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Research article

Changes in weight gain pattern of low-birth weight neonates while gradually shifting from Ryle tube to breastfeeding: A non-experimental descriptive study

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Abstract

Breastfeeding has many health benefits for both the mother and infant. Breast milk contains all the nutrients an infant needs in the first six months of life. Breastfeeding further protects against diarrhoea and common childhood illnesses such as pneumonia, and may also have longer-term health benefits for the mother and child, such as reducing the risk of overweight and obesity in childhood and adolescence. Evidence suggests that initiation of breastfeeding in the first day of life is associated with a significant reduction in the risk of neonatal mortality when compared with delaying breastfeeding for more than 24 hours after birth. Aim of the study was to observe weight gain pattern in low birth weight neonates shifting Ryle's tube feeding to exclusive breast feeding. A total of 60 low birth weight neonates who were between 1500 and 2000 gm and admitted at NICU at Bharati hospital, Pune were included in the study. The patients who did not fulfill exclusion criteria were excluded from the study. Parents of the patients gave their consent for the participation in the study. In this study, paired t test and ANOVA was used to compare mean of two groups and more than two groups respectively. The 62% neonates were female and 68% neonates were having weight between 1500-1799 gm at birth. First birth order included 70% neonates. 97% neonates received 9-12 Ryle's tube feeding per day. The results showed that the frequency of breast feeding increased and frequency of Ryle's tube feeding decreased, there were no neonates whose weight was found within range of 1500 to 1699gm. There were 31% neonates whose weight was found within range of 1800 to 1899 gm.30% neonates whose weight within range of 2000 to 2999gm. The study results showed that when the low birth weight neonate were gradually shifted towards breast feeding from Ryle's tube feeding, there is consistent and significant change in weight gain pattern of the neonate.

Keywords: low-birth weight neonates, breastfeeding, weight gain pattern, nursing.

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1. Introduction

Breast milk is the perfect food for a baby. It is the unique property of human milk which makes it the only nutrition an infant [1]. Breast milk provides adequate nutrition in preterm newborn which not only provides satisfactory weight gain, but also decreases the morbidity and mortality rates in the early months of life as well as in the neonatal period [1,2]. It has been found that breast milk contains anti-infective factors which are associated with decrease in the incidence of diarrhea among preterm infant fed [3]. Previous studies have shown that breast-milk fed infants have less chance of necrotizing enterocolitis, less sepsis and better IQ [1-3].

Some babies are unable to suck their food or milk; hence, inadequate nutrition. It may be because of less developed sucking reflex, tiredness or a medical condition. In such situations, milk can be given via a nasogastral tube (Ryle tube) which passes through nose directly into stomach [4, 5].

Birth weight is considered as a major determinant of neonatal death in developing countries. There is relationship between

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neonatal morbidity and neonatal mortality. The relatively high incidence of low birth weight is among those whose birth weight is below 2500 gm [6]. Low birth weight is considered as one of the important cause of neonatal death. Globally, about 18 million infants are born with a birth weight of (LBW) infants constitute only about 14% of the total live births, they account for 60-80% of total neonatal deaths [7, 8]. Most of these deaths can be prevented with extra attention to warmth, prevention of infections and more importantly, optimal feeding.

Nutritional management influences immediate survival as well as subsequent growth and development of LBW infants. [9] Even simple interventions such as early initiation of breastfeeding and avoidance of pre-lacteal feeding have been shown to improve their survival in resource restricted settings. Early nutrition could also influence the long term neurodevelopmental outcomes; malnutrition at a vulnerable period of brain development has been shown to have deleterious effects in experimental animals.
Studies show that low birth weight is also associated with development of diabetes & heart diseases in adulthood. Appropriate feeding technique immediately after birth & exclusive breast feeding as early as possible till first six months of life reduce the risk of neonatal morbidity and neonatal mortality associated with low birth weight [10-12].

In this study, we planned a study to assess weight gain pattern among low birth weight neonates gradually shifting from Ryle's tube feeding to breast feeding admitted in neonatal intensive-care unit (N.I.C.U.) of Bharati hospital of Pune. We assumed that there will be some change in weight gain pattern when neonate is gradually put on breast feeding from Ryle's tube feeding.

