

Study of growth and nutritional status of low birth weight babies

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Abstract: Low birth weight (LBW) is defined as a birth weight of less than 2500 g (up to and including 2499 g), as per the World Health Organization (WHO, 2014). Twenty five low birth weight babies and mothers were taken to assess the growth and nutritional status in Dharwad-Hubli cities. A detailed case study was conducted for the period of six months using pre-structured questionnaire. The information regarding baby weight and length were recorded for six months every fortnight. Morbidity pattern *i.e.*, infection and diseases suffered by the low-birth-weight babies were recorded. Data was compiled and analysed by using simple descriptive analysis. Frequency and tabulation were done using Microsoft Excel.

Key words: Consumption pattern, Food group, Growth, Height, Low birth weight, Nutritional status, Weight

Introduction

Low birth weight (LBW) is defined as a birth weight of less than 2500 g (up to and including 2499 g), as per the World Health Organization (WHO, 2014). LBW children have a broad spectrum of poor growth, health, and developmental outcomes.

Low birth weight is a valuable public health indicator of maternal health, nutrition, healthcare delivery, and poverty. Neonates with low birth weight have a >20 times greater risk of dying than neonates with birth weight of >2500 g (Badshah 2008). Additionally, low birth weight is associated with long-term neurologic disability, impaired language development (zerbitoet *et al.*, 2016), impaired academic achievement, and increased risk of chronic diseases including cardiovascular disease and diabetes. Preterm infants carry additional risk due to immaturity of multiple organ systems, including intracranial hemorrhage, respiratory distress, sepsis, blindness, and gastro intestinal disorders.

LBW children have a broad spectrum of poor growth, health, and developmental outcomes. Although the majority of the LBW children have normal outcomes, the rate of subnormal growth, illnesses, and neuro developmental problems are higher compared to normal weight children. There is an inverse association between birth weight and the likelihood of stunting in childhood. LBW infants have poor immune function and a higher risk of morbidity, making them more vulnerable to linear growth faltering in the post-neonatal period.

Material and methods

Twenty five low birth weight babies and mothers were taken to assess the growth and nutritional status in Dharwad-Hubli cities. A detailed case study was conducted for the period of six months using pre-structured questionnaire. The information regarding baby weight and length were recorded for six months every fortnight. Morbidity pattern *i.e.*, infection and diseases suffered by the low-birth-weight babies were recorded. Data was compiled and analysed by using simple descriptive analysis. Frequency and tabulation were done using

Microsoft Excel. The consistent increase in weight and height in LBW Babies indicates that they were responding well to nutrition and were allowing them to catch up in growth.

Results and discussion

Table 1. provides a comprehensive overview of the profile of both low-birth-weight babies and their mothers who were selected for the case study. The Table presents various characteristics and variables related to both the low-birth-weight babies and their mothers. here were 56 per cent babies in the study with a birth weight below 1.8 kg, while 8 per cent had a birth weight between 1.8 kg and 2 kg. The birth weight of 36 per cent of babies was between 2.1 kg and 2.49 kg. There were 44 per cent male babies and 56 per cent female babies. Majority of mothers (52%) fall within the age range of 25-29 years. Nearly 60 per cent mothers belonged to Hindu religion, followed by the Muslim religion (36%), 4 per cent Jain religion. Majority of mothers (80 per cent) came from joint families. Majority participants were homemakers (92%). Majority of mothers belonged to Class IV (lower middle) socio-economic status (84%). Nearly 84 per cent participants got married at or after the age of 18 yrs. About 88 per cent participants had a maternal height above 145 cm. Maternal weight of 52 per cent participants was below 45 kg. Weight gain during pregnancy revealed that 64 per cent participants gained weight of 5-7 kg during pregnancy. About 32 per cent participants had birth interval of 2 years or more. When gravidity was considered 60 per cent participants were primigravida (first-time pregnant). The haemoglobin level of 96 per cent participant was between 8.00-10.99 mg per dl. The mean age of the study subjects was 23.61 years (Table 4), the findings were similar to the study conducted in the Nepal (Anil *et al.*, 2020) in which the mean age of the participants was 23 years. And the same findings contradict with the study done in Nepal, that shows a higher risk of delivering low birth weight babies by mother age less than 20 and more than 30 years (Sharma *et al.*, 2015 and Yadav *et al.*, 2011). The changes might be due to regional variations.

