Original Article

An Investigation Into The Relationship Between Birth Weight And Maternal, Placental, And Demographic Factors

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Abstract

The health of the mother and the anatomy of the placenta are the two key characteristics that are known to connect with low birth weight. The mother's health is essential to the development of the foetus. On the other hand, the placenta has to be fully grown and in good health in order for it to be able to transport all of the nutrients that are present in the mother to the developing baby. At the Maternity unit, a prospective study was carried out on a total of 180 moms who had recently given birth. Each mother in turn was asked to participate in the study when her child was being admitted, and this continued until the desired number of participants was reached. Among mothers who were over the age of 25, had an education level that was lower than higher secondary, and had a family income that was less than 15,000 rupees, correspondingly 33.3%, 35%, and 29.2% of their babies were born LBW. The level of schooling a mother had was found to have a significant association with her child's birth weight (p = 0.053). 36.6% of LBW babies were delivered to women who had a history of preeclampsia (12.20), and 42.9% of LBW babies were given to moms who had a history of diabetes (3.9). 31.1% of babies born to moms who had caesarean sections (which made up 50% of all deliveries) and multigravid mothers (which made up 46.7% of all deliveries) were born LBW. There was a statistically significant difference discovered between the gestational age of the mother and the baby's birth weight (p 0.001) According to the findings of the study, the risk factors for low birth weight babies are as follows: maternal age, low education and income, any chronic medical conditions, gestational age, and morphometric placental characteristics. According to the findings of this study, there is a strong association between the morphmetric characteristics of the placenta and the birth weight.

Keywords- Birth Weight, Maternal, Placental, Demographic Factors

Introduction: The single most important risk factor in neonatal and infant health is low birth weight (LBW), which is defined as less than 2500 grammes. [1] Birth defects are present in 15.5% of all live births, which equates to around 20.5 million infants born each year across the world. [2] Low birth weight can occur in infants who are born prematurely (less than 37 weeks of gestation), in newborns who have been diagnosed with intrauterine growth restriction (IUGR), and in full-term infants. [3]

The health of the mother and the anatomy of the placenta are the two key characteristics that are known to connect with low birth weight. [4] The mother's health is essential to the development of the embryo. [7] On the other hand, in order to guarantee that the foetus receives all of the nutrients that are readily available from the mother, the placenta needs to be fully grown and in good health. [5] Comparative studies of maternal socio-demographic factors in a variety of countries, including sub-Saharan Africa, have shown that a young age or maternal age greater than 35, as well as lifestyle choices (such as engaging in physical activities) during pregnancy, are high risk factors that contribute to poor foetal growth and pregnancy outcomes. [6] It has been observed that placental factors alone are responsible for the growth retardation of neonates in 36% of cases of low birth weight. [7] Variations in the length, breadth, and

weight of the placenta, as well as any movements from a central insertion of the umbilical cord on the chorionic plate to an uneven velamentous insertion, are all examples of placental morphological changes. [8] These kinds of alterations have an effect on the efficiency of the placenta in terms of the growth of the vasculature sufficiently to fulfil the nutrient and oxygen demands of the developing embryo. [9] The weight of the placenta is used as a marker to determine the amount of surface area that is available for maternal-fetal nutrition exchange. [10]

Subjects and Methods: A prospective study on 180 mothers who had their babies in the maternity ward was carried out. Each mother in turn was asked to participate in the study when her child was being admitted, and this continued until the desired number of participants was reached.

Sample size: The sample size was 180 determined through calculation.,

At the time of recruiting, a consent after informed thought was sought. After that, a socio-demographic characteristic, maternal, and obstetric profile were all finished up. The mothers were monitored up until the time of birth. During the first hour after delivery, the neonates were placed on electronic weighing scales to be measured and measured. Immediately upon delivery, the placentas were analysed in terms of their weight, diameter, and the number of cotyledons that were present at the maternal surface.

