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ORIGINAL RESEARCH

Correlation of parity and maternal weight during pregnancy with low birth weight: An observational study

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Abstract

Background: The present study was conducted for evaluating correlation of parity and maternal weight during pregnancy with low birth weight.

Materials & methods:A total of 100 pregnant subjects were enrolled in the present study. Inclusion criteria for the present study included pregnant women with first visit in less than 13 weeks, Term pregnancy i.e. between 37 weeks to 40 weeks and maternal age between 18-35 years. Maternal anthropometric measurements such as post pregnancy weight, height, mid-arm circumference and triceps skin fold thickness were recorded at the time of enrolment following stabilization (within 24 hours of delivery) at hospital using standard techniques. Maternal mid-arm circumference was measured using non-stretchable fibre tape. Mother's triceps skin fold thickness was measured using Lange skin fold caliper and body mass index was calculated using the formula, weight in kg divided by the square of height in meters.Data was studied in Excel sheet and analysis was done using SPSS ver. 15.0 for windows one way ANOVA was carried out to find impact of maternal factors.

Results: In our study out of 100 mothers 16% had weight gain less than 7 kg and out of them 88% delivered LBW babies. 64% women gained weight between 7-9 kg and out of them only 23% delivered LBW babies. A significant association was found between maternal pre partum body weight and low birth weight of baby. The incidence of LBW babies was maximum in females having weight less than 40 kg (90%) and least in females having weight more than 60 kg(00%).

Conclusion: The low birth weight was found to be high (46%) compared to national average of 21.5%. this could be because present study was carried out in tertiary care hospitals where many of the pregnant women's are referred from the peripheral centres' for of high risk pregnancy.

Key words: Anthropometry, Intrauterine growth restriction (IUGR), Fetal growth restriction (FGR), Perinatal morbidity and mortality, Small for gestational age (SGA)

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Introduction

The last half-century has witnessed many changes in the reproductive habits of population, the technologies and management of childbirth. Throughout this period birth weight 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) i.e. birth weight less than 2500 g. Birth weight is an important parameter, which could be indicative of the immediate viability of the neonate and the state of maternal health and nutrition during pregnancy.[1, 2]

The causes of low birth weight are multi-factorial, associated with environmental, demographic, social and cultural characteristics. Medical complications in pregnancy, adverse maternal practices, genetic factors and nutritional variables and especially maternal anthropometry also cause low birth weight. Malnourished women are more prone to deliver low birth weight babies and to have pregnancy complications. Perinatal mortality and prematurity rates were found to be high among short-stature women. Women among developing countries like India are undernourished, and their dietary energy intake is not adequate to compensate their heavy physical workload. In these countries most women were found to weigh below the 55 kg norm used by WHO. Although the levels of infant and child mortality are falling in the world, they are still high in India especially, in its under developed north-central states.[3, 4]In addition low rates of antenatal care, low utilization of obstetric and other health services and large number of deliveries by untrained personnel result in poor maternal health and poor birth conditions, such as low birth weight and pre maturity. Improving female education, nutrition and increased the use of health services during pregnancy and delivery are important for reducing childhood mortality rates.[5- 7] Hence; the present study was conducted for evaluating correlation of parity and maternal weight during pregnancy with low birth weight.

Materials & methods

The present study was conducted for evaluating correlation of parity and maternal weight during pregnancy with low birth weight. A total of 100 pregnant subjects were enrolled in the present study. Inclusion criteria for the present study included pregnant women with first visit in less than 13 weeks, Term pregnancy i.e. between 37 weeks to 40 weeks and maternal age between 18-35 years. Maternal anthropometric measurements such as post pregnancy weight, height, mid-arm circumference and triceps skin fold thickness were recorded at the time of enrolment following stabilization (within 24 hours of delivery) at hospital using standard techniques. Maternal mid-arm circumference was measured using non-stretchable fibre tape. Mother's triceps skin fold thickness was measured using Lange skin fold caliper and body mass index was calculated using the formula, weight in kg divided by the square of height in meters. Data was studied in Excel sheet and analysis was done using SPSS ver. 15.0 for windows one way ANOVA was carried out to find impact of maternal factors. Chi square test was used for finding significance between two parameters.

