

Low Birthweight Babies – Outcome at 13 years

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The study was conducted to compare growth status, blood pressure, self esteem and intelligence of 200 low birthweight (LBW) and 224 normal birthweight (NBW) adolescents at 13 years of age. Intelligence scores at or below the 25th percentile (low performance) were observed among 51.4% LBW and 41.7% NBW adolescents (<0.05). Statistically significant lower scores for self esteem (mean difference 4.31, 95% CI 1.91-6.71) were observed among LBW adolescents. Height, weight and body mass index (BMI) were lower among all LBW adolescents and the difference reached statistical significance for weight and BMI among LBW adolescent girls.

Keywords: Adolescent, Body Mass Index, Low birthweight, Self-esteem.

Long term follow-up studies indicate that the adverse consequences of being born low birthweight (LBW) are still apparent in adolescence(1,2). Low birthweight survivors demonstrate significant growth retardation reflected by lower bodyweight, height and higher ambulatory blood pressure values and variability(3-5). Sorenson, *et al.*(6) have observed that birthweight is significantly associated with cognitive ability at age 8 years, through adolescence, and into early adulthood, independent of social background. Adolescents born as LBW have more cognitive, academic, behavioral problems, and lower self-esteem in early adolescence than normal birthweight (NBW) adolescents(7). This study compares growth status, blood pressure, self esteem and intelligence in LBW and NBW adolescents at 13 years of age.

METHODS

A total of 424 adolescents (boys 232; girls 192), 200 born low birthweight (LBW)(<2500g) and 224 born with normal birthweight (NBW), on developmental follow-up at Child Development Centre were seen again at 13 years of age. Outcome measurements were made by observers masked to the birthweight status of the children.

Height and weight were recorded for each adolescent and body mass index (BMI) was calculated. Blood pressure was also measured. Self esteem was measured using a standardized self esteem inventory that consisted of 25 items intended to tap self-evaluation from a wide variety of behavioral domains, including social, academic, physical, and emotional aspects(8). The mean raw scores for LBW and NBW adolescents were compared separately for boys and girls. Intelligence was assessed using Raven's Coloured Progressive Matrices, a test of nonverbal intelligence and classified as per test manual norms into 5 grades: superior, above average, average, below average and intellectually impaired(9). Statistical analysis was done using Statistical Package for Social Science (SPSS) for Windows (version 10.0). *P* value <0.05 was considered as significant.

RESULTS

The mean birthweight of the LBW group (LBW) was 1848±359 grams and that of NBW group 2984±430 grams. The LBW group had 105 (52.5%) boys and 95 (47.5%) girls, as against 127 (56.7%) boys and 97 (43.3%) girls in the comparison group. There were 32 (16%) adolescents with birthweight less than

TABLE I COMPARISON OF VARIABLES AT 13 YEARS AMONG LBW AND NBW GROUPS

Variables	Boys			Girls		
	LBW Mean (SD)	NBW Mean (SD)	<i>P</i>	LBW Mean (SD)	NBW Mean (SD)	<i>P</i>
Height (cm)	145.6 (17.0)	147.6 (9.2)	0.24	147.6 (8.0)	148.5 (17.1)	0.6
Weight (kg)	33.8 (8.8)	35.1 (8.0)	0.25	36.2 (6.6)	39.4 (7.9)	0.002
Body mass index	15.3 (3.1)	16.0 (2.4)	0.06	16.6 (2.6)	17.6 (3.9)	0.04
Systolic BP (mmHg)	100.6 (9.6)	103.0 (9.4)	0.07	104.6 (10.0)	103.6 (9.3)	0.5
Diastolic BP (mmHg)	68.8 (8.2)	70.5 (8.9)	0.14	70.6 (7.2)	71.2 (7.3)	0.6
Self esteem scores	85.7 (11.2)	90.1 (12.6)	0.009	86.2 (12.0)	90.4 (12.8)	0.02

LBW: Low birthweight, NBW: Normal birthweight

1500 grams, 81 (40.5%) with birth weight between 1500 and 1999 grams and 87 (43.5%) with birthweight between 2000 and 2499 grams. The LBW group had 116 (58%) preterm and 84 (42%) term babies. 94 of them were small for gestational age (SGA) and 106 were appropriate for gestational age (AGA).

