Original Research Article

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A study on efficacy of oral administration of colostrum fortified lactoferrin in the weight gain of low birth weight infants

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ABSTRACT

Background: Low birth weight babies is the result of being small for gestational age (i.e. under 10th percentile of the reference population) and preterm (i.e. before 37 weeks of gestation. Preterm infants have higher protein, calorie requirement, which cannot be met with unfortified breast milk feeds.

Methods: This study was conducted prospectively in the Department of Pediatrics, Rajah Muthiah Medical College and Hospital, Chidambaram from October 2016 to April 2018. 20 low birth weight babies were selected by randomization technique and they were administered with 2 grams of oral colostrum fortified lactoferrin daily for 4 weeks. The rate of weight gain, length gain and head circumference gain were assessed prospectively for a period of 4 weeks. They were analysed statistically by ANOVA and tabulated. Babies weighing less than 2.5 kg and on exclusive breast feeding, were included. Babies more than 2.5kg and less than 1kg, at risk for neonatal sepsis, congenital heart disease, necrotizing enterocolitis were excluded from the study.

Results: In the present study, 20 low birth weight babies were included. 11 maternal risk factors were identified. Out of which anemia stands as a single risk factor. The rate of weight gain in oral colostrum fortified lactoferrin, is 320 grams with P value of 0.703 which is not statistically significant. The rate of length gain is 3.3cm, p value is 0.093 which is statistically insignificant. The rate of head circumference gain in oral colostrum fortified lactoferrin is 2.8cm, with the p-value of 0.001 which is statistically significant.

Conclusions: The rate of weight and length gain was normal, but the rate of head circumference gain is significantly increased in oral colostrum fortified lactoferrin supplementation.

Keywords: Low birth weight, Oral colostrum fortified lactoferrin, Prematurity

INTRODUCTION

Babies with a birth weight of <2500 grams are the most vulnerable newborns at higher risk of mortality. Low birth weight is the result of being small for gestational age (i.e. under the 10th percentile of the reference population) preterm (i.e. born before 37 weeks of gestation) or both. Globally 20 million LBW infants are born every year out of which 96.5% are from developing countries. Colostrum is a pre milk substance produced

immediately after birth. This lasts for 2-4 days after the lactation has started. Colostrum is the source of immune factors, growth factors, fats, proteins, sugars, micronutrients.

Colostrum is very rich secretory source of IgA.² Growth factors help in regeneration and accelerate to repair the aged original muscle, skin, collagen, bone cartilage and nervous tissues. Growth factors also stimulate the body to burn fat instead of body's muscle tissue in times of

fasting. Colostrum is very rich secretory source of IgA. Standard treatment used in this study is Oral colostrum fortified lactoferrin. Preterm infants have high calorie, protein and mineral requirements which cannot be met with unfortified breast milk feeds. Such infants require fortification of breast milk with human milk fortifier to optimize their nutritional needs.³ Preterm infants with gestational age of 34 weeks and birth weight less than 1800 grams will require fortification of breast milk with standard treatment once they are on substantial enteral feeds (100-120ml/kg/day).⁴

METHODS

This study was conducted prospectively in the Department of Pediatrics, Rajah Muthiah Medical College and Hospital, Chidambaram from October 2016 to April 2018. 20 low birth weight babies were selected by randomization technique and they were administered with 2 grams of oral colostrum fortified lactoferrin daily for 4 weeks.

The rate of weight gain, length gain and head circumference gain were assessed prospectively for a period of 4 weeks. They were analysed statistically by ANOVA and tabulated.

Inclusion criteria

- Babies weighing less than 2.5kg and
- Babies on exclusive breast feeding.

Exclusion criteria

- Babies weighing more than 2.5kg
- Babies less than 1kg and
- Extreme preterm babies, sepsis, hypothyroidism, necrotising enterocolitis were excluded from the study.

Statistical analysis

Table 1: ANOVA-weight gain.

	Sum of squares	df	Mean squares	f	P value
Oral colostrum fortified lactoferrin	1.357	2	0.678	0.355	0.703

Table 2: ANOVA-length gain.

	Sum of squares	df	Mean squares	f	P value
Oral colostrum fortified lactoferrin	1.673	2	0.837	2.47	0.093

Table 3: ANOVA-head circumference gain.

	Sum of squares	df	Mean squares	f	P value
Oral colostrum fortified lactoferrin	5.181	2	2.591	7.433	0.001

RESULTS

Distribution of sex in the present study

In present study male (12) outnumbers female (8).

Male babies comprise 60% of the study population.

Female babies comprise 40% of the study population.

Table 4: Distribution of sex in the present study.

	Male	Female
Term	-	-
Preterm	12	8

Dubowitz score

In present study the most common gestational age involved is late-preterm (34-36 weeks) 65%.

Male are found to be dominant in late-preterm.

Table 5: Classification of newborn (sex wise distribution) with respect to gestational age.

Dubowitz score	Male	Female
30-32 weeks	1	-
32-34 weeks	1	-
34-36 weeks	10	8
36-38 weeks	-	-

Mode of delivery

In the present study the most common mode of delivery is normal vaginal delivery (60%).

Table 6: Distribution of mode of delivery.

Mode	Male	Female
Normal	8	4
Emergency LSCS	6	2

Maternal risk factors

Nine risk factors were studied in present group.

Out of which anemia stands as a single risk factor in present study group, 4 (20%).

Table 7: Relationship between maternal risk factors and low-birth weight.