Following the baby's birth, all of the infant's parameters were measured. The neonates considered to be at a high risk were not included in the study. When measuring the length of the crown and heel, the subject was positioned supine with their knees fully extended. For the purpose of measuring the head circumference of neonates, a measuring tape was wrapped around the head until it reached above the ears and eyebrows. Either the number of weeks of gestation or the time since the previous menstrual period was used to arrive at an accurate gestational age. The Protocol and Ethical Committee of the study before it was conducted. SPSS V20 was used to perform the analysis on the data.

Results:

Table 1: Demographic variables and birth weight: [N=180]

Demographic variable	**No %**	**Birth Weight Mean ± SD**	**No of LBW (<2500) (%)**	**No of NBW (≥ 2500) (%)**
1.Age of Mother:				
≤25 yrs	96(53.3)	2778.5 ± 510.8	22 (22.9)	74 (77.1)
> 25 yrs.	84 (46.7)	2775.3 ± 507.0	28 (33.3)	56 (66.7)
Test value & p value ⟶		(t =0.043 ;p=0.966)	(χ2 =2.423; p= 0.120)	
2.Education of Mother:				
≤ Higher Secondary	80 (44.4)	2729.8 ± 578	28 (35.0)	52 (65.0)
> Higher Secondary	100(55.6)	2814.8 ± 441.8	22 (22.0)	78 (78.0)
Test value & p value ⟶		(t =0.043 ;p=0.966)	**(χ2 =3.744; p= 0.053)**	
3.Monthly family income:				
Rs ≤ 15000	86 (47.8)	2746.8 ± 420.8	25 (29.2)	61 (70.9)
Rs. > 15000	94 (52.2)	2804.6 ± 576.6	25 (26.6)	69 (73.4)
Test value & p value ⟶		(t =0.762 ;p=0.447)	(χ2 =0.137; p= 0.711)	

Table 1 shows that, Among mothers who were over the age of 25, had an education level that was lower than higher secondary, and had a family income that was less than 15,000 rupees, correspondingly 33.3%, 35%, and 29.2% of their babies were born LBW. The level of schooling a mother had was found to have a significant association with her child's birth weight (p = 0.053).

Table 2: Maternal variables and birth Weight: [N=180]

Maternal variable	No %	Birth Weight Mean ± SD	No. of LBW (<2500) (%)	No .of NBW (≥ 2500) (%)
1. H/O Preeclampsia:				
Yes	22 (12.20)	2657.0 ± 509.4	8 (36.4)	14 (63.6)
No	158(87.8)	2793.7 ± 506.7	42 (26.6)	116 (73.4)
Test value & p value ⟶		(t = 1.185 ;p=0.238)	(χ2 =0.921; p= 0.337)	
2. Type of delivery:				
Normal	90 (50.0)	2795.1 ± 455.7	22 (24.4)	68 (75.6)
Caesarean section	90 (50.0)	2758.9 ± 556.7	28 (31.1)	62 (68.9)
Test value & p value		(t = 0.477;p=0.634)	(χ2 =0.997; p= 0.318)	
3.Gestational Age in (Wks) :				
≤ 37 Preterm	17 (9.4)	2188.2 ± 422.5	13 (76.5)	4 (23.5)
> 37 Not -Preterm	163 (90.6)	2838.4 ± 476.4	37 (22.7)	126 (77.3)
Test value & p value ⟶		**(t =5.408 ; p=0.001)**	**(χ2 =22.187 ; p= 0.001)**	
4.H/O Maternal diabetics				
Yes	7 (3.9)	2763.4 ± 475.0	3 (42.9)	4 (57.1)
No	173 (96.1)	2777.5 ± 510.2	47 (27.2)	126 (72.8)
Test value & p value ⟶		(t = 0.072; p=0.943)	(χ2 =0.826; p= 0.364)	
5.Gravida				
Primi gravida	96 (53.3)	2785.9 ± 513.3	25 (26.0)	71 (74.0)
2 and above gravida	84 (46.7)	2766.8 ± 594.0	25 (29.8))	59 (70.2)
Test value & p value ⟶		(t = 0.250; p=0803)	(χ2 =0.309; p= 0.578)	