The BMI was less than 15 in 43.8% of boys and 20.9% girls. The mean height, weight, BMI, systolic blood pressure, diastolic blood pressure and self-esteem was lower for LBW boys when compared to the NBW boys with the difference showing statistical significance only for self-esteem (**Table I**). Similarly, except for mean systolic blood pressure, the mean height, weight, BMI, diastolic blood pressure and self-esteem was lower for the LBW girls when compared to the NBW girls with the difference showing statistical significance for weight, BMI and self esteem. On considering the group as a whole, the mean self esteem scores of the LBW group was lower (85.9±11.6) than that of the mean scores of the NBW group (90.2±12.6) and the difference was significant (mean difference 4.31, 95% CI 1.91-6.71, $P=0.001$). There was no significant difference in the self esteem scores between preterm and term adolescents of the LBW group. 42.6% of LBW adolescents had a BMI of less than 15 compared to 26.3% of NBW adolescents and this difference was significant ($P=0.002$).

Table II shows comparison of intelligence for 183 LBW and 211 NBW adolescents; 12 adolescents, 6 from each group could not be tested

due to either severe physical or mental handicap; and 18 adolescents did not cooperate adequately for intelligence assessment. There was a statistically significant difference observed in intelligence between the LBW and NBW group. On considering gender, a significant difference between the two groups was seen only in male adolescents ($P=0.035$). Only 46.2% of LBW male adolescents performed well as compared to 59.7% of NBW males. Among the preterms, 92.2% of AGA adolescents were in the good performance group compared to 7.8% of SGA adolescents and this difference was also statistically significant ($P=0.009$).

TABLE II COMPARISON OF INTELLIGENCE SCORES AT 13 YEARS

Intelligence Quotient	LBW (<i>n</i> =183)	NBW (<i>n</i> =211)
Good performance group	89(48.6%)	123(58.3%)
Superior	5	3
Above average	15	18
Average	69	102
Low performance group	94(51.4%)	88(41.7%)
Below average	61	56
Intellectually impaired	33	32

LBW (low birthweight) compared to NBW (normal birth weight); Fisher's Exact Test $P = 0.035$, Scores: superior ≥95th centile; above average ≥75th centile; average, between 25th and 75th centile; below average, at or below 25th centile; intellectually impaired, scores at or below 5th centile.

WHAT THIS STUDY ADDS?

- Low birthweight adolescents have significantly lower self esteem scores and intelligence scores at or below 25th percentile (low performance) compared to normal birthweight adolescents at 13 years of age.

DISCUSSION

This study showed that height and weight of the LBW group was less than that of the NBW group, which is in agreement with reports of many previous studies(1-4). The finding that almost half the boys were underweight shows the need for nutrition monitoring of early adolescent boys as well as girls.

In our study, intelligence scores at or below the 25th percentile (low performance) were observed among 51.4% of LBW adolescents. Many variables including intelligence, have been shown to have direct correlation with self-esteem(10). LBW is also associated with lower academic achievement and school functioning in adolescence(11,12). All these might have contributed to the lower self esteem scores observed among LBW adolescents in this study. The significantly lower mean self esteem observed in the LBW group is supported by Rickards, *et al.*(7), who reported an association between birthweight and self esteem in early adolescence. Inferior intelligence test achievements were seen not only in the LBW group as a whole but in LBW males in particular. This finding is similar to findings of Seidman, *et al.*(13) that low weight at birth in males had a statistically significant independent association with inferior intelligence test achievements.

The overall findings of our study support previous study reports that birthweight has an important role in determining growth, physical and psychological development of an individual and the effects are seen even in early adolescence. It is recommended that LBW babies should receive systematic medical and psychological follow up right through childhood and adolescence.

ACKNOWLEDGMENT

We acknowledge with thanks the assistance offered throughout the study by Lekshmi MA, Letha S and Asokan N, Child Development Centre.

Contributors: PMK and LN were involved in the assessment of adolescents. CDS performed statistical analysis and drafted the manuscript. BG and SKG assisted in planning the study. NMKC was involved in planning the study, critically reviewed the manuscript and would act as guarantor of the study.

Funding: None.

Competing interests: None stated. The findings and conclusions of this report are those of the authors and do not necessarily represent the views of the funding agency.

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