ORIGINAL ARTICLE

Association of Maternal demographic and Anthropometric Characteristics with Birth Weight of the Newborn

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Author`s Contribution

[1]Conception, synthesis, planning of research, [2] Conceived the topic and review the study, [3] Interpretation and Manuscript Discussion, [4] Data Analysis

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ABSTRACT

Objective: To ascertain the effect of auxiliary variables including maternal factors on birth weight of the newborn.

Setting and Duration: The sample was selected from Mother and Child Health (MCH) center, Shaheed Zulfiqar Ali Bhutto Medical University, PIMS Islamabad from March-May 2017.

Methodology: The main variable was birth weight and independent variables were (i) Mother's age (ii) Gestational age (iii) Mother's BMI (iv) Education level (v) Monthly household income (vi) Proper checkup during pregnancy (vii) Proper diet during pregnancy (viii) Use of proper medication/vitamins in pregnancy (ix) Parity and (x) mode of delivery. A questionnaire was developed to get information on auxiliary variables and main variable. This information was used to find out the effect of different variables on fetal outcome in terms of birth weight of babies.

Results: The mean age of participants was 30.23 ± 5.411 years. The mean weight and high in these women was noted to be 62.35 ± 7.876 kg and 168.07 ± 2.514 cm respectively. The mean BMI was recorded as 22.067 ± 2.721, ranging from 16.73 to 30.12. The mean birth weight of the babies was recorded as 2.535 ± 0.670 kg. The results showed that the three was significant (p-value < 0.05) correlation between age of mother (r = - 0.465), weight of mother (r = - 0.170) and BMI (r = -0.157). But the correlation between the height of mother was not statistically significant (p-value > 0.05). There was a significant relationship between low birth weight and maternal BMI, Maternal education, Household income, proper checkup, proper diet and use of Proper medicine/multivitamin during pregnancy.

Conclusion: Accurate estimation of fetal weight in late pregnancy provides valuable information for decision making in the management of birth. Most of the maternal factors had a significant relationship with fetal weight.

Key Words: Birth Weight, Maternal anthropometric measures, low birth weight.

Introduction

Birth weight is very important parameter to be estimated. Birth weight is an imperative characteristic which expresses the perinatal outcome of any pregnancy. It describes mother and baby's health in later life. So, birth weight is a basic parameter to predict the successful

perinatal outcome, survival status and development of the baby. [1]

Birth weight has a significant relationship with health and survival of the newborn. One of the main factors which affect the birth weight is maternal nutritional status during the pregnancy. It may be adversative effects on perinatal life along with increases chances of perinatal morbidity and mortality if a baby born with below average birth weight due to malnutrition. [2,3]

According to WHO estimates, overall prevalence of babies having below average weight at birth is 17%, which has huge variation with respect to developing countries where its prevalence is 19% and developed countries where it has prevalence of 7%. [4] The precise estimation of expected fetal weight in the development of labor may have an important influence on management of labor, particularly during assumed macrosomia or less birth weight. Macrosomic fetuses may cause maternal and neonatal difficulties throughout labor, and LBW fetuses can be at increased danger of sickness and mortality for perinatal. Therefore, a reliable approximation of birth weight could prevent some of these difficulties. [5,6]

The weight of Newborn is an important analytical parameter of neonatal outcome, and its estimation for planning the method of delivery and obstetric management of labor is highly valuable. After the dimension of various fetal structures, approximation weight of fetal through ultrasound uses a deterioration formula to derive the birth weight. Accuracy in forecasting birth weight by a variety of diverse formulas, including various ultrasonic measurements, has been studied widely. [7]

In Obstetrics ultrasonography assessment of the unborn-baby and its weight has turn into part of the repetitive exercise. Extensive variety of diverse weight calculations have been established in near past for precision of antenatal weight assessment, although showing a commonly insufficient level of precision.[8] It has been revealed in various studies that improper education in women, poverty, and poor nutritional status are at increased risk of adverse generative outcomes including LBW and premature birth. [4] A number of dangerous effects connected to LBW are being documented, the babies born with LBW are additionally disposed to decreased neuro-development, diabetes mellitus and hypertension in the grownup lifecycle. [9]

This present study has been planned to assess the association between birth weight and auxiliary variables including maternal anthropometric parameters and maternal practice during pregnancy.