Table 1. Profile of low-birth-weight babies and mothers selected for case study N=25

Variables	number	%
Weight of the baby (Kg)		
< 1.8	14	56
1.8 – 2	2	8
2.1 – 2.49	9	46
Sex of the baby		
Male	11	44
Female	14	56
MotherAge (yrs)		
20-24	4	16
25-29	13	52
30-34	8	32
Religion		
Hindu	15	60
Muslim	9	36
Jain	1	4
Family type		
Nuclear	4	14
Joint	20	80
Extended	1	4
Occupation		
Home maker	23	92
Agriculture labour	2	8
Literacy status		
Primary	1	4
High School	8	32
Post SSLC	11	44
Graduate	5	20
Socio economic status of family (Agarwal scale)		
Class IV	21	84
Class V	4	16
Age at marriage (yrs)		
< 18	4	16
≥18	21	84
Maternal height(cm)		
<145	3	12
>145	22	88
Maternal weight (kgs)		
<45	13	52
≥ 45	12	48
Body Mass Index		
< 18.5	8	32
18.5 – 22.9	13	52
≥23	4	16
Weight gain (kg)		
5-7	16	64
8-10	8	32
≥10	1	4
Birth interval (yrs)		
<2	7	28
≥2	8	32
Primigravida	15	60
Gravidity		
Primigravida	15	60
Second gravida	4	16
Third gravida	6	32
Haemoglobin level (g/dl)		
8 – 10.99 (anaemia)	24	96
≥ 11 (normal)	1	4
Total	25	100

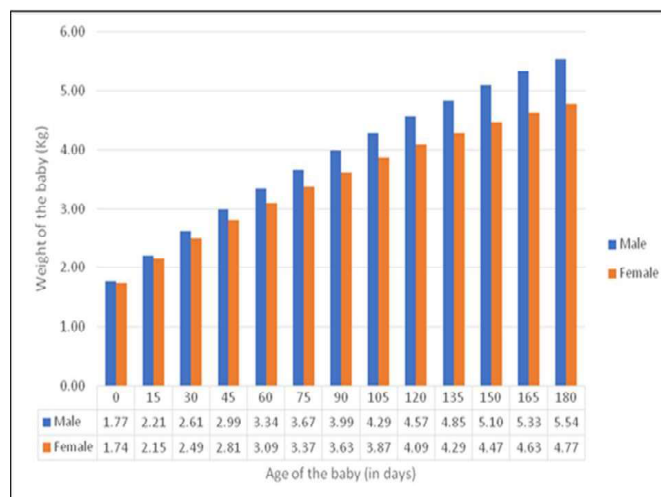


Fig1. Mean weight of the baby from birth to six months

Similar results were observed in Belgavi (Chandra, 2011), that 85.76 per cent were Hindus. 66.87 per cent were housewives and 67.75 per cent belonged to joint family and literacy rate noted among them and their husbands was 86.47 per cent and 88.93 per cent, respectively.

Table 2 provides insights into the food group consumption pattern among selected case studies. The average consumption of cereals and millets is 218 g/day, with a range of 160-255 g/day. The table also indicates the percent adequacy of consumption in different ranges, 80 per cent were consuming more than 70 per cent of the SDA. The average consumption of pulses and legumes is 46 g/day, with a range of 21-71 g/day and 64 per cent were consuming more than 70 per cent of the SDA. The average consumption of green leafy vegetables is 38.50 g/day, with a range of 10-100 g/day and 48 per cent were consuming more than 70 per cent of the SDA. The average consumption of other vegetables is 141 g/day, with a range of 80-220 g/day and 96 per cent were consuming more than 70 per cent of the SDA. The average consumption of roots and tubers is 50 g/day, with a range of 50-100 g/day and 92 per cent were consuming between 50 to 70 per cent of the SDA. The average consumption of fruits is 74.40 g/day, with a range of 50-200 g/day and 52 per cent individuals were consuming less than 50 per cent of the SDA. The average consumption of sugar is 21 g/day, with a range of 15-30 g/day. All the individuals were consuming more than 70 per cent of the SDA. This is supported by a study (Tyagi 2023) that wheat and rice were the primary cereals consumed and 14 per cent pregnant women received <70 per cent of the RDI. The intake of pulses was <70 per cent of the RDI. Mean intake and percentage adequacy of vegetables and fruits was very poor. Even <50 per cent RDI was not met for green leafy vegetables (GLV), other vegetables and fruits by 82, 67 and 69 per cent pregnant women respectively. The percent adequacy of milk & milk products was 36.9 per cent. More than three fourth (77%) pregnant women received only <50 per cent of the RDI for milk and milk products.

Table 3 provides insights into the consumption pattern of various nutrients among the mothers of selected babies in the case study. The average energy intake among the mothers is

Table 2. Food group consumption pattern among selected case studies

N=25

Food Groups	SDA*(gms)	Intake(g/day)		Percent adequacy		
		Mean ± SD	Range	< 50%	50 – 70%	> 70%
Cereals and millets	270	218 ± 26	160-255	0(0)	5(20.0)	20(80.0)
Pulses and legumes	60	46 ± 12	21-71	4(16.0)	5(20.0)	16(64.0)
Green leafy vegetables	50	38.50±14.30	10-100	7(28.0)	6(24.0)	12(48.0)
Other vegetables	200	141±50	80-220	0(0)	1(4.0)	24(96.0)
Roots and tubers	100	50±6.2	50-100	0(0)	23(92.0)	2(8.0)
Fruits	200	74.40±36.50	50-200	13(52.0)	7(28.0)	5(20.0)
Sugar	20	21±4.60	15-30	0(0)	0(0)	25(100)
Milk and milk products	500	118.50±37.2	50-200	25(100)	0(0)	0(0)
Fats and oils	30	46±2.2	45-60	0(0)	0(0)	25(100)

