	9	18%
Educational level		
Illiterate or read and write	9	18%
Preparatory	7	14%
Secondary	18	36%
University	16	32%
Occupation		
House wife	36	72%
Working	14	28%
Residence		
Rural	25	50%
Urban	25	50%
Parity:		
1	16	32%
2	20	40%
3-4	14	28%
Complication of pregnancy:		
Yes	20	40%
No	30	60%
Methods of delivery		
Normal	17	34%
Cesarean	33	66%

Table (2) shows thepercent distribution of mothers according totheir socio-demographic characteristic.It was found that 30% of them aged between 25-29 years, while 28% of them aged between 20-24 years. Regarding their educational levels, it was found that 36% of them were secondary educated, while32%were highly educated, 18% of them were read and write. According to mother's occupation, it was found that nearly three quarter of them (72%) were house wives. Regarding their residence, it was observed that equal result (50%) was rural and urban.Forty percent of their mothers had two time parity, and 60% of them had no complications during pregnancy and about two third of them (66%) were cesarean section.

Table (3): Percentage distribution of the studied premature low birth weight infants according to Apgar score:

Apgar Score	**(n=50)** **No**	**%**
At one minute:		
0(0-<4)	11	22**%**
1(4-<7)	22	44**%**
2(7-10)	17	34**%**
At five minutes:		
0(0-<4)	6	12**%**
1(4-<7)	19	38**%**
2(7-10)	25	50**%**

Table (3) shows the Apgar score among the studied premature low birth weight infants. It was found that at one minute, nearly half of the studied infants (44%) had Apgar score (4-<7) while 34% of infants hadnormal Apgar score (7-10)and 22% had scores(4-<7), while after 5 minutes; the percentages became half of them (50.0%) for normal scores (7-10) while 38% had Apgar score (4-<7) and 12% had Apgar score (0-<4) respectively.

Table 4: Distribution of premature low birth weight infants according to their feeding assessment.

Feeding Assessment		
Feeding used		
	No (N=50)	**%**
Gavages feeding	50	100%
Feeding amount/h and frequency		
2cc/6 2cc/3	5 16	10**%** 32**%**
5cc/3 5cc/6 10cc3	16 2 11	32**%** 4**%** 22**%**
Gavage feeding type		
Complementary feeding (breast, Artificial	40	80**%**
Fortification milk	10	20%
Administration of gavage and intravenous fluid		
Gavage feeding and Intravenous fluid	**50**	100%

Table (4) shows Percent distribution of premature infants according to their feeding assessment. It was observed that all of the preterm infant receiving gavages feeding. As regards amount of feeding / hours that 32%of them receiving 5cc /3hours while 22% of them receiving10cc3hr.According to gavage feeding type most of them (80%) taken Complementary feeding (breast and artificial milk), while20% of them used fortification milk. All of them received both gavages feeding with Intravenous fluid.

Table 5: Distribution of premature low birth weight infants according to their growth parameters from day 1 to day 7.

Growth parameters	**Day1**		**Day2**		**Day3**		**Day4**		**Day5**		**Day6**		**Day7**	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Weight/gm														
<1300-1350	20	40	16	32	15	30	10	20	5	10	2	4	1	2
1360-1400	18	36	16	32	15	30	13	26	9	18	11	22	9	18
>1400	12	24	18	36	20	40	27	54	36	72	36	72	40	80
M+SD	1652. ±55		1423±54		1549 ±53		1411±57		1396±52		1381±51		1369±49.	
Length/cm														
39-40cm	32	64	32	64	31	64	31	62	31	62	31	62	30	60
>40cm	18	36	18	36	18	36	18	36	19	38	19	38	20	40
M±SD	40±5.5		40±5.46		40±1.03		40±1.06		40±1.016		40±.097		41±0.98	
Chest Circumference/cm														
<26cm	2	4	2	4	2	4	2	4	1	2	1	2	1	2
26-27cm	41	82	41	82	41	82	41	82	42	84	42	84	42	84
>27cm	7	14	7	14	7	14	7	14	7	14	7	14	7	14
M +SD	26±3.62		26±3.55		26±0.706		26±0.701		26±0.701		26±0.701		26±0.700	

Table (5) Percentdistribution of premature infants according to their growth parameters. It was observed that birth weight of the premature low birth weight infants were increased from the first day reaching to the 7th day of the study, with M±SD ranged between 1652±55- 1369±9. Also length it was observed that length of the premature infants were increased from first day reaching to 7th day , with M±SD ranged between 40+5.5-41+0.98 . Regarding chest circumference it was observed that no statistical difference between 1st to 7th day of study.

