

Anthropometry of the New Born with Special Reference to Birth Weight

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ABSTRACT 202 infants born to cross-sectional population of a semi-urban locale were studied infantometrically with special focus on birth weight by duly considering the mother's age, education, type of marriage, health, parity and sex of the child for proper interpretation of the data. The results of the study indicate that the incidence of low birth weight (< 2.5 kgs) or better birth weight (> 2.5 kgs) is associated with certain life conditions of the mother as well couples. Variation in physical growth characters is also observed through infantometry. Infants born to mothers in the age-cohorts of 20-24 and 25-29, with good educational background and socio-economically well off are on an average heavier (> 3.00 kgs weight), larger in size (> 48.00 crown-heel) and shape (> 33.00 chest circumference). Incidence of low birth weight is common among infants born to mothers of very young age, i.e., 15-19 years and also infants born to mothers who are not healthy. In such cases infants are lighter in weight (< 2.5 kgs), smaller in size (< 44.00 cms crown-heel length) and shape (31.00 chest circumference). The results of the present model indicate that only a marginal section of the society (26.00%) has the problem of incidence of low birth weight (< 2.5 kgs), while majority of cross-sectional population have improved birth weights (> 2.5 kgs).

INTRODUCTION

In both developed and developing countries birth weight is probably the single most important factor that effects neo-natal mortality in addition to being a significant determinant of post neo-natal mortality and of infant and childhood morbidity. Thus, birth weight has long been a subject of clinical and epidemiological investigation and a target of public health investigation. Birth weight of the new born is believed to be influenced more by environmental than genetical factors. Low birth weight is found to be one of the important aspects of perinatal, neonatal and post-natal mortalities.

Low birth weight (LBW) is defined by WHO as a birth weight less than or equal to 2500 grams, and in such cases infant mortality begins to rise rapidly. According to WHO, the incidence of LBW is 30% in India, 95% in Af-

rica, 9% in Cameroon and 7% in USA. The incidence of LBW is strongly associated with the health and nutritional status of the mother. Apart from its influence on the loss of life at early stages, the LBW may also lead to serious physical and mental handicaps even in those who are fortunate to survive. Several studies on birth weight of the new born particularly during last three and half decades indicate correlation of birth weight with parity, gestational age, maternal age, influence of inbreeding, maternal low income, maternal disorders, maternal smoking and alcohol consumption, infection and ill health during pregnancy (Karn et al., 1951; James, 1969; Mitton et al., 1982; Villar and Belizan, 1982; Hingson, 1982; Pamelie et al., 1984 and Tafari and Nacye, 1990). Studies correlating to most of the above mentioned bio-social factors have also been reported for some Indian populations (Jayanth, 1965; Pachavri et al., 1971; Pachavri and Marwah, 1971; Indrani et al., 1979; Rao and Inbaraj, 1982; Babhrudodoza, et al., 1995). India being a developing country and majority of the people are establishing good progress in economic development, studies on the body measurements of the new born in relation to various biological and socioeconomic factors will be of great value and relevance to understand the possible effects on each other. Hence the present study has been undertaken among the cross cultural populations of Rayachoty town, Cuddapah district of Andhra Pradesh, keeping in view to study the prevalence of LBW and also to assess the variation in birth weight and different anthropometric measurements of the new born in relation to sex, maternal factors and socio-economic conditions.

MATERIALS AND METHODS

The materials for the present study consist

of 202 babies born at private nursing homes and Government hospitals at Rayachoty, Cuddapah district of Andhra Pradesh. Rayachoty is a semi-arid zone and semi-urban centre located between 12°37' N latitude and 14°08' E longitude. The total population is around one lakh. The cross-sectional population consists of Reddis, Kammass, Balijas, Muslims, Scheduled castes and others. Agriculture, employment, business and labour are the main occupations, of the people. The data on mother's age, socio-economic conditions, education, income, occupation, antenatal care, birth intervals, parity, maternal health, sex of the infant were collected through scheduled method during December 1997 to February 1998. The Anthropometric measurements such as weight, crown-heel length, crown-rump length, head circumference and chest circumference were taken on all full term babies. A careful determination of not only birth weight but also the other birth measurements will help to determine the nature and nurture of foetus at birth. Appropriate statistical tools such as means, standard deviations and percentages are used for different parameters and interpretation of results.

RESULTS AND DISCUSSION

Table 1 shows the percentage distribution of birth weight of the new born. Out of total 202 babies 26.24% are less than 2.5 kgs in weight; 34.16% are with in the range of 2.5-2.999 kgs, 34.65% babies weighed 3.0-3.499 kgs and only 4.95% babies are more than 3.5 kgs in their weight. Further, on the whole, the data show that about 26% of the babies are less than 2.5 kgs with low birth weight, whereas the rest, i.e. 74% of the babies are either more than 2.5 kgs or some (5%) even more than 3.5 kgs.

