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A study on anthropometric profile of new born babies at a tertiary care hospital

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Abstract
Birth weight has been universally used as a measure of intrauterine growth, because of its correlation with gestation, and relative ease of recording in hospital setting. Weight is the most widely used single clinical indicator of growth. However birth weight by itself is not infallible. Infants of identical race, sex, gestational age and length have been known to differ in their body weights by up to 40%. Also birth weight is the sum of fat and lean body tissue. Weight gain represents the sum of increments of different body components including muscle, skeleton, adipose tissue and water. So it is rather a non-specific measure of growth. All the singleton live born babies born in the hospital were examined within 48 hours of birth. Gestational age was calculated by enquiring into 1st day of mothers last menstrual period and will be subsequently confirmed by New Ballard Score. If any disparity of more than 2 weeks between gestational age by enquiring LMP and by NBS were excluded from the study. In the present study it was observed that the mean ± SD of Birth weight was 2800.52±446, the mean ± SD of Crown heel length was 48.75 ± 2.0, the mean ± SD of Head circumference was33.64 ± 1.4 the mean ± SD of Chest circumference was31.86 ± 2.19, the mean ± SD of Abdominal circumference was 27.42 ± 2.14, the mean ± SD of Mid arm circumference was 9.08 ± 0.83, the mean ± SD of Calf circumference was 9.9 ± 1.16, the mean ± SD of Skin fold thickness was 4.63 ± 0.64, the mean ± SD of Foot length was 8.03±0.8, and the mean ± SD of Thigh circumference was 15.16 ± 1.35.

Keywords: anthropometric profile, new born babies, birth weight

Introduction

It is universally acknowledged that size at birth is an important indicator of fetal and neonatal health in the context of both individual and population. WHO has estimated 5 million neonatal deaths globally occur every year. In India 55 -60 % of infant death occur in neonatal period. Over 80% of all neonatal deaths in both the developed and developing countries occur among the *Low birth weight* babies [1].

About 25-35 % of babies in India are Low birth weight babies as opposed to about 5-7% of newborns in west. These LBW babies include both *preterm* and *term small for gestational age.* High incidence of Low birth weight babies in our country is accounted by a higher number of SGA babies rather than the preterm babies [1]. These babies with *abnormal fetal growth* need to be identified and observed closely as they have a higher neonatal mortality and morbidity, as compared to normally grown babies of identical gestation.

These babies with abnormal fetal growth are more prone for metabolic derangements like hypoglycemia and polycythemia during neonatal period. Therefore it is very essential to recognize neonates with abnormal fetal growth at birth. So that it forewarns pediatrician for subsequent management of complications on priority basis [2].

To identify these babies at risk we have to quantitate normal fetal growth in utero and to classify newborn baby into SGA, AGA, and LGA. For which construction of *intra uterine growth curves* are very essential.

Birth weight has been universally used as a measure of intrauterine growth, because of its correlation with gestation, and relative ease of recording in hospital setting [3]. Weight is the most widely used single clinical indicator of growth.

However birth weight by itself is not infallible. Infants of identical race, sex, gestational age and length have been known to differ in their body weights by upto 40%. Also birth weight is the sum of fat and lean body tissue. Weight gain represents the sum of increments of different body components including muscle, skeleton, adipose tissue and water. So it is rather a non-specific measure of growth [3].

Further, in our country 80 % of births occur at home and are conducted by traditional birth attendants, where there is a paucity of weighing scales. Recording of birth weight presents a major logistic problem at rural community level.
So measuring fetal growth by a simple low priced reliable and acceptable method applicable by paramedical workers has become a need for third world countries and led to quest to alternative anthropometric parameters, which could be utilized to quantitate fetal growth [4].
Studies from other workers also established the strong correlation of MAC as well thigh circumference with gestational age and early neonatal mortality WHO also recommended that in areas where the early weighing of neonate is not feasible, community health workers should be trained to measure the chest circumference to find out "at risk" neonate. [5, 6] Thus alternative anthropometric parameters could be useful for assessing fetal growth. However such use is hampered by the absence of normative data for these measurements.

Methodology
Inclusion Criteria
All the singleton live born babies born in hospital were included in the study.

Exclusion Criteria
- All twin babies.
- Intra uterine deaths and still born babies.
- Babies with gross congenital anomalies.
- Babies born to mothers with condition likely to influence fetal growth i.e. hypertensive disorders of pregnancy, gestational diabetes mellitus, chronic infections and illnesses are excluded.
- Babies whose gestational age could not be accurately assessed i.e. >2 weeks difference between obstetrical and clinically assessed gestational age.

Method of collection of data
All the singleton live born babies born in the hospital were examined within 48 hours of birth. Gestational age was calculated by enquiring into 1st day of mothers last menstrual period and will be subsequently confirmed by New Ballard Score. If any disparity of more than 2 weeks between gestational age by enquiring LMP and by NBS, were excluded from the study. Their gestational ages ranged from 29 to 42 weeks. As there were few babies in less than 30 weeks gestation they were grouped together.

Results
It was observed from the present study that, of the 1284 babies studied there were 660 males and 624 females, constituting 51.44 % and 48.63 % respectively.