Results

In our study out of 100 mothers 16% had weight gain less than 7 kg and out of them 88% delivered LBW babies. 64% women gained weight between 7-9 kg and out of them only 23% delivered LBW babies. 20% of females were in the group that gained weight more than 9 kg in the antenatal period they delivered 100% normal weight babies.There was a significant relation seen between the parity and low birth weight. The incidence of LBW with first parity was 47.8% then the incidence of LBW was decreased in second parity (20%) which again increased with increasing parity 3rd (50%), 4th (40%) , 5th (66.7%) ,6th (100%).20% mothers had a pre pregnancy weight less than 40 kg followed by majority in group of 40-60

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kg(60%) . A significant association was found between maternal pre partum body weight and low birth weight of baby. The incidence of LBW babies was maximum in females having weight less than 40 kg (90%) and least in females having weight more than 60 kg(00%).

Table 1: Correlation of Parity and LBW-

Parity	Study group	Control group	P-Value
First	47.8%(11)	52.5%(12)	0.003
Second	20.0%(8)	80.0%(32)	
Third	50.0%(13)	50.0%(13)	
Fourth	40.0%(2)	60.0%(3)	
Fifth	66.7%(2)	33.3%(1)	
Sixth	100%(1)	0.0%(0)	

Table 2: Correlation of Maternal weight and LBW

Maternal age(kg)	Study group	Control group	P-value
<40 (20%)	18 (90%)	2(10%)	0.000
40-60(60%)	20(33%)	40(64%)	
>60 (20%)	00(0%)	20(100%)	

Discussion

Malnutrition in pregnancy, especially in developing countries, is at the centre of many women's health issues. During pregnancy, dietary intake is of great significance as far as fetal growth and development are concerned. Consuming a variety of food groups by pregnant women reduces their risk of giving birth to low birth weight babies. Poor nutrition in pregnancy is related to poor birth outcomes including low birth weight babies, preterm delivery, and intrauterine growth retardation. In the same way, a healthy birth outcome stems from a good nutritional status therefore the diet should be diverse and balanced for pregnant women.[8- 10]Hence; the present study was conducted for evaluating correlation of parity and maternal weight during pregnancy with low birth weight.

In our study out of 100 mothers 16% had weight gain less than 7 kg and out of them 88% delivered LBW babies. 64% women gained weight between 7-9 kg and out of them only 23% delivered LBW babies. 20% of females were in the group that gained weight more than 9 kg in the antenatal period they delivered 100% normal weight babies.There was a significant relation seen between the parity and low birth weight. The incidence of LBW with first parity was 47.8% then the incidence of LBW was decreased in second parity (20%) which again increased with increasing parity 3rd (50%), 4th (40%) , 5th (66.7%) ,6th (100%).20% mothers had a pre pregnancy weight less than 40 kg followed by majority in group of 40-60 kg(60%) . A significant association was found between maternal pre partum body weight and low birth weight of baby. The incidence of LBW babies was maximum in females having weight less than 40 kg (90%) and least in females having weight more than 60 kg(00%).Mitra, Set al determined the effect of maternal anthropometry and metabolic parameters on neonatal anthropometry.Large for gestational age (LGA) babies had higher maternal body mass index (BMI), fasting serum insulin, and cord blood insulin levels, and lower maternal high density lipoprotein (HDL) compared to appropriate for gestational age (AGA) group ($P < 0.001$). Among the maternal parameters, BMI, gestational age, fasting serum insulin, and random blood sugar (RBS) had significant positive correlation, while HDL had negative correlation with birth weight ($P < 0.05$). However, only maternal BMI was the significant predictor of neonatal birth weight on multiple regression analysis (ß = 0.340, $P = 0.01$).The BMI of glucose-tolerant mother is more important than metabolic parameters in determining the birth weight of term babies.[12]