The causes of either low birth weight or high

birth weight are many and the WHO (1980) has made a critical analysis of the incidence of low birth weight world over. According to WHO review, the low birth weight is the problem of less developed nations in particular but in general the incidence of low birth weight is associated with several conditions of life events namely, socio-economic condition, age, health and education of the mother or couple and above all nation's progress in increasing the living standards of the people, providing medical facilities and other family planning measures. Though the present data represent a small area with limited sample, yet the model explain the whole picture of the contemporary situation of the country. The very fact that only 26% of the babies in a cross-cultural populations have low incidence of birth weight (as per WHO standards), however, the larger section of the society

Table 2: Frequency of birth weight < 2.5 kgs and > 2.5 kgs in relation to different parameters

Parameter	Birth weight < 2.5 kgs		Birth weight > 2.5 kgs	
	No.	%	No.	%
1. Age of Mothers				
15-19 years (73)	45	61.64	28	38.36
20-24 years (94)	0	0	94	100.00
25-29 years (28)	5	17.8	23	82.14
30+ years (7)	3	42.8	4	57.14
2. Education				
Illiterates (40)	18	45.00	22	55.00
Primary (43)	14	32.55	29	67.44
Secondary (45)	8	17.77	37	82.22
Graduates (74)	8	10.81	66	89.19
3. Income				
Low (109)	39	35.77	70	64.22
High (93)	8	8.60	85	91.39
4. Type of Marriage				
Consanguineous (97)	34	35.05	63	64.94
Non-consanguineous (105)	10	9.52	95	90.47
5. Parity				
I (112)	32	28.59	80	71.43
II (71)	9	12.69	62	87.32
III (19)	0	0.00	19	100.00
6. Health of Mother				
Hypertensive (27)	22	81.48	5	18.52
Healthy (175)	32	18.28	143	81.71
7. Sex of Child				
Male (100)	22	22.00	78	78.00
Female (102)	29	27.45	73	71.5

Note: The numbers given in parentheses are actual number of babies born

Table 1: Percentage distribution of new born birth weight

Birth weight (kgs)	No.	%
1.5-1.999	20	9.90
2.0-2.499	33	16.34
2.5-2.999	69	34.16
3.0-3.499	70	34.65
3.5+	10	4.95
Total	202	100.00

have appreciable birth weight of new born.

Table 2 presents a survey of birth weight distribution in terms of < 2.5 kgs and > 1.5 kgs and its relation to different parameters of life conditions. Results indicate that the age of mother, education, income, state of health, parity and type of marriage influences the birth weight of the baby. Incidence of low birth weight is striking in the mothers of 15-19 age-cohort, where, out of 73 babies 45 of them (62%) have registered low birth weights and only 28 babies (38%) have > 2.5 kgs. However, no baby is underweight for the mothers born in the age-cohort of 20-29 years. Again, low birth weight figures among babies born to mothers of 30+ years age-cohort. The variation in birth weight is further associated strongly with education, income, health, parity and type of marriage. The data thus reveal that infants born to mothers of good health, better income and education are generally heavier (> 3.00 kgs) over others. The

variation is marked in infants born to non-consanguineous mothers who have higher birth weight (> 2.5 kgs) than consanguineous. The birth weight of the infants in relation to parity highlights the fact that second and third born have higher birth weights (> 2.5 kgs) than the first born. Infants born especially to hypertensive mothers have low birth weight (< 2.5 kgs) over the healthy and normal mothers. The birth weight of the infants in relation to sex indicates that female babies are slightly less in weight over their counterparts.

However, it is worth to examine the present series of data in the background of various life situations of the couple and their reflection not only on birth weight but on other anthropometric characters namely, Crown-heel length, Crown-rump length, Head circumference and Chest circumference.

Table 3 presents results of birth weight and other anthropometric values in association with

Table 3: Distribution of birth weight and anthropometric measurements in relation to different parameters

Parameters	%	Birth weight (kgs)		Crown-heel length (cms)		Crown-rump length (cms)		Head circumference (cms)		Chest circumference (cms)	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Age of Mothers											
15 - 19 years (73)	36.14	2.28	0.45	44.35	3.84	26.89	1.97	31.50	2.28	30.35	3.12
20-24 years (94)	46.53	3.06	0.24	48.26	2.11	29.70	2.33	33.86	1.34	33.53	2.12
25-29 years (28)	13.86	2.73	0.43	46.80	5.51	30.90	3.23	34.18	1.46	33.01	2.11
30+ years (7)	3.46	2.60	0.61	46.05	4.79	30.33	2.29	32.47	3.33	32.00	2.61
2. Education											
Illiterates (40)	19.80	2.42	0.50	45.07	2.75	28.55	2.51	32.08	1.32	32.10	2.51
Primary (43)	21.29	2.62	0.49	45.57	3.59	28.91	3.10	32.39	2.26	32.91	3.13
Secondary (45)	22.80	2.80	0.30	48.02	2.27	29.32	2.71	33.40	1.77	33.37	1.34
Graduates (74)	36.63	3.01	0.53	48.87	2.05	29.91	2.93	34.34	1.36	33.57	1.65
3. Income											
Low (109)	53.96	2.51	0.42	46.31	3.48	28.52	2.35	32.60	2.14	31.84	2.64
High (93)	46.04	3.10	0.37	48.11	2.86	29.85	2.26	33.90	1.63	33.01	3.72
4. Type of Marriage											
Consang. (97)	48.02	2.53	0.47	46.27	4.01	28.48	2.61	32.73	2.50	31.71	2.65
Non-consang. (105)	51.98	3.00	0.36	47.61	3.66	29.32	2.07	33.40	2.16	32.95	2.15
5. Parity											
I (112)	55.45	2.83	2.12	46.26	3.29	28.58	2.46	33.19	2.13	32.07	2.41
II (71)	35.15	3.32	3.30	48.23	3.53	29.30	2.58	33.24	2.64	33.11	2.70
III (19)	9.41	2.80	0.21	48.01	1.91	29.28	2.03	33.63	1.11	32.40	2.31
6. Health of Mother											
Hypertensive (27)	13.37	2.10	0.31	44.43	3.12	27.42	2.61	31.76	3.13	30.43	2.24
Healthy (175)	86.63	3.05	0.29	48.82	2.45	29.50	1.54	34.24	1.25	33.71	1.49
7. Sex of Child											
Male (100)	49.50	2.81	0.49	47.63	3.38	29.30	4.25	33.41	2.27	33.01	2.51
Female (102)	50.50	2.69	0.48	46.96	3.34	29.50	3.61	33.21	2.12	31.92	2.5