*Suggested Dietary Allowance (SDA) Figures in parentheses indicate percentage

Table 3. Consumptions pattern of nutrient among mothers of selected babies of case study

N=25

Food Groups	RDA*	Intake (g/day)		Percent adequacy		
		Mean±SD	Range	< 50%	50 – 70%	> 70%
Energy (Kcal)	2730	1770±172	1396-1977	0(0)	19(76.0)	6(24.0)
Protein (g)	62.2	40.32±8.84	23.12-51.80	4(16.0)	10((40.0)	11(44.0)
Calcium (mg)	1000	854.36±101.40	584.00-1084.50	0(0)	1(4.0)	24(96.6)
Iron (mg)	23	10.65±4.30	3.60-20.90	17(68.0)	6(24.0)	2(8.0)
Folate (ug)	330	200.64±100.72	42.00-375.60	9(36.0)	3(12.0)	13((52.0)

*Recommended Dietary Allowance (RDA) Figures in parentheses indicate percentage

1770 Kcal/day, with a range of 1396-1977 Kcal/day. The table also indicates the per cent adequacy of energy intake in different ranges: only 6 per cent were consuming more than 70 per cent of the recommended energy. The average protein intake among the mothers was 40.32 g/day, with a range of 23.12-51.80 g/day and 44 per cent were consuming more than 70 per cent of the recommended protein. The average calcium intake among the mothers is 854.36 mg/day, with a range of 584.00-1084.50 mg/day and 96 per cent were consuming more than 70 per cent of the recommended calcium. The average iron intake among the mothers is 10.65 mg/day, with a range of 3.60-20.90 mg/day. The table shows that 68 per cent mothers were consuming less than 50 per cent of the recommended iron. The average folate intake among the mothers is 200.64 ug/day, with a range of 42.00-375.60 ug/day and 52 per cent were consuming more than 70 per cent of the recommended folate. Similar data was observed in a study (Tran *et al.*, 2019) that over three-quarters of the pregnant women did not meet the adequate intakes for energy, fat, carbohydrate, calcium, iron, zinc, vitamins A, D, E, B2, and folate at baseline.

Fig 1 displays the increase in weight (kg) of low-birth-weight babies, categorized by gender, at different time points over a span of 6 months. The data shows the progression of weight gain among low-birth-weight babies as they grow and develop over the first 6 months. The weight of both male and female low-birth-weight babies has consistently increased over the 6-month period. At birth, the average weight of babies was 1.76 kg. As time progresses, the weight gain has followed a general trend of steady increase, indicating that the babies were growing and gaining weight as expected. On average, both male and female babies have exhibited similar weight gain patterns. There is no significant difference in the weight gain between male and female babies at any given time point. Casey *et al.* (1990) observed the same results in their study.

Fig. 2 displays the increase in height (cm) of low-birth-weight babies, categorized by gender, at different time points over a span of 6 months. The data in this table provides insights into the growth of low-birth-weight babies in terms of their height over the first 6 months of life. When height growth progression was considered both male and female low-birth-weight babies have shown consistent and gradual increase in height throughout the 6-month period. At birth, the average height of babies was around 40.13 cm. Both male and female babies have exhibited similar height growth patterns. There is no significant difference in the height gain between male and female babies at any given time point. The data shows that low-birth-weight babies had an average height increase of about 12.60 cm (40.13 cm - 52.73 m) during the first 6 months. Overall, the figure illustrates that low-birth-weight babies can achieve healthy growth in terms of height during the first 6 months. This consistent increase in height indicates that they were responding well to nutrition and were allowing them to catch up in growth. This is on par with study conducted by Ahmad *et al.* (2021).

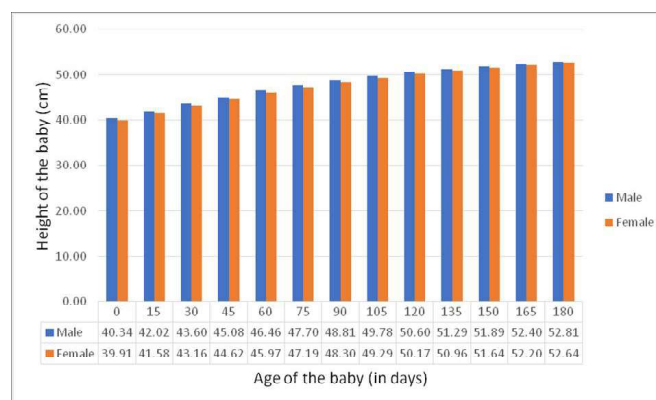


Fig 2. Mean height of the baby from birth to six months

Conclusion

In an study conducted on LBW infants in areas of Dharwad-hubli demonstrated proper growth during the first year of life. However, poor nutritional status was found to be higher among

LBW infants. Therefore, it is vital to strengthen the components of various maternal and child health programmes to empower mothers of babies with low birth weights to routinely monitor the well-being of their children.

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