Hypothesis
Ho: There is no significant difference in weight gain pattern of low birth weight neonates when they are gradually shifting from Ryle's tube feeding to breast feeding.
H1: There is significant difference in weight gain pattern of low birth weight neonates when they are gradually shifting from Ryle's tube feeding to breast feeding.

Limitations

Related electronic infant weighing scale
Regular calibration of machine is important to get accurate readings; sudden checking of weight could not be recorded as it takes 3 to 4 seconds every time to make it "0"; if it is not charged properly it will not work in the absence of electricity.

Related babies
Initially babies cried as they were put on weighing scale without clothes; weighing time, sleeping time of infant and nursing intervention disturbs the baby; therefore, weighing the baby sometimes become difficult to record.

Aim
A study to assess weight gain pattern among low birth weight neonates gradually shifting from Ryle's tube feeding to breast feeding admitted in N.I.C.U. of Bharati hospital of Pune.

Objectives
To fulfill the aim following objectives were chosen: To assess weight of low birth weight neonates before starting breast feeding; to assess the weight gain pattern among low birth weight neonates gradually shifting from Ryle's tube feeding to breast feeding; to compare weight gain pattern with selected demographic variables.

2. Patients and methods

This is a non-experimental descriptive study conducted at neonatal intensive care unit at Bharati Hospital, Pune, India. A total of 60 low birth weight neonates who were admitted in the NICU were enrolled in the study. All selected patients weighed between 1500 to 2000 gm. Low birth weight neonates who were critically and chronically ill, neonates who were receiving formula feed, and neonates who would go back to exclusive Ryle's tube feeding from weaning towards breast feeding were excluded from the study. The study was approved by institute ethics

committee and parents of the participants gave their consent for participation in the study.

Non- probability convenient sampling method was used as sample technique. In this method, subjects are selected in non-random method. It is called as convenient on the basis of subject population selection.

Data collection technique

Direct observation technique was used to assess and record the pattern of weight gain. Data collection tool was divided into 3 sections: Section A, B and C. Section A consisted of Code number, birth weight, sex, and birth order. Section B consisted of 4 following observations: Days of exclusive Ryle's tube feeding; Total number of Ryle's tube feeding per day; Weight on last day of exclusive Ryle's tube feeding; Weight of the baby on first day of breast feeding. Section C had only observational results.

Procedure of data collection

Each day the investigator went to the NICU, made the list of neonates who matched into the inclusion criteria. Data collection was done by assessing the weight gain pattern using electronic infant weighing scale; this was done to get an idea about minimum and maximum weight gain with respect to the time i.e. morning time. The demographic data, the neonates was collected with the help of register on duty and neonate's admission record file. The investigator personally maintained good rapport with the staff to get their full co-operation. All data was filled in the weight assessment tool then and there only. The child was kept naked on infant weighing scale with Ryle's tube if child has and if child was not on Ryle's tube. The investigator washed her hands before touching the neonate. First, Infant weighing scale was checked for its accuracy and then the neonate weighed on it. The investigator moved to the next baby to take the readings, after one reading of the sample was completed. The reading of weight was recorded on 6 alternative days of each neonate during their weaning period from Ryle's tube feeding to exclusive breast feeding.

Validity and reliability

To ensure content validity of the prepared tool, it was submitted to twenty-three experts out of which nine were from the pediatric nursing specialty, five were from other nursing specialties, four from medical profession, three from environmental science, did the content validity of the tool. On common agreement, a few additions and deletions were made in the tool. Reliability of the electronic Infant weighing scale was done from Bio- medical engineer from maintenance department of Bharati Hospital, Pune, Maharashtra, India.

Pilot study

A pilot study was conducted in N.I.C.U. of Bharati Hospital, Pune. The pilot study was done by assessing 8 low birth weight neonates by using infant weighing scale and observation table. Necessary information obtained from the patient's data. Samples were selected by non-probability convenient sampling technique. A pilot study did not reveal any flaws in the feasibility and design of the observation table and criterion (unpublished data).