Table 2 shows that, 36.6% of LBW babies were delivered to women who had a history of preeclampsia (12.20), and 42.9% of LBW babies were given to moms who had a history of diabetes (3.9). 31.1% of babies born to moms who had caesarean sections (which made up 50% of all deliveries) and multigravid mothers (which made up 46.7% of all deliveries) were born LBW. There was a statistically significant difference discovered between the gestational age of the mother and the baby's birth weight (p 0.001)

Table 3: Placental Variables and Birth Weight: [N=180]

Placental variable	No %	Birth Weight Mean ± SD	No. of LBW (<2500) (%)	No .of NBW (≥ 2500) (%)
1. Placental weight in (g):				
≤ 500gm	40 (22.2)	2465.2 ± 587.4	23 (57.5)	17 (42.5)
> 500gm	140 (77.8)	2866.1 ± 446.1	27 (19.3)	113 (80.7)
Test value & p value ⟶		**(t =4.653 ; p<0.001)**	**(χ2 =22.646; p< 0.001)**	
2. Placental Diameter (cm):				
≤ 20cm.	52 (28.9)	2554.9 ± 541.9	24 (46.2)	28 (53.8)
> 20cm.	128 (71.1)	2867.2 ± 465.7	26 (20.3)	102 (79.7)
Test value & p value ⟶		**(t =3.885; p<0.001)**	**(χ2 =12.308; P< 0.001)**	
3. Number of Cotyledon:				
≤ 17 Number	56 (31.1)	2598.9 ± 531.7	22 (39.3)	34 (60.7)
> 17 Number	124 (68.9)	2857.4 ± 477.1	28 (22.6)	96 (77.4)
Test value & p value ⟶		t = 0.401;p=0.689	χ2 =1.173; p= 0.279	
		(t = 3.246 ;p=0.001)	**(χ2 =5.366; p= 0.021)**	

Table 3 shows that there was significant correlation found between mean placental weight and birth weight of babies (p< 0.001). Placental diameter was associated with birth weight of babies (p< 0.001). Mothers having numbers of cotyledons < 17, delivered (39.3%) LBW babies and found significant association with birth weight (p< 0.001)

Table 4: **Fetal Variables and Birth Weight:** **[N=180]**

Fetal variable	**No %**	**Mean birth weight ± SD**	**No. of LBW (<2500) (%)**	**No .of NBW (≥ 2500) (%)**
1.Length of Baby in Cms:				
≤ 50	81 (45.0)	2591.0 ± 443.4	32 (39.5)	49 (60.5)
> 50	99 (55.0)	2929.2 ± 508.1	18 (18.2)	81 (81.8)
Test value & p value ⟶		**(t =4.702 ;p <0.001)**	**(χ2 =10.098; p= 0.001)**	
2. Head Circumference in (Cms.)				
≤ 35	160 (88.9)	2714.8 ± 463.5	50 (31.2)	110 (68.8)
> 35	20 (11.1)	3275.0 ± 579.8	00.0 (0.0)	20 (100)
Test value & p value		**(t = 4.949;p<0.001)**	**(χ2 =8.654; p= 0.0.003)**	
3.Apgar Score at 1- minute:				
≤ 7	12 (6.7)	2628.0 ± 635.2	05 (41.7)	07 (58.3)
> 7	168 (93.3)	2787.6 ± 497.9	45 (26.8)	123 (73.2)
Test value & p value ⟶		(t =1.053 ;p=0.294)	(χ2 =1.236; p= 0.266)	
4.Apgar Score at 5- minute:				
≤ 7	11 (6.1)	2676.9 ± 642.1	4 (36.4)	7 (63.6)
> 7	169 (93.9)	2783.5 ± 499.3	46 (27.2)	123 (72.8
Test value & p value		(t =0.674 ;p=0.501)	(χ2 =0.431; p= 0.512)	
5. NICU Admission:				
Yes	26 (14.4)	2777.5± 711.6	9 (34.6)	17 (65.4)
No	154 (85.6)	2776.9 ± 467.7	41 (26.6)	113 (73.4)
Test value & p value ⟶		(t = 0.007;p=0.996)	(χ2 =0.708; p= 0.400)	
6. Fetal distress:				
Yes	18 (10.0)	2822.2 ± 644.3	5 (27.8)	13 (72.2)
No	162 (90.0)	2772.0 ± 492.3	45 (27.8)	117 (72.2)
Test value & p value ⟶		(t = 0.398;p=0.691)	(χ2 =0.000; p= 1.000)	
7.Gender:				
Male	89 (49.4)	2850.5 ± 505.1	20 (22.5)	69 (77.5)
Female	91 (50.6)	2705.1 ± 502.5	30 (33.0)	61 (67.0)
Test value & p value ⟶		**(t = 1.937;p=0.054)**	(χ2 =2.470; p= 0.116)	

