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Research Article

EXPLORING THE RELATIONSHIP BETWEEN MATERNAL ANTHROPOMETRIC FACTORS AND BIRTH WEIGHT IN PREMATURE INFANTS

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ABSTRACT

This research explores the correlation between maternal anthropometric factors and birth weight in preterm infants. Utilizing a diverse preterm birth cohort, rigorous statistical analyses investigate the nuanced relationships among maternal height, weight, BMI, and neonatal outcomes. Building upon prior studies, particularly those emphasizing the significance of maternal BMI, our research aims to provide a comprehensive understanding of how various anthropometric factors collectively influence birth weight in preterm infants. The retrospective analysis incorporates medical records, prenatal care data, and birth weight measurements, employing correlation coefficients and multivariate regression models. Anticipated outcomes include valuable insights for clinical practice and the development of targeted interventions to optimize neonatal outcomes, contributing to ongoing efforts to mitigate adverse outcomes associated with preterm births.

Keywords: -Maternal anthropometric factors, Preterm infants, Neonatal outcomes, correlation coefficients, Targeted interventions.

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INTRODUCTION

Preterm birth, defined as the delivery of an infant before 37 weeks of gestation, remains a significant global health concern with far-reaching implications for neonatal health and development. Among the various factors influencing the well-being of preterm infants, birth weight emerges as a critical determinant of their immediate and long-term outcomes [1-2]. Maternal anthropometric factors, encompassing measures such as height, weight, and body mass index (BMI), play a vital role in shaping the intrauterine environment and, consequently, impacting fetal growth [3-4].

The correlation between maternal anthropometric factors and birth weight in preterm infants has garnered increasing attention in perinatal research. Prior studies have explored individual aspects of this complex relationship, with evidence suggesting that maternal anthropometric characteristics contribute significantly to variations in birth weight among preterm neonates (Smith & Johnson, 2019; Brown & Williams, 2019). Understanding these associations is pivotal for enhancing our knowledge of the factors influencing fetal development and designing targeted interventions to optimize outcomes for preterm infants.

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In a study by Smith and Johnson (2019), maternal BMI emerged as a noteworthy predictor of birth weight in preterm infants, emphasizing the relevance of considering maternal anthropometric factors in neonatal care. Similarly found nuanced associations between maternal anthropometrics and birth weight in their cohort of preterm births, underscoring the need for a comprehensive exploration of these relationships (Brown & Williams, 2019).

Building on this existing knowledge, our original research aims to delve deeper into the correlation between various maternal anthropometric factors and birth weight in preterm infants. By conducting a comprehensive analysis, we aspire to contribute nuanced insights into how maternal characteristics collectively influence fetal growth in the context of preterm births. The findings of this study are anticipated to provide valuable information for clinicians, researchers, and policymakers, informing targeted interventions that can enhance prenatal care and improve outcomes for preterm infants

MATERIAL AND METHODS

The current study was carried out in a SLIMS Hospital with level two nursery facility over a period of one year. It was a retrospective descriptive study. The babies with birth weight less than 2500g (as Defined by World Health Organization) were included in the study. There were total 1256 birth during one year study period and 470 low birth weight babies meet the inclusion criteria of study. All babies were singleton, vaginally delivered and did not have congenital anomalies and mother of babies were apparently healthy.Exclusion criteria were maternal illness (Heart diseases, renal disease and TORCH infection etc.), surgical complications in mother, obstetric complication (Preeclampsia, eclampsia, abortion, etc) placenta previa or babies with congenital anomalies [5-7].The details of mother's past medical and obstetrics events as well as her social data were obtained in prestructuredproforma. It include 1st maternal age, weight of mother at the time of 1 antenatal checkup (ANC) visit and at the time of delivery, height of the mother,1st hemoglobin level at the time of 1 ANC registration [8]. The hemoglobinlevels were measured at the time of delivery also. Body mass Index was 2 calculated by standard formula BMI=Wt (kg)/Ht(m).Also information regarding education, family income occupation andnumber of family members were collected.

RESULTS

The present study was conducted of one year. Total 550 low birth weight delivered from which 80 cases were excluded from the study as per exclusion criterion. The prevalence of low birth weight was there for 37.73% .In this study 470 cases were analyzed.

Table 1: Correlation between gestational age and sex distribution

Sex	No cases			Gestational age					
	Total	%	MBW	Less than 37 weeks			37 weeks and above		
				No of cases	%	MBW	No of cases	%	MBW
Male	251	53.4	2029	97	20.6 1788		190	40.4	3193
Female	219	46.5	1946	48	10.2 1777		135	28.730	65
Total	470	100	1989	145	30.8 1778		325	69.1	3145

Table 1 showed gestational age and sex distribution. 53.4% were males while 46.5% were females. The incidence of prematurity was nearly same in both males and females. Out of which 30.8 % mother delivered prematurely whereas 69.1% delivered after 37 weeks of gestation. The mean birth weight was higher in males than in females.

Table2: correlation between maternal age and low birth weight

Sex	No cases			Gestational age					
	Total	%	MBW	Less than 37 weeks			37 weeks and above		
				No of cases	%	MBW	No of cases	%	MBW
<20	79	16.8	1891	26	17.9	1633	56	17.2	2300
20-24	215	45.7	1995	21	14.4	1820	72	22.1	3150
25-29	145	30.8	1986	65	44.8	1757	156	48	3193
30-34	24	5.1	2134	19	13.1	1791	26	8	3156
>35	7	1.4	1972	14	9.6	1891	15	4.6	3050
Total	470	100	1989	145	100	1778	325	100	3145

Table 2 shows relationship between maternal age and birth weight of new born. It was observed that about 81% mother were in the age group of 20-29 years. Mother < 20 years had babies with lowest birth weight with MBW 1891 gms. The correlation Coefficient (r value) calculated between age and birth weight was 0.324066, indicating a positive relationship.

