Original Research Article

Association of maternal physical status and pregnancy outcome

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ABSTRACT

Background: Lots of research both in India and abroad studying the effect of maternal physical markers on their infant's birth weight is going on. The present study has been planned to evaluate the effects of maternal physical markers on their infant's anthropometry and cord blood haemoglobin.
Methods: Maternal background information, height, last known pre-pregnancy weight, gestational age and number of children was obtained and recorded in case proforma. 100 post-partum women and their newborns were studied. The study was carried in a post-natal ward of a tertiary care hospital. Maternal and neonatal data were recorded.
Results: Maternal physical status (pre-pregnancy weight, height and BMI) significantly influences the pregnancy outcome (neonatal parameters) of the baby.
Conclusions: There should be emphasis on improvement in nutrition of the girl child to improve the health of the upcoming generations. Maternal body mass index needs to be optimized to reduce perinatal complications to both mother and the baby.

Keywords: Anthropometry, Body mass index, Height, Newborn, Pregnancy outcome, Weight

INTRODUCTION

The growth of a new-born is affected by various prenatal, perinatal and post-natal factors. It is well known that optimum physical features pre- pregnancy affects health of mother and the child in long run. Thus, maternal nutrition plays an important role in life long health of baby. Therefore, the knowledge of maternal nutrition and foetal growth is crucial. Assessment of maternal nutrition depends upon maternal physical markers like pre-pregnancy weight, height, BMI etc.

Pregnancy outcome depends on birth weight, new-born physical parameters and cord blood haemoglobin. Poor maternal nutrition leads to low birth weight (LBW, birth weight < 2500 g) related to high morbidity and mortalit.[1] Despite advanced medical practices in the field of reproduction and child health, the infant mortality rate which is widely taken as an indicator of population's health status remains high. The two leading causes of neonatal deaths are low birth weight and prematurity in which maternal anthropometry (height, weight BMI, etc.) plays an important role.

Objective of this study was to study the effect of maternal physical markers on the neonatal parameters and cord blood haemoglobin concentration of their new-borns.

To study the effect of physical maternal markers (viz. weight, height, body mass index (BMI) and on pregnancy outcome determined by following neonatal parameters.

- Anthropometric parameters of their newborn
- Cord blood haemoglobin of their new born.

METHODS

Study area: This was an observational study done in the post-natal ward of our hospital. Before the start of our study an ethics committee clearance was obtained.

Post-delivery informed consent of women willing for the study was obtained. All women and their new-borns fulfilling the inclusion criteria were enrolled. A total of 100 mother-newborn pairs were selected from July 2011 to June 2012.

Inclusion criteria

- Pre-term and term live birth neonate- mother pairs whose hospital stay exceeded one day
- Newborns born by vaginal and caesarean delivery.

Exclusion criteria

- Unregistered mothers
- Mothers with any maternal disorder like diabetes mellitus, pregnancy induced hypertension, connective tissue disorder
- Multiple pregnancy
- Newborns with congenital malformations.

Maternal background information, height, last known pre-pregnancy weight, gestational age and number of children was obtained and recorded in case proforma.

Last known pre-pregnancy weight was recorded. Gestational age was calculated from Naegele's formula. The weighing machine was standardized frequently. The weight was recorded to the nearest 50 gm.

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. Pre-pregnancy

Body mass index (BMI) was calculated using formula weight (kg)/height (m^2).

New-born weights were measured using electronic weighing scale. Length, head circumference and chest circumference were measured within 48 hours after birth using non-stretchable measuring tape to the nearest of 0.5 cm. Ponderal index of the new-borns was calculated using formula weight (gms)/length (cm^3).

Statistical analysis

The data obtained was analysed using SPSS 20 software. The two groups were compared using one-way analysis of variance. For more than two groups comparisons post-hoc analysis was done using Tukey test. Pearson correlation coefficient was used. P-value less than 0.05 was considered significant.

RESULTS

In the present study, the mean pre-pregnancy weight and height were 58.04 kg and 158.86 cm with a body mass index (BMI) of the study population mothers was 23.09. (Table 1).

Table 1: Anthropometric features of mothers.

Maternal characteristics	Mean	Median	SD
Maternal pre-pregnancy weight (kg)	58.04	59.00	8.785
Maternal height (cms)	158.86	159.00	5.002
Body mass index (BMI)	23.09	23.23	3.189

The means of the maternal characteristics of the studied population as described in Table 1 are as follows. The mean pre-pregnancy weight and height were, 58.04 kg and 158.86 cm with a body mass index (BMI) of the study population mothers was 23.09.