Table 4 reveals that crown heel length of baby and head circumference, gender showed significant co-relation with birth weight (p<0.001).

Discussion:

In India, the percentage of newborns with a low birth weight ranges between 25 and 30 percent. [1] In the current study, moms who were older than 25 years, had an education level that was lower than higher secondary, and had a lower family income had a greater number of babies who were born LBW. The research carried out by TS Raghu Ramen et al. [11] found that 64.5% of low birth weight neonates were born to mothers whose families had a monthly income of less than Rs 2000. The research carried out by Sengupta et al. [12] found a strong correlation between LBW and low birth weight. The research that was carried out by Salunkhe and colleagues [13] found that there was a

significant difference in connection to education (p 0.001). According to the findings of the research that was carried out by Chandra S. Metgud [14], maternal illiteracy was the risk factor that was strongly connected with the birth weight of the newborn.

In the current research, it was found that moms who had a history of both preeclampsia and diabetes were more likely to deliver kids with a low birth weight. According to the research carried out by Viswanatha Kumar HM et al.[15] and Fairley L et al. [16], hypertension was found to have a substantial association with newborns having a low birth weight. Pre-eclampsia has been found to have a substantial association with low birth weight in another study that was conducted by Larysa A [17] et al.

In addition, we discovered that there was a strong link between the mean weight of the placenta and the weight of the baby at birth (p 0.001). In the research carried out by Larysa A. et al. [17], it was discovered that there is a very substantial correlation between the weight of the placenta and LBW.

The LBW rate in the current study was 27.8%, which was comparable to the LBW rate identified in the study carried out by Avinash S. et al. [18], in which he discovered 105 (27.6%) LBW newborns.

In the current study, there were a total of 17 premature births, which represents 9.4% of the total. There was a statistically significant correlation between the length of gestation and the weight of the infant at birth (p 0.001), according to the research. According to the findings of a study that was carried out by Theresia B. Temu and her colleagues [19], there is a high prevalence of preterm deliveries, which is equal to 14.2%. An additional researcher, Avinash S. et al. [18], observed that the rate of premature birth was 19.5%.

According to the findings of this study, mothers who had more than one child delivered a higher percentage (29.8%) of babies who were born LBW. According to the findings of a study [20] carried out by Fairley L in Scotland, the presence of many births to the same mother as well as a larger total number of births is a common factor associated with a low birth weight. In a different study that was carried out by Viswanatha Kumar HM et al. [15], the researchers found that 65 percent of low birth weight infants were born to moms who had previously given birth to multiple children.

According to the findings of this research, the anthropometric characteristics of neonates, specifically their crown-to-heel length and head circumference, have a significant connection (p 0.001) with their birth weight. According to the findings of a study that was carried out by Achebe C. Ugochukwu [21] and colleagues, it was discovered that the circumference of the head and the length from the crown to the heel showed a substantial, linear, and positive connection with birth weight (p 0.001).

The **conclusion** of the study was that the risk factors of low birth weight were maternal age, low education and income, any chronic medical conditions, gestational age, and morphometric placental characteristics. According to the findings of this study, there is a strong association between the morphmetric characteristics of the placenta and the birth weight.

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