Maternal risk factors	Pre-term
Anemia	4
PIH	1
Gdm and hypothyroid	2
Prom	3
Maternal fever	1
Polyhydraminos	1
Previous abortions	1
Previous LSCS	1

Fetal risk factors

The most common identifiable foetal risk factor is low birth weight (70%). Very low birth weight (10%), IUGR (10%), twins (10%).

Table 8: Distribution of foetal risk factors.

Foetal risk factors	No. of newborns
Low birth weight	14
Very low birth weight	2
IUGR	2
Twins	2

Weight gain in low birth weight neonates in various groups

In present study, the rate of weight gain in oral colostrum fortified lactoferrin, is 322 grams per month respectively.

The rate of weight gain is normal with the P value of 0.703 which is not statistically significant.

Length gain in low birth weight neonates in oral colostrum fortified lactoferrin

The rate of length gain is 3.53cm in oral colostrum fortified lactoferrin group. P-value is 0.093 and is statistically insignificant.

Hence oral colostrum fortified lactoferrin does not have influence in linear growth of newborn.

Head circumference gain in low birth weight neonates after administration of oral colostrum fortified lactoferrin

The rate of head circumference gain is 2.8cm per month in oral colostrum fortified lactoferrin group. P value is 0.001 and it's found to be statistically significant.

Table 9: Weekly weight gain attained by the low birth weight neonates in oral colostrum fortified lactoferrin.

Medications	Birth	Weight at 1 st	Weight at 2 nd	Weight at 3 rd	Weight at 4 th	Weight gain
	weight (kg)	week (kg)	week (kg)	week (kg)	week (kg)	(grams)
Oral colostrum fortified lactoferrin	1.824±0.298	1.712±0.302	1.839±0.330	1.991±0.370	2.146±0.403	322

Table 10: Length gain in low birth weight neonates after administration of oral colostrum fortified lactoferrin.

Medications	Length	Length	Length	Length	Length gain
	1 st week (cm)	2 nd week (cm)	3 rd week (cm)	4 th week (cm)	(per month)
Oral colostrum fortified lactofe	rrin 44.44±3.31	45.39±3.14	46.71±2.89	47.84±3.13	3.53cm

Table 11: Head circumference gain in low birth weight neonates in oral colostrum fortified lactoferrin.

Medications	Head cir 1 st week (cm)	Head cir 2 nd week (cm)	Head cir 3 rd week (cm)	Head cir 4 th week (cm)	Gain in head cir
Oral colostrum fortified lactoferrin	30.9±1.6	31.6±1.57	32.36±1.72	33.3±1.94	2.816cm

DISCUSSION

Sex of the study population

In the present study male neonates were predominant. 12 preterm males were involved with a male preponderance of 60%. In a study conducted by mass et al 33 female newborns with prevalence of 54%. In a study by Polberger et al, male preponderance were noted. 35 male newborns were studied.⁶

Gestational age

In present study the most common gestational age involved is late pre-term (34-36 weeks). Out of 20 newborns, 18 belongs to late preterm.

A study conducted by Dhogra et al the most common gestational age involved is late-preterm (34-36 weeks) (43%).⁷

Maternal risk factors

The no of pre-terms presented with maternal risk factors were 14 (70%). Rest 6 (30%) doesn't have maternal risk factors.

9 risk factors were studied in present group. Out of which anemia stands common risk factor in present study group, 4 (20%).

In a study conducted by Ahankari et al, anemia stands as a common risk factor and was prevalent in 91% of women tested. In a study conducted by lei et al, PIH stands to be a common maternal risk factor and 2845 PIH mothers were included. PIH antenatal mothers have a higher incidence of low birth weight babies.⁸

Comparison of weight gain attained by the low birth weight babies

In the present study, Birth weight attained by the oral colostrum fortified lactoferrin is 1824±0.296, Weight at the end of study is 2146±0.403, weight gain at the end is 322 grams i.e. 13g/day.

Table 12: Comparison of weight gain in various studies. 9-14

Study	Initial mean birth weight (grams)	Mean birth weight at end of study (grams)	Weight gain per month (grams)	Weight gain per week (grams)
Present	1824	2146	322	12
Miller	1530	2070	540	18
Mass	1450	1950	500	16
Colacci	1293	1910	617	20
Myles	1156	1676	520	17
Weillietner	1020	1560	540	18
Berceth	1200	1750	550	17

Table 13: Comparison of head circumference gain in various studies. 9-14

Study	Initial mean head circumference (cm)	Mean head circumference at end of study (cm)	Head circumference per month (cm)	Head circumference gain per week (mm)
Present	30.9±1.94	33.3±1.94	2.8cm	7mm
Miller	31.5±2.3	33.5±2.8	2cm	5mm
Mass	32.07±2.82	34.11±2.89	2.09cm	5.5mm
Colacci	31.27±1.03	33.5±1.2	2.450cm	6mm
Myles	32±1.1	34±2.5	2 cm	5.mm
Weillietner	31.5±1.5	33.5±1.7	2cm	5mm
Berceth	30.1±2.3	32.5±2.1	2.4cm	6mm

Comparison of head circumference gain attained by the low birth weight babies

In present study the mean head circumference at birth in oral colostrum fortified lactoferrin supplementation is 30.9±1.6cm.

CONCLUSION

The weight gain and length gain was similar in oral colostrum fortified lactoferrin supplementation. the rate of head circumference gain is significantly increased in oral colostrum fortified lactoferrin.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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