ANTHROPOMETRIC MEASUREMENTS;
NEWBORNS IN URBAN KARACHI POPULATION

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ABSTRACT... Background: Determination of anthropometric measurements, especially of birth weight of newborn in first few days after birth is important for the assessment of neonatal nutritional status, gestational maturity, and prediction of early neonatal death. **Objectives:** (1) To determine the mean birth weight, mean birth length and mean head-circumference. (2) To seek association between income of the family and mean birth weight. **Study Design:** Analytical cross-sectional study. Setting & Period: This study was done in the pediatric department of Liaquat National Hospital from March 2003 to September 2003. **Materials and methods:** One hundred full terms, normal, singleton newborn babies were included and birth weight, length and head circumference were taken within 72 hours of birth. **Results:** Overall mean birth weight was 2.890 kg, mean birth length 48.245cm and mean head circumference was 34.232 cm.The % of LBW babies was 13. The mean birth weight of babies belonging to group A (born to families with income >5000 Rs/mth) was 3.044 Kg and that of group B (born to families with income <5000 Rs/mth) was 2.736 Kg. Group A had 8 % LBW babies whereas group B had 18 %. Mean birth weight, length and head circumference of boys was 2.961Kg, 48.776 cm and 34.316 cm respectively. Mean birth weight, length and head circumference of girls was 2.788 Kg, 47.480 cm and 34.109 cm respectively. **Conclusions:** Community based studies should be conducted from time to time in order to develop our own population data.

Key words: Low birth weight (LBW), Anthropometry, Socioeconomic status (SES)

INTRODUCTION

It is universally acknowledged that size at birth is an important indicator of fetal and neonatal health in the context of both individuals and populations. Birth weight in particular is strongly associated with fetal, neonatal and post neonatal mortality and with infant and child morbidity[1].

According to W.H.O. birth weight less than 2.5 kg is labeled as low birth weight. LBW is a major health problem especially in developing countries[2] where 16 per cent of infants, weigh less than 2,500 grams at birth. South-Asia has by far the highest number of LBW with 27 per cent at birth[3] and is one of the main contributing factors of Infant mortality and childhood handicap[4]. LBW babies are more prone to develop complications like RDS, asphyxia neonaturum and sepsis[5] and have been found to have less childhood cognitive test and educational achievements than babies of normal weight[6]. Socio-economic status has been considered as one of the most important factor effecting birth weight and length. In families of low SES there is increase incidence of maternal malnutrition, anemia, and inadequate antenatal care resulting in LBW[7]. A community based study done in Karachi showed that low SES had high Perinatal Mortality, higher incidence of maternal illness like hypertension and Ante Partum Hemorrhage and more cases of LBW[8].

MATERIALS AND METHODS This study was done in the Pediatrics department of Liaquat National Hospital, which is located at the center of Karachi and receives majority of the patients belonging to the middle class. The study was completed in six months and included hundred full terms, normal, singleton newborn babies of whom birth weight, length and head circumference were recorded in following category:

- Live births.
- Gestational age between 37-42 weeks.
- Singleton.
- And following category was excluded
- Intrauterine deaths.
- Gestational age < 37 weeks.
- Gestational age > 42 weeks.
- Gross congenital abnormalities.
- Twins.
- Infants of diabetic mothers.
- Infants born to mothers having history of

pregnancy induced hypertension, hypertension and pre-eclampsia.
- Infants born to mothers who are not sure of their LMP.
- Infants having discrepancy of 4 weeks or more in gestational age by LMP/ultrasound and Dubowitz score.
- Any maternal history of co-morbid factors (diabetes, hypertension etc).