Table (6): Percent distribution of premature infants according to physiological measurement before and after feeding.

Physiological measurement	Before feeding (n=50)		After feeding (n=50)	
	No	%	No	%
Temperature				
36.4:37.4	43	86%	44	88%
>37.5	7	14%	6	12%
Respiratory rate				
45:50c/m	45	90	46	92%
51:60c/m	5	10	4	8%
Heartrate				
130-139b/m	27	54%	30	60%
140-149b/m	14	28%	16	32%
>150b/m	9	18%	4	8%

Table (6) Show the percent distribution of premature infants according to measuring physiological measurement which include temperature, respiration and heart rate. As regards to temperature it was observed that majority of them (86%)were 36.4:37.4 before feeding increased to 88% of them after feeding, while only 14%>37.5 decreased to 12%had after feeding . Regarding to respiration before feeding were 90%, reached to 92% were after feeding. Finally their heart rate were 54% ranged between 130-139 b/m before feeding ,increased to 60 % after feeding .while28% ranged among 140-149b/m before feeding reached to 32% after feeding , only eighteen percent before feeding more than 150b/m decreased to 8% after feeding.

Table 7: Distribution of premature infant according to Daily Assessment.

Daily Assessment		
Color	**No (n=50)**	**%**
Pink	49	98%
Cyanosis	1	2%
Movement and Alertness		
Sleepy	1	2%
Alert	49	98%
Restlessness	---	---
Sucking		
Good	43	86%
Moderate	6	12%
Weak	1	2%
Oxygen Supplementation		
Head box	1	2%
Nasal cannula	0	0
Mask oxygen	0	0
Incubator air	49	98%

Table (7) Show Percent distribution of premature low birth weight infants according to their Daily Assessment .It was observed that majority of them (98%) were pink, andonly2%were cyanotic .Regarding to movement and alertness the majority of them (98%) were alert and only 2 % were sleepy. According to sucking most of them(86%) had good sucking, while 12% had moderate and only 2 % were weak. As regard to oxygen supplementation, the majority of them (98%) were on incubator air and only 2% of them on head box.

Table (8): Distribution of premature low birth weight infants according to their behavioral organization.

Behavioral State	Before NNS (n=50)		After NNS (n=50)		X2	P
	No	%	No	%		
Sleep(0)	0	0%	0	4%	1.897	0.058
Drowsy(1)	8	16%	5	10%		
Alert(2)	42	84%	45	90%		
Global Posture						
Extended(0)	0	0%	1	2%	3.606	<0.001
Partly flexed(1)	12	24%	2	4%		
Flexed(2)	38	76%	47	94%		
Global Tonus						
Hypotonia	4	8%	3	6%	1.732	0.083
Normotonia	46	92%	47	94%		

Table (8) shows the behavioral state before non- nutritive sucking that most of prematurelow birth weight infants (84%) were with alert state while 17% of them were drowsy. After using non-nutritive sucking,majority of them (90%) were alert while 10% were drowsy. Global posture was present before NNS 76%were at flexed position and 24% were partly flexed .After non- nutritive sucking, it was observed that majority of them (94%) were flexed while 2% were in extendedposition and 4% were in partly extended position. Regarding Global tonus before non- nutritive sucking it was presented that 94% of them were normotonia and eight percent of them with hypotonia after non- nutritive sucking, it was observed that majority of them (94%)with normotonia and 6 % were hypotonia.

Table (9): Percent distribution of premature infants according to their oralreflexes.