Methodology

The study was started after taking approval form the hospital ethical committee. The pregnant women visiting to the mother and child health (MCH) center PIMS, Islamabad, for delivery were selected in the study after taking informed written consent. A predesigned questionnaire was used to obtain relevant information about auxiliary variables related to the maternal characteristics. Auxiliary variable are the variables within the original data which are not part of the analysis but are correlated with the variable of interest.

The information related to main variables of interest in the study i.e. weight of newborn babies, and supplementary or auxiliary variables (i) Mother age (ii) Gestational age (iii) Mother's BMI (iv) Education level (v) Monthly household income (vi) Proper checkup during pregnancy (vii) Proper diet during pregnancy (viii) Use of proper medication/vitamins in pregnancy (ix) Parity and (x) mode of delivery was recorded on the Performa.

Results

In this cross-sectional study a total of 164 pregnant women were included. The study sample had a mean age of 30.23 ± 5.411 years, with a minimum age of 17 years and maximum age of 38 years. The mean weight and high in these women included in the study were noted to be 62.35 ± 7.876 kg and 168.07 ± 2.514 cm respectively. The mean BMI was recorded as 22.067 ± 2.721, ranging from 16.73 to 30.12. The mean birth weight of the babies was recorded as 2.535 ± 0.670 kg with minimum 1.20 and maximum 4.10 kg birth weight as elaborated in table I.

Table I: Demographic Characteristics of the Patients

Characteristics	N	Min.	Max.	Mean	Std. Deviation
Age	164	17	38	30.23	5.411
Weight	164	45	82	62.35	7.876
Height	164	160	172	168.07	2.514
Body Mass Index	164	16.73	30.12	22.067	2.721
Birth Weight (Kg)	164	1.20	4.10	2.535	0.670

Pearson correlation coefficient was calculated for age, weight, height, and BMI of mother to find an association with a birth weight of the baby. The results showed that the three was significant (p-value < 0.05) correlation between age of mother ($r = -0.465$), weight of mother ($r = -0.170$) and BMI ($r = -0.157$). But the correlation between the height of

mother was not statistically significant (p-value > 0.05) as given in table II.

Table II: Pearson Correlation Coefficient of different characteristics with birth weight

Characteristics	Correlation Coefficient	P-Value
Age of mother	-0.465	0.000 *
Weight of mother	-0.170	0.030 *
Height of mother	-0.058	0.462 **
Body Mass Index	-0.157	0.044 *

* Correlation is significant at 5% level of significance
** Correlation is significant at 5% level of significance

According to the results there was a significant relationship between low birth weight and maternal BMI, a mother with normal weight had significantly (p-value < 0.05) lower rate (44% vs 89.47%) of low birth weight babies as compared with overweight mothers. Maternal education significantly (p-value < 0.05) decreased the rate of low birth weight (30.37%) in the mother having > 8 years education in comparison with mothers (68.23%) having < 8 years education. Household income also had significant (p-value < 0.05) impact on low birth weight. The mothers with < 25000 income had (72.22%) LBW rate in contrast to the mother having > 25000 income with (39.09%) LBW rate. According to the results of the study the mothers having proper checkup during pregnancy (26.89% vs 80.28%), proper diet during pregnancy (28.94% vs. 68.18%) and mothers using Proper medicine/multivitamin in pregnancy (30.76% vs. 73.97%) had significantly lower rate of low birth weight babies as compared with their counterparts. Similarly, parity and mode of delivery also showed significant (p-value < 0.05) relationship with rate of low birth weight as elaborated in table III.

Table III: Association of different Maternal Characteristics with Birth Weight

Variables	Low Birth Weight		Total	P-value
	Low BW (< 2.5Kg)	Normal (2.5-4kg)		
Body Mass Index				
Normal Weight (BMI< 25)	65	80	145	0.000
Over Weight (BMI >25)	17	2	19	
Educational status of the mother				
<8 years	58	27	85	0.000
>8 years	24	55	79	
Income per month				
< 25000	39	15	54	0.000
> 25000	43	67	110	
Proper checkup during pregnancy				
Yes	25	68	93	0.000
No	57	14	71	
Proper diet during pregnancy				
Yes	22	54	76	0.000
No	60	28	88	
Use of Proper medicine/multivitamin				
Yes	28	63	91	0.000
No	54	19	73	
Parity				
< 3	74	45	119	0.000
> 3	8	37	45	
Mode of delivery				
Normal	26	58	84	0.000
C-section	56	24	80	