Anthropometric measurements of all babies were done within 72 hours of birth. Dubowitz score of each child was done and the infant having discrepancy of 4 weeks or more in gestational age by LMP/ ultrasound abdomen as compared with Dubowitz score was excluded. Information regarding family income was collected by interview. Each baby was weighed without clothes on an infant weighing scale and the scale was calibrated daily for accuracy. Newborn crown-heel length was recorded on an infantometer with fixed head and mobile foot parts keeping the baby in supine position with the knees fully extended. A non-stretchable plastic measuring tape was used to measure head circumference around the maximum occipito-frontal circumference. Data was separated for male and female babies. The proforma contained information like family's income, age, sex, weight, length and head circumference of the child. On the basis of the income, 2 groups were formed. Group A contained babies born to family with monthly income >5000 Rs and group B contained babies born to family with monthly income <5000 Rs. The data was fed into the computer on monthly basis. For data analysis SPSS 10.0 statistical computer package was used. The limitations of the study were that it did not include maternal anthropometric variables, dietary data during pregnancy, parity, living standards of the family, premature and post mature babies.

RESULTS

The study included 100 full term neonates of whom there were 59 male and 41 female neonates. The mean birth weight of the study was 2.890 kg, minimum birth weight was 2.1Kg and maximum was 5.2 Kg (Std.Deviation 0.4715). The boys were found to be heavier than the girls as the mean birth weight of males was 2.961 Kg and that of female babies was 2.788 Kg. Total number of low birth weight neonates in the study was 13 and that of normal birth weight were 87.

The overall mean birth length was found to be 48.245 cm with minimum length 43.60 cm and maximum length as 53.00 cm (Std.Deviation 1.5811). The boys were taller than the girls. The mean birth length of males was 48.776 cm and that of females was 47.48 cm.

The mean head circumference of the study was 34.232 cm, maximum was 35.20 cm and minimum was 32.10 cm (Std.Deviation 0.5713). There was not much difference of mean head circumference value between male and female babies as it was 34.316 cm and 34.109 cm respectively.

Table-I. Comparison of 02 groups

Variable	S.E.class	No. of neonates	Mean	P-value
Weight (kg)	Group A Group B	50 50	3.044 2.736	0.001
Length (cm)	Group A Group B	50 50	48.5520 47.9380	0.086
FOC (cm)	Group A Group B	50 50	34.3300 34.1340	0.052

The whole study population was divided into 2 groups on the basis of socio-economic status and each group contained equal number of neonates. Group A had 30 males and 20 females whereas group B had 29 males and 21 female babies. The mean birth weight of group A was 3.044 Kg and that of group B was 2.736 Kg. The mean birth length and mean head circumference of group A was 48.55cm and 34.33 cm respectively. Similarly, the mean length and mean head circumference of group B was 47.93cm and 34.13 cm respectively.

DISCUSSION

There is significant association between low family income and low birth weight. The status of the mother's nutrition and socio-economic variables have long been known to influence the reproductive performance and outcome and the condition of the infant at birth. Our study showed that there is preponderance of males as there were 59 males and 41 female neonates out of 100

neonates, a finding similar to that of Parveen[9] in whose study there was a ratio of 100 female for 106 males.

The mean birth weight of the study was 2.890 kg, which is not significantly different from the studies of Arif and Nizami[10] and Akram et al[11] who found mean birth weights of 2.980 Kg and 2.83 Kg respectively in their studies. Arif and Nizami's study population included newborns of different gestational ages, newborns having congenital abnormalities and mothers having diseases like diabetes, eclampsia etc. Akram et al study population consisted of lower socioeconomic class. This mean birth weight is in comparison with other studies done in countries of same economic status like India[12], Bangladesh[13] and Sudan[14] where birth weights were recorded as 2.846 ± 378 gm, 2,889 +/- 468 gm and 3.027 kg respectively. In this study, there was not much difference of mean head circumference value between male and female babies as it was 34.316 cm and 34.109 cm respectively but differences were found between the mean birth weight and length of male and female babies. The mean weight and length of males were 2.961 Kg and 48.788 cm respectively. Similarly mean weight and length of females were 2.788 Kg and 47.480 cm respectively. Thus males were found to be heavier and taller than the female babies as found also by Parveen (9), al-Mazrou et al[15] and Ayatollahi and Shahsawary[16] in their studies. The overall mean birth length was 48.245 cm and the mean head circumference was 34.232 cm. These values are higher than Akram et al's[11] study in which mean length was 46.8 cm and mean head circumference was 33.4 cm.