Oral reflexes	**Before NNS (n=50)**		**After NNS (n=50)**		**X2**	**P**
Rooting Reflex	No	**%**	No	**%**		
Absent(0)	1	2%	0	0%		
Weak(1)	17	34%	10	20%	3.800	<0.001
Present(2)	32	64%	40	80%		
Sucking Reflex	No	**%**	No	**%**		
Absent(0)	0	0	0	0%		
Weak(0)	23	46%	10	20%	6.193	<0.001
Present(2)	27	54%	40	80%		
Biting Reflex	No	**%**	No	**%**		
Absent(0)	1	2%	1	2%		
Weak(1)	15	30%	5	10%	5.145	<0.001
present(2)	34	68%	44	88%		
Gag Reflex	No	**%**	No	**%**		
Weak (1)	5	10%	3	6%	2.0	0.046
Present(2)	45	90%	47	94%		

Table (9) Percent distribution of premature infants according to their oralreflexes. It was showed that 64% of premature infants had rooting reflex before non-nutritive sucking improved to 80 % after non-nutritive sucking.Regarding sucking reflex before NNS, 54 % had sucking improved to80 % had suckingafter NNS. According to biting reflex before non-nutritive sucking, 68% of them had biting reflex improved to 88% were present after NNS. Lastly,regarding gag reflex part is present in 90% of premature infant improved to 94% afterNNS.

Table (10): Percent distribution of premature infants according to Early Feeding skill Assessment.

Oral Feeding Readiness	**(n=50) Yes**	**%**
Able to hold body in a flexed position	50	100**%**
Awake state	50	100**%**
Demonstrate energy for feeding	50	100**%**
Attention is directed toward feeding	50	100**%**
Baseline oxygen saturation>95%	50	100**%**

Table (10) shows the percent distribution of preterm infants according to Early Feeding skill Assessment.Regarding ability to hold body in a flexed position, awake state, demonstrating the ability for feeding, attention is directed towards feeding and baseline of oxygen saturation >95%all of the sample represented all of them (100%).

Table (11): Percent distribution of premature infants according tothe ability to coordinate Swallowing

Ability to Coordinate Swallowing	**All of the feeding**		**Most of the feeding**		**Some of the feeding**		**None of the feeding**	
Manages fluid during swallow	11	22%	37	74%	2	4%	0	0%
Pharyngeal sounds are clear	36	72%	14	28%	0	0%	0	0%
Swallow are quite	1	2%	46	92%	3	6%	0	0%
Airway open fully after swallow	5	10%	39	78%	6	12%	0	0%
A single swallow clears the sucking bolus	3	6%	36	72%	8	16%	3	6%
No overt evidence of potential for aspiration	15	30%	19	38%	10	2%	6	12%
oxygen 5min	92 – 100		98.10 ± 1.54				2.198	0.032*

* P < 0.05 significant

Table (11) shows the Percent distribution of premature infants according the ability to Coordinate Swallowing. It was observed that74%of them were able to manage fluid during swallow in most of the feeding time. Regarding pharyngeal sound is clear in all of the feeding time represented 72 %. Regarding swallow is quite in most of feeding of them represented 92% of them. According to airway after swallow was fully open in most of the feeding which represented 78%. According to a single swallow clears the sucking in most of the feeding represented72%. Thirty eight(38%)% of them were no overt evidence of potential for aspiration most of the feeding with mean ±SD for oxygen at 5minute with significant value P < 0.05 significant.

Table (12):Mean Score ofpremature infants according to oxygen saturation during feeding.

Oxygen/min	Range	Mean ± SD	T	P
Oxygen 1min	91 – 100	97.48 ± 1.81		
oxygen 2min	89 – 100	97.67 ± 1.95	1.055	0.296
oxygen 3min	89 – 100	97.76 ± 1.99	1.080	0.285
oxygen 4min	91 – 100	98.10 ± 1.67	2.215	0.031*
oxygen 5min	92 – 100	98.10 ± 1.54	2.198	0.032*

* P < 0.05 significant

Table (12) shows the mean distribution of premature infants according to oxygen saturation post feeding for five minute. It was found that at 1st minute, oxygen saturation ranged between 91-100 % with Mean (± 1.81) while oxygen saturation at 2nd and 3rd minute ranged between 89%-100%. In relation to the 1stminute, there wasno significant differencewhile oxygen saturation at the 4th minute ranged between 91-100%, but when reaching the 5th minute, oxygen saturation ranged between 92%- 100%. In relation to the 1st minute,there was a statistical significance with P < 0.05.

Table (13): Percentage distribution of premature infants according to Infant Breast feeding behaviors scale.