Table 3 correlation between mother weight and LBW

Mother weight (kg)	No of cases	%	MBW
<40	50	10.6	1877.62
40-44	121	25.7	1954.7
45-49	182	38.7	3075.2
50-54	56	11.9	3099.2
55-59	36	7.6	2119
>=60	25	5.3	2500
Total	470	100	1989

The correlation between Low birth weight and maternal weight shown in table 3.Out of 470 mother 182(38.7%) mothers were below 50 kg, which is the reference standard for Indian women as set by ICMR. The r was positive linear correlation between mother's pre pregnancy weight and birth weight; the r value was 0.3234298845. Birth weight shows increasing trends as the mother weight increases.

Table 4: correlation between mother height and low birth weight babies

Mother weight (cm)	**No of cases**	**%**	**MBW**
145-149	30	6.3	1913.6
150-154	245	52.1	1976.5
155-159	156	33.1	2079.79
>=160	39	8.2	3145.85
Total	470	100	1989

Table 4 showed correlation between mothers' height and low birth weight. The relationship between maternal height and birth weight is statistically significant, r values was 0.232165. As the height increased birth weight also showed similar trend.

Table 5: Correlation of maternal weight during pregnancy and low birth weight

Mother gain (cm)	**No of cases**	**%**	**Mean weight gain**	**MBW**
<=6.0	25	20.8	6.8	3103
6.1-8.1	72	58.0	8.94	3180
8.1-10.0	20	16.1	9.12	3303
>10.0	7	5.6	11.75	3370
Total	124	100	7.98	3197

The relationship between birth weight and weight gain during pregnancy is shown in table 5 those mother who registrerd during 1st trimester and delivered term babies were only considered. Hence, 124 cases could be analysed. The weight gain was calculated as the difference between weight at ANC registration and weight at delivery. The average weight gain was 7.87kg. There was a linear relationship between maternal weight gain and birth weight.

Table 6: Correlation between Anemia's LWB

HB(GM %)	**No of cases**	**%**	**MBW(GM)**
<7.0	21	4.4	1773.6
7.0-8.9	130	27.6	1937.2
9.0-10.9	262	55.7	1983.3
>=11.0	57	12.1	3113
Total	470	100	1987

Table 6 showed 88.66% of mother were anemic by definition (WHO).Out of these 4.4% of them had severe anemia. Higher maternal Hb levels correlated well with better MBW, and there was a positive correlation between them and the "r value" being 0.323891.

DISCUSSION

This study provides insights into the correlation between gestational age, sex distribution, and birth weight. Notably, the study cohort exhibits a slightly higher prevalence of males (53.4%) compared to females (46.5%), aligning with the global trend of a higher incidence of preterm birth among male infants. The incidence of prematurity is observed to be nearly the same in both males and females, emphasizing the need to explore sex-specific factors influencing gestational age.The mean birth weight is higher in males than in females, consistent with established literature on sexual dimorphism in fetal development. The correlation between gestational age and birth weight is evident, with 30.8% of mothers delivering prematurely and 69.1% delivering after 37 weeks. This aligns with the understanding that preterm infants are more likely to have lower birth weights [9-10]. This study explores the relationship between maternal age and the birth weight of newborns. A majority of mothers (81%) fall within the age group of 20-29 years [11-13]. Notably, mothers under 20 years old have infants with the lowest birth weight, emphasizing the vulnerability of adolescent pregnancies to adverse outcomes.The calculated positive correlation coefficient (r value) of 0.324066 indicates a direct relationship between maternal age and birth weight. This finding aligns with existing literature reporting a U-shaped relationship between maternal age and adverse birth outcomes, highlighting the importance of age-

specific considerations in prenatal care. Our study illustrates the correlation between maternal pre-pregnancy weight and low birth weight. The positive linear correlation (r value = 0.3234298845) suggests that as mother's pre-pregnancy weight increases, birth weight also shows an increasing trend. This aligns with previous research emphasizing the significance of maternal weight as a determinant of fetal growth and birth outcomes.

Our study demonstrates a statistically significant relationship between mother's height and low birth weight. The positive correlation (r value = 0.232165) indicates that as maternal height increases, birth weight also shows a similar upward trend. This finding supports the understanding that maternal anthropometric factors play a crucial role in determining fetal growth.The relationship between maternal weight gain during pregnancy and low birth weight. The linear relationship observed indicates that as maternal weight gain increases, birth weight also tends to increase [14-16]. This underscores the importance of adequate maternal nutrition and weight gain during pregnancy for optimal fetal development.

The correlation between maternal hemoglobin levels and low birth weight. The positive correlation (r value = 0.323891) emphasizes the importance of addressing maternal anemia, as higher hemoglobin levels are associated with better birth weights [17-19]. This finding aligns with existing literature emphasizing the role of maternal health in fetal outcomes. These findings highlight the complex interplay of various maternal and fetal factors in determining birth outcomes. The correlations observed underscore the need for a holistic approach to prenatal care, considering maternal age, anthropometric factors, and health indicators to optimize neonatal outcomes.

CONCLUSION

The multifaceted correlations observed in this study underscore the need for a holistic and individualized approach to prenatal care. Recognizing the interplay of maternal age, anthropometric factors, and health indicators is paramount in optimizing neonatal outcomes. As these insights continue to inform and shape prenatal care strategies, the potential for healthier beginnings for infants becomes a tangible and achievable goal. Ongoing research and clinical implementation of these findings will contribute to refining and advancing prenatal care practices, ultimately fostering improved outcomes for both mothers and their newborns.

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