Statistical analysis

The analysis was done on the objectives and the hypothesis to be tested. Demographic data of the samples was calculated as frequency and percentage. Assessment of weight of low birth weight neonate before starting breast feeding and assessment of weight gain pattern among low birth weight neonate gradually shifting from Ryle's tube feeding to breast feeding was calculated as mean. Comparison of weight gain pattern with demographic variables was done by paired "t" test. The findings were documented in tables and graphs.

3. Results

Out of 60 neonates included in the study, 62% were female while remaining 38% were male. 32% of neonates weighed between 1800 and 2000 g while the remaining 68% neonates weighed between 1500 and 1799 g. 70% of neonates were in birth order I while in birth order IV, there were 8% neonates.

A detailed analysis has been presented in table 1.

Table 1: Frequency and percentage wise distribution of low birth weight neonates under demographic characteristics

SN	Characteristics	Sample characteristics	Frequency (n)	Percentage (%)
1	Gender	Male Female	23 37	38 62
2	Weight of low birth weight neonate at birth (gm)	1500 to1799 1800 to 2000	41 19	68 32
3	Birth order of low birth weight neonate	I II III IV	42 9 4 5	70 15 7 8

Majority of the neonates were at 1-3 exclusive days of Ryle's tube feeding. Only 3% neonates were 7 to 9 days of exclusive Ryle's tube feeding (Table 2).

Table 2: Frequency and percentage distribution of the total days of exclusive Ryle's tube feeding of LBW neonates

SN	Total days of exclusive Ryle's tube feeding	Frequency	Percentage (%)
1	1 to 3	39	65
2	4 to 6	19	32
3	7 to 9	02	3

Weight of low birth weight neonates on last day of exclusive Ryle's tube feeding was recorded and it was observed that 88% neonates has weight between 1500 and 1999 gm. Between 2000 and 2999 gm, there were 12% neonates (Table 3).

Table 3: Frequency and percentage distribution of the weight of LBW neonates on last day of exclusive Ryle's tube feeding

SN	Weight on last day of exclusive Ryle's tube feeding (gms)	Frequency	Percentage (%)
1	1500 to 1999	53	88
2	2000 to 2999	07	12

Frequency and percentage distribution of the total number of Ryle's tube feeding per day the LBW neonate showed that there were 97% who required 9 to 12 Ryle's tube feeding while 3% neonate required 4 to 8 Ryle's tube feeding.

Table 4 and 5 shows frequency and percentage distribution of weight of LBW neonate on 1st day of breast feeding with 1 breast feeding and 11 Ryle's tube feeding and frequency and percentage distribution of weight of LBW neonate on 2^{nd}, 4^{th}, 6^{th}, 8^{th}, 10^{th} day of Ryle's tube feeding followed by breast feeding and weight on 12th day of exclusive breast feeding.

Table 4. Frequency and percentage distribution of weight of LBW neonate on 1st day of breast feeding with 1 breast feeding and 11 Ryle's tube feeding

SN	Weight of LBW neonate on 1 direct breast feeding and 11 Ryle's tube feeding (gm)	Frequency	Percentage (%)
	1500 to 1599	1	7
	1600 to 1699	27	42
	1700 to 1799	9	15
	1800 to 1899	9	15
	1900 to 1999	5	6
	2000 to 2999	9	15

Table 5: Frequency and percentage distribution of weight of LBW neonate on 2nd, 4th, 6th , 8th, 10th day of Ryle's tube feeding followed by breast feeding and weight on 12th day of exclusive breast feeding

SN	Weight (gm)	2nd day with 02 B.F.		4th Day with 04 B.F.		6th Day with 06 B.F.		8th Day with 08 B.F.		10th Day with 10 B.F.		12th Day with 12 B.F.	
		F	%	F	%	F	%	F	%	F	%	F	%
1	1500 to 1599	0	0	0	0	0	0	0	0	0	0	0	0
2	1600 to 1699	18	30	7	12	04	07	02	03	01	02	0	0
3	1700 to 1799	19	32	24	40	26	43	16	26	11	18	7	12
4	1800 to 1899	14	23	11	18	11	18	22	37	24	40	19	31
5	1900 to 1999	09	15	06	10	05	08	07	12	10	16	16	27
6	2000 to 2999	0	0	12	20	14	24	03	22	13	22	18	30
7	3000 to 3999	0	0	0	0	0	0	0	O	01	02	0	0