Infant Breast feeding behaviors scale.	No	%
Rooting	**50**	
Did not root(0)	0	0%
Showed some rooting behavior(1)	5	10%
Showed obvious rooting behavior(2)	45	90%
Areola grasp (how much of breast inside the baby mouth		
None, the mouth only touched the nipple(0)	0	0%
Part of the nipple(1)	0	0%
The whole nipple, not the areola(2)	0	0%
The nipple and some of the	50	100%
Did not latch on		
Latched on and fixed(0)	0	0%
Latched on for<5minutes(1)	18	36%
Latched on for 6-to10minutes(2)	30	60%
Latched on for >11-15minutes	2	4%
Sucking		
No sucking or licking(0)	0	0%
Licking and tasting but not sucking(1)	0	0%
Single suck, occasional short sucking bursts (2-9suck)(2)	23	46%
Repeated sucking bursts, occasional long bursts (>10sucks)(3)	27	54%
Longest Sucking burst		
5-consecutive sucks(1)	0	0%
6-10 consecutive sucks(2)	39	78%
11-15 consecutive sucks(3)	8	16%
16-20 consecutive sucks(4)	3	6%
21-25-consecutive sucks(5)	0	0%
Swallowing		
Swallowing was not noticed(0)	44	88%
Occasional swallowing was noticed(1)	6	12%
Repeated swallowing was noticed(2)	0	0%

Table (13) shows the percent distribution of premature infants according toinfant breast feeding behaviors scale. It showed an obvious rooting behavior which was represented in 90% of them. All of them had the ability to start feeding with breast feeding inside the baby mouth and some of areola. Regarding latch on 60% of them latch on for 6-10minutes. According to the longest sucking bursts, 78% were 6-10 consecutive sucking .Swallowing was not noticed in 88% of them while it was noticed that 12% were occasional swallowing.

Table (14) Relation between premature low birth weight infant and their feeding performance.

Feeding performance	1st day	2nd day	3rd day	P
Efficiency	**3.66-1.77**	**5.74 ± 1.44**	**7.89-1.75**	**P1<0.001* P2<0.001* P3<0.001***
Consumed	**16.28-5.27**	**22.87 ± 5.75**	**35.18-8.05**	**P1<0.001* P2<0.001* P3<0.001***
Proficiency	**14098-3.26**	**19.48 ± 4.41**	**22.19-4.10**	**P1<0.001* P2<0.001* P3<0.001***

Table (14) Show relation between premature infant and their feeding performance. It was observed that, their efficiency was improved from the first day 3.66±1.77, second day 5.74±1.44 and the third day 7.89±1.75. Asregardsto consume of feeding, it was noted that, their consuming were improved from the first day 16.28±5.27, second 22.87±5.75 and third day 35.18- 8.05. Finally their proficiency was improved from the first day 14.98±3.26, second 19.48±4.41 and third 22.19±4.10.

III. Discussion

Premature infants frequently experience many difficulties afterbirth and nutritional problems are one of the major challenges. Premature babies who are born at less than 34 weeks of gestational age have an uncoordinated suck-swallow-breath pattern and cannot be fed by mouth successfully or safely. Thus, it is necessary to evaluate whether using the feeding guideline is beneficial in accelerating the rate to oral feeding for preterm infants Prematurity and LBW arethe second leading cause of infant mortality (birth defects are the leading cause of infant death).The incidence of infants born with LBW is increasing. (15-16)

The findings of the present study showed the socio-demographic characteristics of the studied premature neonates in relation to gender .It was observed that nearly half of the premature neonates were females .This finding is consistent with**Valeri (2014)**who mentioned that the preterm group and genderhave no statistical differences between groups were observed with male and female infants. (17)

It was found in the present study that about more than half of the premature neonates had idiopathic respiratory distress syndrome (52%)). This finding can be explained in the fact that premature neonates are more liable to respiratory problems due to the immaturity of lung and surfactant. This is congruent **Weerasekera1 (2018),** who stat that the incidence and severity of NRDS is inversely related to gestational age and birth weight. Whilst 60-80% of neonates born earlier than 28 weeks of gestation and 15-30% born at 32-36 weeks of gestation develop NRDS, it is rare in those more than 36 weeks of gestational age. (18)

Regarding the characteristics of mothers in the study group, it was found that an equal presentage of them are living in both urban and rural areas . This finding is incongruent with the finding of **Chloe (2018)** who mentioned that Loss ofobstetric services at hospitals in rural countries puts mothers at a higher risk of preterm birth and birth outside of a hospital or in a hospital without any managment in obstetricunit.(19)

