

## ASSOCIATION BETWEEN BODY MASS INDEX OF MOTHER AND ANTHROPOMETRY OF NEWBORN

\*Nagmoti SA<sup>1</sup>, Walvekar PR<sup>2</sup>, Mallapur MD<sup>3</sup>

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**Authors details:** <sup>1</sup>Intern, <sup>2</sup>Professor, <sup>3</sup>Asst. Professor / statistician, Dept of community medicine, Jawaharlal Nehru Medical College, K.L.E. University, Belgaum, Karnataka, India

**\*Corresponding author:** Soumya A Nagmoti

Dept of community medicine, Jawaharlal Nehru Medical College, K.L.E. University, Belgaum, Karnataka, India

Email: [soumya160@gmail.com](mailto:soumya160@gmail.com)

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### ABSTRACT

**Introduction:** Maternal body dimensions are the first determinants of neonatal biometrics, especially their birth weight and length. Mother's nutritional status is also known to be a key indicator of infant's body dimensions and its early growth features. Birth weight and length are clearly based on mother's nutritional and anthropometric factors hence the present study was done to find the association between BMI of mother and anthropometry of newborn among all the delivered women in tertiary care hospital. **Aim:** To study association between BMI of mothers and anthropometry in newborn. To know the other factors responsible for anthropometry of newborn. **Methodology:** 216 delivered women were taken consent by predesigned questionnaire information was collected regarding the socio-demographical data and the anthropometry of newborn and mother was recorded. Statistical analysis was done by using percentage and analysis of variance. **Results:** Our study showed association between maternal BMI and weight with neonatal parameters except mid arm circumference. There was no association between maternal heights with any of the neonatal parameters. **Conclusion:** In our study we found the association between Maternal BMI and Anthropometry of Newborn, Maternal Weight and Anthropometry of Newborn, But no association was found between Maternal height and Anthropometry of Newborn, so, by carrying out some intervention during pregnancy to improve nutrition of the mother which has better effect on the Anthropometry of newborn.

### INTRODUCTION

Humans, including the embryo transfer, the size at birth is primarily determined by the mother, whose influence acts more through the intrauterine environment and transmitted to her baby <sup>[1]</sup>. There is interrelation between the body physique of the mother, her nutritional status, haemoglobin levels, socioeconomic class and her exposure to passive smoking during pregnancy and intrauterine growth and birth size of her neonate. Significant positive correlations between maternal anthropometric parameters and neonatal birth dimensions were observed. These effects were more evident in female babies than male babies as regards to BMI and head circumference. This indicates that neonatal growth as reflected by birth weight, length and head circumference, are mostly influenced by maternal size. A study done in Egypt showed that best predictor of birth weight as a continuous variable was maternal weight at registration compared to combination of initial weight and height of the mother. A maternal pre gestational weight, weight at delivery, gestational weight gain and height correlated significantly with neonatal birth weight and birth length <sup>[1]</sup>. Birth weight determines the perinatal morbidity and mortality, and maternal body dimensions are first determinants of neonatal biometrics <sup>[2]</sup>. Many studies have been done to find association between non biometric maternal factors and neonatal anthropometry. Maternal nutritional status which is indicated through weight, height and BMI could be considered to predict the neonatal anthropometry hence the present study.

### MATERIALS AND METHOD

**Study design:** Present study was a cross-sectional, analytical study

**Place of research & Period:** The study was conducted in Dr.Prabakar Kore's Charitable hospital during the month of August 2014.

**Ethics approval:** Ethical clearance was obtained from Institutional ethical committee for human subjects. Informed consent was taken from all the study participants.

**Inclusion criteria:** The study included all the mothers giving birth to singleton babies during the study period.

**Exclusion criteria:** women with severe anemia, diabetes, hypertension to avoid influence of these factors on anthropometry of the new born and we also excluded women with babies requiring Neonatal Intensive Care Unit Admission (as it was difficult to collect measurements of the babies).

**Sample size:** Totally 216 women and the newborns were included in the study.

**Methodology:** BMI was not available for all pregnant women in first trimester; hence BMI of 5 months was included in the study. BMI was calculated using the formulae:  $BMI = \frac{WEIGHT (kg)}{HEIGHT (mts)^2}$  Predesigned and pretested questionnaire <sup>[8]</sup> was used to collect the relevant data. Data was collected regarding socio-demographic, obstetric history etc and maternal weight and height was measured, and calculated and neonatal birth weight (within one hour of birth), length, mid arm

circumference, head and chest circumference were measured.

**Statistical analysis:** Numerical outcome were summarised by mean and Standard deviation and they were compared among the groups by analysis of variance. Categorical outcome were summarised by rates. The percentage and analysis of variance, f value was calculated, p<0.05 statistically significant.

## RESULT

In the present study total 216 were participated. The height participant age range was between 20- 24years. (Table 1 ) and most them were studied high School level education, most of the participant were vegetarian, primigravida.

In the present study 65.7% of women had haemoglobin >11 gm %. Folic acid tablets were taken by 81.9%, Iron tablets by 99% and Calcium tablets by 76.8 %. Among the newborns, male babies were 51.9% and female babies were 47.1%. Weight of 89% of the new born babies was >2.5kg and 11% were <2.5kg. Maternal height was >150 cm in 57.9 % of women and only 1.9% were having height less than 140cms. Maternal weight in 2<sup>nd</sup> trimester was between 41-50 kg in 64.4 % of the participants and 13% had weight less than 40kgs.