B.F: breast feeding; F: Frequency

Weight gain pattern of shifting from Ryle's tube to breast feeding weight gain pattern of neonates from birth and last date of Ryle's tube feeding to breast feeding was observed and it was calculated that there was significant difference in weight gain on the last date of exclusive Ryle's tube feeding and the last day of exclusive breast feeding (1.76±0.18 vs. 1.97±0.23; P=0.000). There was no difference in weight gain at birth and on the last date of exclusive Ryle's tube feeding (1.70±0.17 vs. 1.76±0.18; P=0.074). A detailed presentation has been shown in table 6 and figure 1.

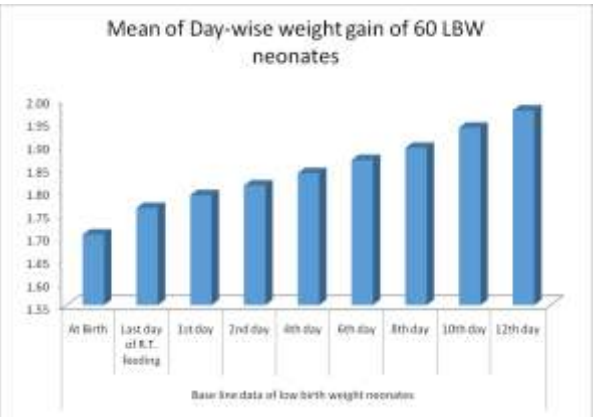

Figure 1: Mean of day-wise weight gain of 60 low birth weight neonates

Table 6: Mean of day-wise weight gain of 60 low birth weight neonates

	Weight on Particular Day of Breast Feeding								
	Birth	Last day of exclusive Ryle's tube feeding	1st	2nd	4th	6th	8th	10th	12th
Mean	1.70	1.76	1.79	1.81	1.84	1.87	1.89	1.94	1.97
SD	0.17	0.18	0.17	0.17	0.16	0.17	0.17	0.21	0.23

It was observed that there was weight gain in female neonates weight compared to male neonates weight (0.29±0.24 vs. 0.24±0.11; P=0.18). However, the weight gain was not significant.

Analysis of variance was performed to measure weight gain according to the birth order of the neonates. It was observed that there was non-significant weight gain according to birth order (P=0.58) (table 7).

Table 7: Birth order wise weight gain comparison

Birth order	Count	Sum	Average	Variance
I	42	11.801	0.280976	0.053783
II	9	1.943	0.215889	0.013259
III	4	0.747	0.18675	0.025466
IV	5	1.716	0.3432	0.018064

4. Discussion

The study showed that 62% neonates were female and 68% neonates were having weight between 1500-1799 gm at birth. Out of all neonates, 70% neonates were of 1stbirth order and 97% neonates were received 9-12 Ryle's tube feeding per day.

As the frequency of breast feeding increases and frequency of Ryle's tube feeding decreases and stops there were no neonate whose weight was found within range of 1500 to 1699 gm. There were 31% neonates whose weight was found within range of 1800 to 1899gm. 30% neonates whose weight within range of2000 to 2999gm. There was significant increase in weight gain from last day of exclusive Ryle's tube feeding to exclusive day of breast feeding. It indicate that when neonate is gradually shifting from Ryle's tube feeding to breast feeding there is consistent and significant increase in weight gain pattern of low birth weight neonate.

Conclusion

The study results showed that when the low birth weight neonate were gradually shifted towards breast feeding from Ryle's tube feeding ,there is consistent and significant change in weight gain pattern of the neonate. The study also revealed that gender and birth order of low birth weight neonates does not play any significant role in the weight gain pattern of neonate.

Limitations of the study

There is no study without limitations. Our study has following limitations: There was a time limitation for completion of the study; limited sample size; study limited to the assessment of weight; only to those who are willing to participate in the study; limited to setting mentioned in the study.

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