Note: The numbers given in parentheses are actual number of babies born

different parameters like, age of mothers, education, income, type of marriage, parity, sex of the child and health of the mother. The table highlights that the infants born to 20-24 age group mothers are heavier in weight (3.06 kgs) and larger in size (48.26 cm: crown-heel length) and shape (33.53 cm: chest circumference). This is followed by 25-29 and 30+ age group mothers. However, infants born to 15-19 age cohort mothers are low in birth weight (2.28 kgs) and smaller in size (44.35 cm: crown-heel length) and shape (30.35 cm: chest circumference). Considering the education of mothers, infants born to graduate mothers are heavier in weight (3.01 kgs) and larger in size (48.87 cm: crown-heel length) and shape (33.57 cm: chest circumference). This is followed by infants born to mothers having secondary education and primary education background. Infants born to illiterate women have however registered low birth weight, i.e., 2.43 kgs and are smaller in size (45.07 cm: crown-heel length) and shape (32.10 cm: chest circumference). The interesting point to take notice is that all mothers with graduation and secondary education come in the age cohort of 20-24 and 25-29 years. The data confirm earlier scientific notion that children born to young and adolescent mothers (15-19 years), have low incidence of birth weight and also are smaller in size and shape.

The present series of data have further subjected to examine the association of anthropometric characters of the new born to income. Infants born to high income group couples are heavier (3.10 kgs) and larger in size (48.11 cm: crown-heel length) and shape (33.01 cm: chest circumference) over the low income couples (2.51 kgs: birth weight; 46.31 cm: crown-heel length, 31.84: chest circumference). Similarly, there is considerable anthropometric variation of infants born to consanguineous (2.53 kgs: birth weight; 46.27 cm: crown-heel length and 31.71 cm: chest circumference) than non-consanguineous couples (3.00 kgs: weight, 47.61 cm: size; 33.00 cm: shape). The other interesting anthropometric variation of the new born is found to be in the parity. The results indicate that the second born babies are heavier (3.32 kgs) than the first (2.83 kgs) and third (2.80 kgs) born and the same holds good for similar varia-

tion in other metric characters also. There is reasonable good interpretation for this finding. It is natural that the first born children are generally found to be smaller in size and volume over the others, i.e., second and consecutive births as because the first conception makes the uterus to stretch considerably. In this process the first parity child appears to be less elastic over the others.

The health of the mother is an important aspect of child bearing and its related aspects of growth and development. There is a marked variation in the birth weight and associated anthropometric measurements of the infants born to normal mothers and hypertensive mothers. Low birth weight (2.10 kgs) seems to be common among infants born to hypertensive mothers. Whereas infants born to normal mothers have a birth weight with an average of 3.05 kgs. There is also significant anthropometric variation between the two categories of infants. Children of hypertensive mothers are smaller in size (44.43 cm) and shape (30.43 cm). Whereas children of normal mothers are found to be larger in size (48.82 cm), shape (33.71 cm) and weight (3.05 kgs). Lastly, the association of birth weight and sex of the baby indicate that there is no significant variation either in birth weight or other anthropometric characters excepting the male babies showing slightly higher birth weights (2.81 kgs) over their counterparts (2.69 kgs). In anthropometry also male babies are found to be slightly larger in size (47.63 cm) than female babies (46.96 cm) and in over all shape also male babies slightly higher values (33.01 cm) than the female babies (31.92 cm).

Thus, the analyses of infant anthropometry with special reference to birth weight help to locate the present status of the population in its locale and the association of data with country's progress in the fields of health, education, medicine and family planning, and overall progress in socio-economy of its people, living standards and population planning and development. The results of the present model also indicate that only a marginal section of the society (26%) has the problem of incidence of low birth weight, while majority of the population have improved birth weights, say above 2.5 kgs. Results emphasise that the incidence of low birth weight is mainly associated with age of mothers

and health in particular and education, income and other social conditions in general.

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