The association between maternal BMI and anthropometry of newborn shown in table 2, maternal weight and anthropometry of newborn shown in table 3, maternal height and anthropometry of newborn shown in table 4.

### Abbreviations used in tables

**HC:** Head circumference

**CC:** Chest circumference

**MAC:** mid arm circumference

**P<0.05** consider as statistically significant

**Table 2: Association between maternal BMI and anthropometry of newborn**

Maternal BMI	<18.5	18.5-24.9	25-29.9	F <sub>2,207</sub>	P
No. of mothers	48	156	6		
<b>Parameters – Newborn</b>					
Birth weight (kg)	2.76±0.43	2.96±0.44	3.28±0.61	5.784	0.004
HC(Cm)	33.02±1.57	33.75±1.81	34±2.28	3.305	0.039
CC(Cm)	30.83±1.56	31.74±1.62	32.5±1.51	6.908	0.001
Length (cm)	42.87±3.03	44.41±4.45	47.16±2.85	4.170	0.017
MAC (cm)	8.96±0.74	9.35±3.11	10±0.63	0.589	0.556

**Table 3: Association between maternal weight and anthropometry of newborn**

Maternal weight	<40	41-50	>50	F <sub>2,207</sub>	P
No. of mothers	28	139	43		
<b>Parameters – Newborn</b>					
Birth weight(kg)	2.65±0.43	2.91±0.43	3.17±0.44	12.234	<0.001
HC (Cm)	33.03±1.5	33.49±1.87	34.3±1.5	5.125	0.007
CC (cm)	30.67±1.61	31.47±1.61	32.39±1.49	10.481	<0.001
Length (cm)	42.89±3.49	43.73±4.32	46.25±3.53	7.796	0.001
MAC (cm)	8.82±0.72	9.35±3.29	9.37±0.72	0.495	0.622

**Table 4: Association between maternal height & anthropometry of newborn**

Maternal height (cms)	<140	141-150	>150	F <sub>2,213</sub>	P
No. of mothers	4	87	125		
<b>Parameters-Newborn</b>					
Birth weight (kg)	2.77±0.49	2.92±0.42	2.93±0.48	0.252	0.777
HC	32±2	33.87±1.91	33.52±1.69	2.706	0.069
CC (Cm)	30.25±1.25	31.81±1.67	31.44±1.61	2.640	0.074
Length(cm)	44.5±4.43	44.28±3.59	44±4.53	0.131	0.878
MAC (cm)	9.25±0.50	9.04±0.70	9.47±3.46	0.635	0.531

**Table 1: Socio-demographic & Obstetric profile of pregnant women**

PARTICULARS	NUMBER	%
<b>Age Years</b>		
15-19	06	2.8
20-24	161	74.6
25-29	34	15.7
30-34	15	6.9
<b>Place of residence</b>		
Rural	111	51.4
Urban	105	48.6
<b>Educational status of mother</b>		
Primary	01	0.5
Secondary	23	10.6
High school	180	83.3
>Than high school	12	5.6
<b>Educational status of father</b>		
Primary	10	4.6
Secondary	146	67.6
High school	60	27.8
<b>Food habits</b>		
Vegetarian	130	60.2
Mixed	86	39.8
<b>Obst score</b>		
Primi para	142	65.7
Para 2	55	25.5
Para 3	12	5.6
> Para 3	7	3.2

## DISCUSSION

Our study showed that maternal weight was positively associated with birth weight of the newborn as the maternal weight increased weight of the new born also increased which was statistically significant with P value of <0.001. Similar results were observed in the study done in Sri Lanka with r value of 0.27<sup>[3]</sup>, similar findings in other studies<sup>[1,4,5,6,7]</sup>. Our study showed that maternal weight was positively associated with head circumference, chest circumference and length of newborn. Similar results were found in<sup>[1]</sup>. Our study did not show association between maternal weights with mid-arm circumference of the newborn.

In our study maternal BMI was positively associated with BW of newborn<sup>[1,2,3,5,10]</sup>. Similar results were found in studies done in Saudi Arabia<sup>[6]</sup>, Nigeria<sup>[7]</sup>, Nepal<sup>[8]</sup>, Romania<sup>[9]</sup>. Our study showed that maternal BMI was positively associated with HC of newborn. Similar results were found in<sup>[6]</sup>. Our study also showed that maternal BMI was positively associated with CC of newborn. Our study also showed that maternal BMI was positively associated with length of newborn. Similar result were found in<sup>[1,10]</sup>. Our study did not show association between maternal BMI with MAC of newborn.

Our study did not show association between maternal height and BW, Length, HC, CC and MAC of the newborn. In contrast to our study, a study done in Australia<sup>[11]</sup> found positive correlation between maternal height and HC of the new born. Similar results were found in<sup>[1,9]</sup>

## CONCLUSION

In the present study we found positive association between Maternal BMI and weight with anthropometry of Newborn except for mid arm circumference. But maternal height was not associated with any of the foetal parameters. Hence we suggest some interventions during pregnancy to improve nutritional status of the mother by which it is possible to improve the Anthropometry of the newborn.

**Limitation:** Study was conducted for a period of 1 month only hence it was not a representative study.

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**Conflict of interest:** Nil

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