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Maternal anthropometry and infant birth weight among the Paite tribe of Churachandpur, Manipur

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ABSTRACT

Background: *Maternal nutritional status during pregnancy has been a known factor to have significant impact on pregnancy outcomes, especially on birth weight.*

Objective: *To find the correlations between maternal anthropometry at the third trimester and birth weight of the infant.*

Material and methods*: Cross sectional, hospital based study. Maternal height, weight and newborn weight were measured using standard techniques. The study was conducted for a period of 3 months (November, 2010- February, 2011) in and around Churachandpur hospitals and maternity clinic. 219 Paite mother-infant pairs formed the study. Mothers who completed 37 weeks of pregnancy were included in the study. Twins and babies born out of HIV positive mothers are excluded. It is a population-based study.*

Results: *The mean birth weight of the present study is 3.19 kg, and the mean maternal weight; height and BMI are 57.83 kg, 152.44 cm and 24.85 respectively. The present study showed significant positive correlations between maternal weight and birth weight (r = 0.25), maternal height and birth weight (r = 0.20), maternal body mass index and birth weight (r = 0.19).*

Conclusion: *Maternal weight, height and BMI are good predictors of birth weight and can be recommended for use among peripheral health workers for detection of mothers at risk of delivering big or low birth weight babies in Churachandpur town.*

Key words: *birth weight, maternal weight, height and BMI.*

INTRODUCTION

Maternal nutritional status during pregnancy has been a known factor to have significant impact on pregnancy outcomes, especially on birth weight. Assessment of maternal nutritional status relies on measurements of height, pre-pregnancy weight, post pregnancy weight, body mass index (BMI), and weight gain at different trimesters, skinfold thickness. Maternal weight, height and pregnancy weight gain have all been shown to be significant predictors of birth weight (Nahar *et al*., 2007). Birth weight, on the other hand is an important determinant of infant's well being (Barker 2004). It has been, and continues to be, a central focus of professional and social interest. The essential source of concern lies in the implications of birth weight, and particularly of low birth weight (LBW), for the survival of infants, and for the later physical, mental health and development of children. Although various definitions of LBW exist, some as long ago as 1906 (Newman 1906), the World Health Organization (WHO 1992) definition, of a newborn baby weighing less than 2500g, is the one most commonly used, and a normal birth weight as 2500-4000g and a macrosoma as a birth weight >4000g. Several factors such as mothers' genetic characteristics, socio-cultural, demographic, behavioral factors, pre-pregnancy and pregnancy body mass index (BMI), etc contribute to birth weight (Padilha *et al*., 2009). Numerous researchers have studied maternal anthropometric indicators as predictors of birth weight. (Karim and Mascie-Taylor 1997; Nahar *et al*., 2007; Elshibly and Schmalisch 2008; Ugwa 2014; Thame *et al*., 2015; Juneja *et al*., 2016, Shrivastava *et al*., 2016). No works have been carried to find the association among the present study population. Thus keeping in view the importance of health and well being of newborn babies, who are the future of our society, the present study has been undertaken to examine the association between maternal anthropometry and birth weight among the Paite newborns.

MATERIAL AND METHODS

The present study has been conducted among the Paite tribe of Churachandpur town, Manipur. The Paite are the dominant tribe of Churachandpur district. Paite is a name of a tribe formed by congeries of clans. Official use of the term came into existence in India since the

specification of the term under the provision of Article 342 of the Constitution of India in the modification order of the Constitution, 1956. The Paite, according to their traditional story,