Table 2: Influence of pre-pregnancy weight on length of the baby (n = 100).

Pre-pregnancy weight (kg)	Length (cm)		
	N	Mean	SD
Less than 40	5	46.20	0.45
41-50	15	49.67	1.99
51-60	40	50.38	2.81
61-70	33	51.09	1.97
More than 70	7	49.57	1.40

One-way analysis of variance followed by post-hoc analysis results: Mean length in pre-pregnancy weight categories 41-50, 51-60 and 61-70 are significantly higher than that of less than 40 kg category (P < 0.05). No statistically significant difference seen among any of the categories (Table 2).

There is statistically significant (P = 0.031)* positive correlation between mothers pre-pregnancy weight and length of the new-born (Table 3).

There is statistically significant (P = 0.002)* positive correlation between mother's height and head circumference of the new born (Table 4).

Table 3: Pearson correlation coefficients (P-values in brackets) between maternal pre-pregnancy weight and neonatal parameters (stature and cord blood haemoglobin).

Parameters	Birth weight (kg)	Length (cm)	HC (cm)	CC (cm)	Ponderal Index	Cord blood Hb (gm%)
Mothers pre-pregnancy weight (kg)	0.052 (0.611)	0.216 (0.031)*	0.042 (0.679)	0.005 (0.960)	-0.156 (0.122)	0.063 (0.534)

*Statistically significant values.

Table 4: Pearson correlation coefficients (P-values in brackets) between maternal height and neonatal parameters (anthropometry and cord blood haemoglobin).

Parameters	Birth weight (kg)	Length (cm)	HC (cm)	CC (cm)	Ponderal index	Cord blood Hb (gm%)
Mothers height (cm)	0.130 (0.196)	0.163 (0.106)	0.305 (0.002)*	0.168 (0.095)	-0.068 (0.503)	0.019 (0.849)

*Statistically significant values.

DISCUSSION

The indicators of nutritional status of newborn are physical parameters and cord blood haemoglobin and that of mother are height, weight and BMI.

Anthropometry has been since long used as a marker of well-being of a newborn infant. Birth weight has been the most common marker used to assess the intra-uterine growth since it is easier to measure and modern balances can measure weight up to nearest five grams. Also, other parameters like length measured with the help of an infantometer, head and chest circumference measured using a non-stretchable measuring tape are widely used to assess the growth and development of a newborn during the intra-uterine life. Birth weight is an important marker of child's lifespan. Birth weight not only implies the intra-uterine growth but it also has implications on adult life.

It is evident that taller mothers (> 165 cm) gave birth to heavier newborns as compared to short statured mothers (< 150 cm), however this was not significant statistically. Other research workers like Elshibly and Schmalisch found that maternal height was the most important maternal parameters influencing birth weight and the risk for LBW.[3]

Elshibly and Schmalisch reported preterm birth rate of 5.7% in their study.[3] The WHO report puts the world-wide incidence of preterm births (< 37 weeks) at 11.1%.[4] However our study, though with a smaller sample size showed preterm birth rate of 7%. This was due to the better government services and nutrition offered to the mothers.

In our study, the incidence of low birth weight is 22%. In developing countries like ours, this is because of poor in utero growth of foetus.[5]

Our results pointed out that as the pre-pregnancy weight increased there was a corresponding increase in the mean birth weight and this relationship was statistically significant (Table 4). Many research workers have reported an increase in the mean birth weight as the pre-pregnancy weight increased.[6] This emphasizes the role of adequate nutrition prior to pregnancy and preparation for the demands of the periods of increased metabolism during pregnancy.

The present study also revealed statistically significant (P = 0.002) positive correlation between mother's height and head circumference of the newborn (Table 4). This effect was not studied before. Thus, long term nutrition of the female, reflecting in the stature of the mother has an effect on the fetal development.

There was no statistically significant correlation between mother's height and weight and cord blood Hb.

Undernourished girls later turn into undernourished lady who give birth to a new generation of undernourished kids. It affects country's economy . Thus, there is a need to improve the health of adolescent girls in developing countries.[7]

CONCLUSION

Widespread poor maternal nutrition leads to low birth weight neonates. The mothers give birth to babies who are not only low birth weight but also have reduced anthropometric markers like length, head circumference, chest circumference and Ponderal index.

To conclude, pre-pregnancy weight, height and BMI has a very significant impact on the pregnancy outcome measured by neonatal anthropometric parameters. The better pregnancy outcome will decrease the overall infant morbidity and mortality.

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