SES is considered as one of the most significant factors affecting birth weight and length .On basis of family's income, 2 groups were made and each group contained equal number of neonates. The mean weight of group A was 3.044 Kg and that of group B was 2.736 Kg (p value 0.001). Mean FOC of group A was 34.33 cm and group B was 34.13 cm. The mean length of group A was 48.55cm and that of group B was 47.93 cm (p value 0.052). Auger N et al in their longitudinal study found that mothers of rural areas had given birth to more SGA (small for gestational age) babies and LBW babies and mothers living in small urban areas had given birth to more Pre Term Babies as compared to those of urban areas[17,18].

Along with SES race, ethnicity[19,20] and maternal health[21] are other important factors affecting the weight of a newborn. Another conclusion of the study was that the LBW was 13% and 87% newborns were of normal weight. No VLBW or ELBW was found probably because of exclusion of the premature babies. Out of 13 LBW, 4 belonged to group A (high family income) and 9 to group B (low family income). According to sex distribution, 5 boys and 8 girls had LBW.LBW is considered to be an indicator not only of the health and nutritional status of the pregnant woman but also of the social development of a population. The incidence of LBW varies in different regions as Sub-Saharan Africa has 14%, Middle East and North Africa has 15% and Latin America and Caribbean has 10%[3]. Arif and Nizami found LBW as 22.1% out of which males constituted 51.9% and females 48.1%[10]. Akram et al[11] had even higher values i.e. 30%. In Nair et al's study, the incidence of LBW varied among the different socioeconomic classes. It was 11.5% in upper class and 16.2% in lower class. Sociodemographic parameters, which were found to contribute to LBW, were lower social class, bad obstetric history, maternal illiteracy and maternal age more than 35 yrs[21]. In a Syrian study, LBW incidence was 6.6 %. The rate of LBW varied by geographic region from 8.6 % in Damascus to 3.2 % in the south of the country. It also varied by hospital from 10.8 % to less than 1%[22].In one of the recent studies, a direct relationship has been found between LBW and neonatal mortality[23].

CONCLUSIONS

Determination of anthropometric measurements, especially of birth weight of newborn in first few days after birth is important for the assessment of neonatal nutritional status, gestational maturity, and prediction of early neonatal death. Socio-economic status has been considered as one of the most important factor effecting birth weight and length. Low SES has been associated with a 3.5 fold elevated risk of LBW.

Because of the variability of growth in different populations it is logical that we should have our own national reference charts. It is therefore recommended

that community based studies should be conducted from time to time which will be helpful for providing data to researchers in the medical field enhancing current epidemiological knowledge. This information can then be use by the health authorities to plan and take necessary measures to reduce the incidence of LBW and to set priorities for the allocation of health care resources which would be helpful for the promotion of health of our nation.