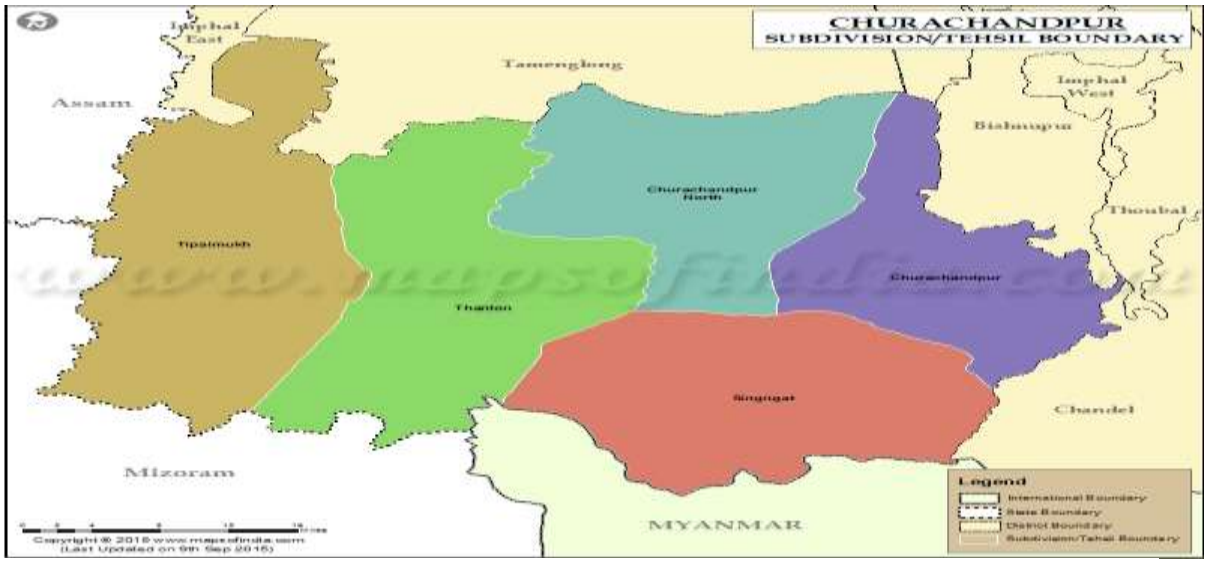

Fig 1: Map of study area in purple colour.

originated from a cave in China from where they entered India through Burma. They belong to the Northern Chin sub-group of Kuki-Chin-Mizo locally known as Zomi (Grierson 1967).

For collection of data, hospitals and maternity clinics in Churachandpur town were approached. Mothers who delivered after completing 37 to 42 weeks of pregnancy were included in the study, and the birth weight of their babies was recorded. The sample comprises 219 mother- infant pairs. After explaining the purpose of the study, permission was obtained from Hospital and clinic administration and written consent was obtained from the mothers before proceeding with the work. The data was collected for a period of three months (November, 2010-February, 2011).

The anthropometric variables of the mothers namely weight and height are measured at the third trimester, whereas newborn babies weight was recorded within the next 24 hours of birth. The maternal weight and height obtained were used to calculate maternal BMI (kg/m^2). All the babies were weighed on a weighing machine by a standard scale to the nearest 10 grams. For measuring the maternal anthropometric variables standard techniques given Weiner and Lourie were followed (Weiner and Lourie 1981). All the instruments were checked for zero error before each measurement and procedure for taking measurements was practiced before hand to reduce

personal error. The mothers' weights were measured using spring balance (adult) with minimum clothing after correcting zero error. The weight was recorded to the nearest 50 gm. The height was measured keeping the women standing on level ground, without footwear, against a wall, by using measuring tape to the nearest of 0.5 cm.

Landmann *et al*. (2001) have suggested a BMI cut off point of <18.5 for underweight, 18.5-22.9 normal and <23.0 for overweight in Asian countries (Landmann *et al*., 2006). The World Health Organization also recommends using this criterion for Asian population and this is the cut-off we used in the present study (WHO 2004).

Statistics: Absolute numbers and simple percentages were used to describe categorical variables. Similarly, quantitative variables were described using measures of central tendency (mean) and measures of dispersion (range, standard deviation) as appropriate. The accuracy of maternal weight, height and body mass index in predicting birth weight was compared using Student's t- test and Pearson's Coefficient of Correlation. Statistically significant associations between maternal anthropometric measurements and birth weight was considered when $P < 0.001$.

RESULTS

The mean weight, height and BMI of pregnant mothers at the third trimesters are 57.83 kg, 152.44 cm and 24.85 respectively as shown in Table 1.

Table 1: Mean anthropometric variables of mothers and new born babies

Variables	Mean (SD)	CV	Minimum	Maximum
Weight (kg)	57.83 (7.6)	13.25	42.0	80.0
Height (cm)	152.44 (4.7)	3.11	139.2	167.1
BMI (kg/m^2)	24.85 (2.7)	10.94	19.23	32.88
Birth weight (kg)	3.19 (0.4)	14.25	2.0	4.50

Table 2 gives the sample distribution of mothers according to the different ranges of BMI. The absence of underweight mothers is observed in the present study. Maximum mothers are found in overweight category (58%).