In the present study, it was observed that about nearly two thirds of the studied mothers' age ranged between 25 and 29 years. It may be the cause of preterm labor and cesarean section and premature newborn infants. The current study is incongruent with the **Kang (2015)** who mentioned that Teenage pregnancy is associated with poor neonatal outcomes; young maternal age is found to be associated with a higher risk of prematurity neonates, congenital malformations, neonatal mortality and low birth weight percentiles. (20)

The Apgar score remains to be a good tool for assessingfull term newborns and preterm neonates and useless in assessing the state of low birth weight, verylow body weight and extremely low body weight babies. In the present study it was observed that the Apgar score among the studied premature low birth weight infants. It was found that at one minutenearly half of the studied preterm infants (44%) had Apgar score (4-<7) improved after five minutes to be half of them with score 7-10.

Padmasri, (2015) Apgar score is an index of a newborn's condition immediately after birth, particularly in regarding recovery and in neonatal death. An Apgar score of less than 5 at 5 min is a useful predictor of neonatal mortality in infants with a birth weight between 1500 grams and 2499 grams. (21)

Regarding the behavioral organization of the premature neonates, the present study revealed that after using non-nutritive sucking, the majority of them maintained with alertness state, flexed posture, and normotonia of global tonus. This may be due to effect of Sucking on a pacifier (non-nutritive sucking) during gavage feeding may encourage the development of sucking behavior and improve digestion of the feeding. Non-nutritive sucking may also have a calming effect on infants.

This finding is consistent with **Foster (2016)** who explained that non-nutritive sucking reduces the time infants need to transition from gavage feeding to full oral feeding and from start of oral feeding to full oral feedingand the digestion of enteral feedings. It also reduces the length of hospital stay.(22)

The functional development of sucking is dependent on the presence of adaptive and protective reflexes. Adaptive reflexes, suc h as rooting and sucking, assist the infants to direct feeding into the gut. The present study revealed thatthe majority of the studied infants had rooting, sucking, and gag reflex after using nonnutritive sucking.

This is agreement with **Linda (2011)** who investigated protective and adaptive reflexes in infants ranging from 25 to 37.5 weeks. The investigator found that the gag reflex could occasionally be stimulated in 90 % of infants at 29 weeks.Several weeks before the age of 33 weeks in which the reflex could be consistently evoked (23)

The present study revealed that more than three quarters of the studied neonates have maintenance of sucking rhythm and strain after non –nutritive sucking. This may be due to the maturity of sucking reflex. This finding is congruent with **Hellen (2008)**who showed that Non-nutritive sucking, associated with oral stimulation programs, can contribute to the improvementof breastfeeding rates among preterm infants with very low birth weight.(24)

As regards the early feeding skill assessment of the studied neonates, the present study revealed that all of them (100%) demonstrate oral feeding readiness through the ability to hold body in a flexed position, maintaining an awake state, demonstrate energy for feeding with sufficient attention, and baseline oxygen saturation more than 95%.

This finding is consistent with **Lindsey (2013)** who mentioned that Significant changes in early feeding skill score, adjusted for gestational age and birth weight, were found for early feeding skill days andpreterm group through it preterm infant demonstrates a behavioral organization and energy for the work of feeding by attaining and maintaining an awake state, a flexed body posture with sufficient muscle tone, and interest in sucking. (25)

The current study showed that majority of the studied neonates showed obvious rooting behaviors prior to feeding .All of them had the ability to grasp areola including the nipple and some of the areola during feeding.This can be explained as increased the ability to coordinate suck- swallow – breathing pattern.

This finding is agreement with **El-Shahat (2018)** who demonstrated that preterm neonates received pre-feeding oral stimulation technique group started oral feeding early, had higher rooting behaviors on the first contact at the breast, efficientrooting ,areola grasp and latching on were observed . All preterm neonates in both groups had no adverse reactions during the study both before and after oral feeding.(26)

IV. Conclusions

The present study concludes that using of feeding guidelines intervention on premature low birth weight Infant such as non-nutritive sucking will improve their Feeding Performance and Growth parameters.

Recommendations

Evaluating for growth parameters and sucking/swallowing ability is essential prior to discharge of preterm low birth weight infants; and appropriate counseling and continuous follow-up and monitoring after discharge will help achieve better long-term health outcomes and reduced the transition time from gavage feeding to oral feeding, improve the rate of growth and reduce the length of hospitalization .

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