REFERENCES

1. The (Newborn infant. In report of a WHO expert committee. Physical status: **The use and interpretation of anthropometry.** Geneva: WHO technical report series; 1995: 121-160.
2. Aziz S, Puri DA, Hossain KZ, Hussain F, Naqvi SAA, Rizvi SAH. **Anthropometric indices of middle socio-economic class school children in Karachi compared with NCHS standards - a pilot study.** J Pak Med Assoc 2006 Jun; 56(6):264-7.
3. UNICEF Childinfo. Monitoring the situation of children and women [Online] 2009 [cited 2010 Feb 05]. Available from www.childinfo.org/low birthweight/status and trends.
4. Wickramasinghe VP, Lamabadusuriya SP, Atapattu N. **Nutritional status of schoolchildren in an urban area of Sri Lanka.** Ceylon Med J, 2004 December; 49(4):114-18.
5. Ogden CL, Kuezmarski RJ, Flegal KM, Mei Z, Guo S, Wei R. et al. **Center for Disease Control and Prevention2000. Growth charts for the United States: Improvements to the 1977 National Center for Health Statistic Version.** Pediatrics 2002; 109:45-60.
6. Fattal-Valevski A, Toledano-Alhadef H, Leitner Y, Geva R, Eshel R, Harel S. **Growth patterns in children with intrauterine growth retardation and their correlation to neurocognitive development.** J Child Neurol. 2009 Jul; 24 (7):846-51.
7. Cole TJ, Paul AA, Whitehead RG. **Weight reference charts for British long term Breast fed infants.** Acta Paediatr 2002; 91:1296-1300.
8. Wikland KA, Luo ZC, Niklasson A, Karlberg J. **Swedish population based longitudinal reference values from birth to 18 years of age for height, weight and head circumference.** Acta Paediatr 2002; 91:739-54.
9. Parveen Z. **Birth weight percentiles by gestational age: A hospital based study.** JAMC 2001; 13(2): 22-27.
10. Arif MA, Nizami SQ. **A study of 10566 newborn babies.** Pak Pedia J 1985;9:20-5.
11. Akram DS, Agboatulla M, Khan IA. **A study of newborns.** Pak Pedia J 1991; 15: 11-20.
12. Ghosh S , Hooja V, Ahmad SH, Acharyulu R, Bhargava SK. **A longitudinal study of length, weight and head circumference from birth to 2 years among children of high socio economic urban community in Delhi.** Indian Pediatr. 1974 Jun;11(6):395-8.
13. Dhar B, Mowlah G, Nahar S, Islam N. **Birth-weight status of newborns and its relationship with other anthropometric parameters in a public Maternity Hospital in Dhaka, Bangladesh** J Health Popul Nutr. 2002 Mar; 20(1):36-41.
14. Elshibly EM and Schmalisch G. **The effect of maternal anthropometric characteristics and social factors on gestational age and birth weight in Sudanese newborn infants** BMC Public Health. 2008; 8:244.
15. Al-Mazrou, al-Amood MM, Khoja T, al-Turki K, el-Gizouli SE, Tantawi NE et al. **Standardized national growth chart of 0-5 year old Saudi children.** J Trop Pediatr 2000 Aug; 46(4): 212-8.
16. Ayatollahi SM, Shahsawary S. **Sizes at birth in Shiraz, Iran.** J Trop Pediatr 2002 Aug; 48(4): 245-7.
17. Auger N, Authier MA, Martinez J, Daniel M. **The association between rural-urban continuum, maternal education and adverse birth outcomes in Québec, Canada.** J Rural Health. 2009 Fall; 25(4):342-51.
18. Zeka A, Melly SJ, Schwartz J. **The effects of socioeconomic status and indices of physical environment on reduced birth weight and preterm births in Eastern Massachusetts.** Environ Health. 2008 Nov 25; 7:60.
19. Deurenberg P, Deurenberg- Yap M, Foo LF, Schmidt G, Wang J. **Differences in body composition between Singapore Chinese, Beijing Chinese and Dutch children.** European J Clin Nutr 2003; 57:405-9.
20. Nepomnyaschy L. **Race disparities in low birth weight in the U.S. south and the rest of the nation.** Soc Sci Med. 2009 Dec 26.

21. Ganesh Kumar S, Harsha Kumar HN, Jayaram S, Kotian MS. **Determinants of low birth weight: A case control study in a District Hospital in Karnataka.** Indian J Pediatr. 2009 Nov 20.

22. Nair NS, Rao RSP, Chandrashekar S, Acharya D, Bhat HV. **Socio-demographic and maternal determinants of low birth weight: multivariate approach.** Indian J Pediatr 2000; 67(1): 9-14.

23. Wannous S, Arous S. **Incidence and determinants of low birth weight in Syrian government hospitals.** Eastern Mediterranean J 2001 Nov; 7(6): 966-74.

24. Jehan I, Harris H, Salat S, Zeb A, Mobeen N, Pasha O, et al. **Neonatal mortality, risk factors and causes: a prospective population-based cohort study in urban Pakistan.** Bull World Health Organ. 2009 Feb; 87(2):130-8.

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