Discussion

Neonatal birth weight is very important and sensitive marker for health and survival of the newborn because it is strongly connected with morbidity and mortality of the baby. It also indicates problems related to the development of the child and risk of various diseases which can be developed in later life. The diseases like diabetes, hypertension and cardiovascular conditions can be predicted on the basis of birth weight. [10]

Maternal age and parity have been found significantly associated with birth weight. Women having age between 20 to 30 years are at minimum risk of giving birth to a baby having low birth weight and mother other than this interval are at greater risk of low birth weight. Similarly, mothers at first pregnancy and after fourth pregnancy had higher chances of low birth weight babies as compared with mothers of the second and third baby. [11]

The results of present study showed that the three was significant (p-value < 0.05) correlation between age of mother (r = - 0.465), weight of mother (r = - 0.170) and BMI (r = -0.157). But the correlation between the height of mother was not statistically significant. Similarly, parity and mode of delivery also showed significant (p-value < 0.05) relationship with the rate of low birth weight.

Maternal height, weight gain during pregnancy, pre-pregnancy BMI, and gestational duration were related to an increased BW. The gestational duration is the most important factor affecting the BW in singleton term infants, which is consistent with the present study. Another similar study found that placental weight was also associated with macrosomia, perhaps due to continuous fetal growth and aging of the placenta. Maternal age and gestational age should be considered as independent risk factors for newborn macrosomia. [10,12] Results of the present study

revealed that there was a significant relationship between low birth weight and maternal BMI, a mother with normal weight had significantly (p-value < 0.05) lower rate (44% vs 89.47%) of low birth weight babies as compared with overweight mothers.

Pregnancy is a period in which maternal body undergoes many changes and mother's body requirements regarding nutrition, metabolism, endocrinology, and circulation also distorted significantly. Maternal weight before and during pregnancy also has been proved to be significantly associated with birth weight. Both low and high maternal weight are a greater risk for baby's birth weight. [13] The low weight of mother is a risk for fetal development and higher weight marked increase the chance of cesarean section. [14] The maternal obesity rate is increasing very sharply throughout the world, which should be considered seriously in childbearing age because obesity is a main factor for the caesarian section and macrosomial births. [15, 16]

Other mother related factors which have a great impact on maternal weight are imbalance diet, lack of knowledge related to balance diet, poor dietary habits and lack of physical activity and these factors cause overweight and obesity among women, making the condition unfavorable for childbirth. [16]

Results of this study recommended that household income also had significant (p-value < 0.05) impact on low birth weight. The mothers with < 25000 income had (72.22%) LBW rate in contrast to the mother having > 25000 income with (39.09%) LBW rate. According to the results of the study the mothers having proper checkup during pregnancy (26.89% vs 80.28%), proper diet during pregnancy (28.94% vs. 68.18%) and mothers using Proper medicine/multivitamin in pregnancy (30.76% vs. 73.97%) had significantly lower rate of low birth weight babies as compared with their counterparts.

According to the literature, formal education was associated with increased likelihood of having delivered a LBW baby which is a surprising finding but different measures of socioeconomic disadvantage are associated with adverse delivery outcomes such as LBW. The mechanisms associated with LBW among the less educated may include poor diet as a result of low income and low dietary literacy. [17,18]

The results of this present study show that the education is one of the factors having less influence on outcome measure of the main variable. Maternal education in this study significantly (p-value < 0.05) decreased the rate of low birth weight (30.37%) in the mother having > 8 years education in comparison with mothers (68.23%) having < 8 years education.

Previous studies have found the considerable effect of education on birth weight. In a study, it was noted that women with no formal education were more likely to have delivered a LBW baby compared to those with at least primary education. This difference persisted even after controlling for maternal age, marital status, region, education, wealth index, a number of children ever born, and a number of times received antenatal care. Both lower parity and lower wealth index were independently associated with a higher likelihood of having delivered a LBW baby. [17, 19]

The weight estimation certainly contributes to the subsequent management of labor. Sonographic estimation of fetal weight has also been widely used with a significant correlation between the neonate's estimated and actual weight. Nevertheless, fetal weight estimation based on palpation and clinical data is still a valid and reliable method.[20, 21]

Conclusion

Accurate estimation of fetal weight in late pregnancy provides valuable information for decision making in the management of birth, namely the mode and time of birth, as well as the subsequent management of the mother and the neonate. According to the results of this study, most of the maternal factors significantly affect the accuracy of fetal weight estimation including the age of mother, gestational age, parity, monthly household income, body mass index (BMI) of the mother, proper checkup, diet and use of multivitamins during pregnancy.

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