Table 1: Sex distribution of subjects based on gestational age

Gestational age (wks)	Male	Female	Total
<"30	6(0.91)	-	6(0.47)
31	5(0.76)	3(0.48)	8(0.62)
32	3(0.45)	4(0.64)	7(0.55)
33	6(0.91)	6(0.96)	12(0.93)
34	19(2.88)	11(1.76)	30(2.34)
35	10(1.52)	11(1.76)	21(1.64)
36	22(3.33)	24(3.85)	46(3.58)
37	66(10.00)	58(9.29)	124(9.66)
38	108(16.36)	127(20.35)	235(18.30)
39	170(25.76)	145(23.24)	315(24.53)
40	219(33.18)	218(34.94)	437(34.03)
41	23(3.48)	13(2.08)	36(2.80)
42	3(0.45)	4(0.64)	7(0.55)
Total	660(100.00)	624(100.00)	1284(100.00)

Of the 1284 newborn analyzed, 130 were preterm, 1147 were of term gestation and 7 were post term babies, constituting 10.12 %, 89.33 %, and 0.54 % respectively.

Table 2: showing gestational distribution.

Gestational age	Subjects	Percentage
PRE TERM	130	10.12 %
TERM	1147	89.33%
POST TERM	7	0.54 %

In the present study it was observed that the mean ± SD of Birth weight was 2800.52±446, the mean ± SD of Crown heel length was 48.75 ± 2.0, the mean ± SD of Head circumference was33.64 ± 1.4 the mean ± SD of Chest circumference was31.86 ± 2.19, the mean ± SD of Abdominal circumference was 27.42 ± 2.14, the mean ± SD of Mid arm circumference was 9.08 ± 0.83, the mean ± SD of Calf circumference was 9.9 ± 1.16, the mean ± SD of Skin fold thickness was 4.63 ± 0.64, the mean ± SD of Foot length was 8.03±0.8, and the mean ± SD of Thigh circumference was 15.16 ± 1.35.

Table 3: Descriptive Statistics of all study variables showing Mean ± SD

Study variables	No. of subjects	Mean	Std. Deviation
Gestational age	1284	38.56	1.856
Birth weight	1284	2800.52	446.980
Crown heel length	1284	48.75	2.046
Head circumference	1284	33.64	1.403
Chest circumference	1284	31.86	2.199
Abdominal circumference	1284	27.42	2.142
Mid arm circumference	1284	9.08	.834
Calf circumference	1284	9.99	1.165
Skin fold thickness	1284	4.63	.641
Foot length	1284	8.03	.802
Thigh circumference	1284	15.16	1.356

Discussion

It is important to recognize babies with *abnormal fetal growth* at birth, due to their high morbidity and mortality. Early identification of these 'at risk' neonates helps for referral to higher levels of care on priority basis.

For classification of newborn at birth construction of fetal growth curves are very essential. Cross sectional dates on birth weight and gestational age at birth are commonly used to construct a longitudinal curve of fetal growth [2]. This fetal growth curve helps to classify babies as SGA, AGA and LGA. These curves are also helpful to differentiate SGA from preterm babies.

Birth weight has been universally used as a measure of intrauterine growth largely because of relative ease of its measurement and of its correlation with gestation. However birth weight by itself is not infallible. Infants of identical race, sex, gestational age and length have been known to differ in their body weights by upto 40% [3].

Weight gain represents the sum of increments of different body components including muscle, skeleton, adipose tissue and water. So birth weight is rather a non-specific measure of growth[3]. Further, in our country 80% of births occur at home conducted by traditional birth attendants, where there is a paucity of weighing scales. Recording of birth weight presents a major logistic problem at community level.

So alternative simple anthropometric measurements like MAC and TC could be useful for assessing fetal growth. However such use is hampered by absence of normative data [3].

Present study was performed with the objective to find correlation between anthropometric measurements and gestational age, and to construct normograms for all the anthropometric measurements studied.

This provides base line data for indigenous population and can be gainfully employed for further studies to know whether simple anthropometric measurements other than birth weight will be useful to quantitate fetal growth and to identify at risk babies in rural community level.

In the present study the mean and standard deviation of all the anthropometric parameters, intrauterine growth curves of ten anthropometric measurements studied

On comparing mean and SD of the present study with other studies it is seen that the mean and SD of Birth weight, Crown heel length, Head circumference, Chest circumference, Abdominal circumference studied were comparable with other studies by Parmar et al. [7] Sharma et al. [8] and other Indian studies, [9] but were lower than western study by Usher et al. [10]

Mean values of calf, MAC and TC are also comparable with other Indian studies. [7] The mean value of foot length is almost in far with Usher et al.

Mean skin fold thickness in a study done by Raghbir Singh et al. was 4.8 ± 0.105, which is in comparable with the present study but lower than Usher et al.

So the mean and SD of all the anthropometric measurements studied were comparable with other Indian studies but were lower than western studies.

This is due to the lower birth weight for gestation of Indian babies comparing to western babies. This may also reflect the effect of genetic factors, lower socio economic status, and poor maternal nutrition in Indian mothers.

Conclusion

The study of anthropometric measurements at birth allows for rapid evaluation of the infant who has suffered abnormal intrauterine growth and is at increased risk of postnatal metabolic complication.

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