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Costanza, J et al assessed nutrient intake during pregnancy in 503 women with uncomplicated pregnancies, using the validated Food Frequency Questionnaire developed by the European Prospective Investigation into Cancer and Nutrition (EPIC-FFQ).In all, 68% of women had a normal body mass index at the beginning of pregnancy, and 83% of newborns had an appropriate weight for gestational age. Maternal pre-pregnancy body mass index (BMI), gestational weight gain (GWG), and placental weight were independently correlated with birth weight. GWG was not related to the pre-pregnancy BMI. EPIC-FFQ evaluation showed that 30% of women adhered to the European Food Safety Authority (EFSA) ranges for macronutrient intake. In most pregnant women (98.1%), consumption of water was below recommendations. Comparing women with intakes within EFSA ranges for macronutrients with those who did not, no differences were found in BMI, GWG, and neonatal or placental weight. Neither maternal nor neonatal parameters were associated with the maternal dietary profiles.[13]

Abubakari, A et al assessed the effect of maternal dietary intake, gestational weight on birth weight among pregnant women in Tamale Metropolis. The study was a health-facility-based analytical cross-sectional study that involved 316 postnatal mothers. A semi-structured questionnaire was used to collect the data. Data collected were analyzed using STATA version 12. The study showed 17.8%, 55.9%, and 26.4% prevalence of inadequate, adequate, and excessive gestational weight gain, respectively. Although, all respondents consume supper every day, only 40.0% consumes snacks daily, 97.5% and 98.7% consumes breakfast and lunch daily respectively. Majority of the respondents (92.4%) had acceptable minimum dietary diversity. About 11.0% and 4.0% of the babies were low birth weight and macrosomic, respectively. Furthermore, the prevalence of inadequate and adequate dietary intake was, respectively, 7.6% and 92.4%. The results showed that underweight before pregnancy (BMI<18Kg/m2) (AOR=8.3, 95% CI: 6.7-15.0) and inadequate weight gain during pregnancy (AOR=4.5, 95% CI: 3.9-6.5) were significant determinant of low birthweight baby. On the whole, maternal body mass index and weight gain during pregnancy were strong predictors of low birth weight.[14,15]

Conclusion

In conclusion, this study investigated the correlation between parity, maternal weight during pregnancy, and the incidence of low birth weight (LBW). The findings underscore the significance of maternal nutritional status and health during pregnancy in influencing birth outcomes. Maternal factors, including weight gain during pregnancy and pre-pregnancy weight, were identified as crucial determinants of neonatal birth weight. The study revealed a notable association between first parity and a higher incidence of LBW, highlighting the importance of reproductive history in maternal and child health.

The results align with existing literature emphasizing the multifactorial nature of LBW, implicating environmental, demographic, social, and cultural factors. Maternal malnutrition, particularly in developing countries, emerged as a central concern, with undernourished women more prone to delivering LBW babies. The study provides valuable insights into the complexities of maternal health and its impact on neonatal outcomes.

Limitations

Despite contributing meaningful insights, this study has certain limitations that should be acknowledged. The sample size, consisting of 100 pregnant subjects, may limit the generalizability of the findings to broader populations. The study's focus on a specific geographic region or healthcare setting could also restrict the applicability of results to diverse contexts.

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Moreover, the retrospective nature of some data collection, such as maternal weight gain during pregnancy, might introduce recall bias. The reliance on maternal self-reporting for certain parameters could affect the accuracy of the information collected. Additionally, the study did not explore potential confounding factors that could influence birth weight, such as maternal medical history and access to healthcare services.

Future research endeavors with larger and more diverse samples, prospective study designs, and consideration of additional influential factors would enhance the robustness of the findings. Despite these limitations, the study contributes valuable insights into the complex interplay of maternal factors and their impact on neonatal outcomes, emphasizing the importance of maternal well-being for healthy birth outcomes.

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