Table 2: Sample distribution of mothers according to BMI ranges as per cut off points for Asians

Range	Nutritional status of mothers	
Normal	55	(25.1%)
Overweight	128	(58.4%)
Obese	36	(16.4%)

Similarly in Table 3, the ranges of maternal BMI in relation to birth weight have been presented. It is further observed that, the highest mean birth weight is observed among obese (3.28 kg) mothers followed by overweight (3.16 kg) and the least among the normal weight (3.09 kg) mothers.

Table 3: Maternal BMI (Asian) in relation to mean birth weight (kg).

BMI	N	Mean (SD)	Minimum	Maximum
Normal	55	3.06 (0.50)	2.10	4.50
Overweight	128	3.22 (0.44)	2.00	4.50
Obese	36	3.28 (0.37)	2.50	4.10
Total	219	3.19 (0.45)	2.00	4.50

In Table 4, Student's t-test was used to find any significant difference between the different ranges of BMI classification, which indicates the maternal nutritional status. It is clear from t-values that there are no significant differences between the three ranges of mothers' BMI. Further, Pearson correlation was applied to find the association between maternal anthropometric variables (weight, height and BMI) and birth weight, and it is clear from the table that maternal

variables namely height, weight and BMI at the third trimester is positively correlated with birth weight of infants. Thus, signifying that maternal variables are a good predictor of infants' birth weight.

Table 4: Significance test (t) and Pearson Correlations between maternal anthropometric variables and birth weight of infants.

Classification of BMI	**Comparison**	**t- values**
BMI	Overweight-obese	-0.16
	Normal-obese	0.16
	Normal-overweight	0.22
Variables	**r values (with birth weight)**	
Weight (kg)	0.248*	
Height (cm)	0.207*	
BMI	0.198*	

*** correlation is significant at 0.01 level**

DISCUSSION AND CONCLUSION

The mean maternal weight, height and BMI at the third trimester are 57.83 kg, 152.44 cm and 24.85 respectively. The present study showed significant positive correlations between maternal weight and birth weight (r = 0.25), maternal height and birth weight (r = 0.20), maternal body mass index and birth weight (r = 0.19). This was comparable to significant positive correlations observed in Dhaka (Nahar *et al*., 2007) and Nigeria (Ugwa 2014). Maternal height and weight at the third trimester were significantly correlated with birth weight as reported in Mysore city (Khoushabi and Saraswathi 2010) further, in Kenya (Neuman *et al*., 1995); Rio de Janeiro (Padilha *et al*., 2009); Khoy city, Iran (Tabrizi and Saraswathi 2012). Positive correlations were observed between birth weight and maternal anthropometric variables during all the three trimesters. However, among the Sri Lankan, Jananthan *et al*. (2009) did not report any significant influence of maternal height at the third trimester on birth weight; similarly

weight, height and BMI of mothers in Navsari district had no significant impact on birth weight (Solanki *et al.*, 2012).

The limitation of this study is that anthropometric variables namely weight and height before pregnancy were not recorded. However, in our set up prenatal care is an evolving field and women commonly do not go for regular checkups from time to time. They go to hospitals only when they are advanced in pregnancy.

Infant birth weight is vital predictors of child's health status, which is largely determined by maternal characteristics. Hence, maternal anthropometry and indicators of maternal nutritional status are crucial prognosticators of pregnancy outcomes. There are strong epidemiological evidences of a relation between maternal nutritional status and birth weight resulting in a number of intervention studies of nutritional supplementation during pregnancy that have been carried out both in developing and developed countries (Abu-Saad and Fraser 2010).

There has been no study conducted among the present study population on the influence of maternal anthropometry on infant birth weight. Among the present study population, the mean birth weight of the newborn babies is 3.19 kg, which is relatively higher as compared to Gorakhpur (Kaur *et al*., 2014) and Lucknow (Sahu *et al*., 2015) babies. The explanation was that poverty, chronic under nutrition and poor living conditions exist among majority of mothers in various populations. It is further observed that, the mean birth weight of newborn babies born to overweight and obese mothers are relatively higher than normal weigh mothers in the present study.

In conclusion, maternal weight, height and BMI are good predictors of birth weight and can be recommended for use among peripheral health workers for detection of mothers at risk of delivering big or low birth weight babies in Churachandpur town.

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