

MATERNAL FACTORS AFFECTING NEWBORN WEIGHT AT TERM- A STUDY IN A REFERRAL HOSPITAL

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ABSTRACT

BACKGROUND

Maternal factors known to contribute to low birth weight (LBW) include biological factors, nutritional factors, low socio-economic class, poor education, medical and obstetric problems.

The aim and objective of this study was to identify and assess the influences of maternal factors on the neonatal birth weight.

MATERIALS AND METHODS

The present study is undertaken at tertiary care referral centres affiliated to Osmania Medical College, Hyderabad. A total of 100 mothers with live singleton new born babies with gestational age between 37 to 41 weeks and with no major congenital malformations are included in this study. Maternal data of the mothers of these babies is recorded in detail.

RESULTS

The total incidence of LBW in this study came as 26%. Association of low birth weight was assessed with maternal factors. The maternal factors like multiparity, pregnancy induced hypertension and eclampsia was associated with LBW and is statistically significant. The other maternal factors like age, literacy in mothers and maternal diseases associated with pregnancy were not affecting the birth weight in this study.

CONCLUSION

Maternal factors and her nutritional status play a major role in the anthropometry of a newborn baby more so affecting the birth weight. Maternal biological factors which may influence birth weight include parity and pregnancy associated diseases like gestational hypertension and eclampsia.

KEYWORDS

Eclampsia, Low Birth Weight, Maternal Factors, Neonate, Parity, PIH.

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BACKGROUND

Birth weight plays an important role in infant survival, child development, and adult metabolic diseases.^{1,2,3} Intrauterine growth and development is one of the most vulnerable processes in human lifecycle and its aberrations can result in lasting profound influence in later life. In the context of developing countries, intrauterine growth has been invariably assessed by birth weight. The birth weight of an infant is a reliable index of intrauterine growth and also a sensitive predictor of newborn's chances of survival, growth and long term physical and psychosocial development.⁴

Maternal characteristics have been variously shown to impact on the progress and outcome of pregnancy, especially those related to birth weight and perinatal

mortality.^{5,6,7} Such maternal factors like genetic endowment, socio-cultural, demographic, and medical conditions (e.g. hypertension, malaria, urinary tract infections, malnutrition and anaemia) are strongly associated with foetal complications especially low birth weight, prematurity and birth asphyxia all of which act individually or in concert with each other to increase neonatal and infant mortality.^{7,8,9} While it is important to describe the independent effects of different behavioural and socioeconomic risk factors, we must bear in mind that these factors are not isolated events in women's lives, but are a part of many interrelated and complex behaviour and environmental risks. Many of the known determinants of a baby's birth weight are not within a woman's immediate control.¹⁰

The World Health Organization has defined low birth weight at birth as less than 2,500 grams (2.5 kilograms 5.5 pounds) (WHO, 1992). This practical cut-off for international comparison is based on epidemiological observations that infants weighing less than 2.5 kilograms are approximately 25 to 30 times more likely to die than infants with birth weight exceeding this cut-off, and it increases sharply as birth weight decreases.¹¹ Most of the babies born between 37 to 40 weeks weigh around 2500 to 2900 grams. Any baby

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weighing less than 2500 grams is termed "low birth weight" baby. Maternal factors like genetic endowment, socio-cultural, medical conditions (e.g.: - diabetes, hypertension, anaemia, malnutrition, rubella etc.) are strongly associated with low birth weight.

Aim

The present study was undertaken to study association between maternal risk factors and birth weight of a term new born.

MATERIALS AND METHODS

The present study was a hospital based observational study conducted at Niloufer Hospital and Modern Maternity Government hospital which are tertiary care institutes, located in Hyderabad. Both the institutes are affiliated to Osmania Medical College. Data was collected from the randomly selected post-natal mothers with the help of pre-tested semi structured questionnaire till the sample size 100 was achieved. The baby birth weight was taken within half an hour after birth. Mothers were interviewed, and available health records were verified. Consent was taken from the Institutional Ethics Committee before starting up of the study and informed consent was taken from the study population, who are willing to participate. Neonates weighing less than 2.5 kgs (2500 gms) are considered low birth weight in our study.¹¹

Inclusion Criteria

Only the live singleton infants born at 37 to 41 weeks of gestation are enrolled in this study. Only full-term pregnant mothers will be included in the study.

Exclusion Criteria

Those who did not give consent, preterm new born, babies born with major congenital anomalies and twins were excluded.

The data was analysed by preparing master table. Data is analysed by chi square test and represented in the form of p values to know the association between maternal factors and birth weight. The formula for the chi-square statistic used in the chi square test is $X^2 = \sum (O - E)^2 / E$.

RESULTS

In the present study the incidence of low birth weight was found to be 26% which is almost equal to national average i.e. 27%. Mean birth weight of babies was 2.418 kgs. In this study the analysis which was done on 100 randomly selected postnatal mothers is given as follows. 45 out of 100 mothers were anaemic (HB<10 gm %) and 39 mothers suffered from diseases like gestational hypertension, gestational diabetes, oligohydramnios, irritable uterus, PROM etc. Hence in our study we tried to analyse that whether any possible relation is present between the low birth weight in newborns with the diseases associated during pregnancy.

Age	Low Birth Weight	Normal Birth Weight	Total
Less than 20 Yrs.	5	5	10
More than 20 Yrs.	21	69	90
Total	26	74	100

Table 1

At first the age of the mothers was analysed to see whether this parameter was associated with low birth weight of the babies. Maternal ages ranged from 19 to 45 years, with a mean of 24.85 years. The analysis is shown in Table no 1. The chi-square statistic is 3.3264. The p-value is 0.068176. Hence the result is not significant. Thus, in our study it is shown that the age is not associated with the low birth weight neonates.

Literacy	Low Birth Weight	Normal Birth Weight	Total
Illiterate	15	24	39
Primary	8	36	44
Secondary	3	14	17
Total	26	74	100

Table 2

In this study it was found that there is no significant relation between literacy in mothers and the weight of the newborn baby (ref Table no 2). The chi-square statistic for this relation is 5.1621. The p-value is 0.075694. The result is not significant at $p < 0.10$.

Consanguinity	Low Birth Weight	Normal Birth Weight	Total
Yes	10	15	25
No	16	59	75
Total	26	74	100

Table 3

In this study it was found that there is no significant relation between consanguinity and the weight of the newborn baby (ref Table no 3). The chi-square statistic for this relation is 3.3957. The p-value is 0.065366. The result is not significant at $p < 0.10$.

Antenatal Visits	Low Birth Weight	Normal Birth Weight	Total
1-2	3	13	16
3-4	7	20	27
5-8	11	28	39
9-12	5	13	18
Total	26	74	100

Table 4

The chi-square statistic is 0.5653 for the Table no 4. The p-value is 0.904323. The result is not statistically significant.

No. of Pregnancies	Low Birth Weight	Normal Birth Weight	Total
Multi Gravida	15	66	81
Primi	11	8	19
Total	26	74	100

Table 5

Analysis was done to see whether number of pregnancies would affect the outcome of pregnancy in terms of birth weight. The above Table no 5 clearly shows that there is a significant association of multi gravida pregnancies affecting the birth weight of neonates. In the above result the chi-square statistic is 12.4023 and the p-value is 0.000429 which is significant at $p < 0.05$.

Gestational Hypertension	Low Birth Weight	Normal Birth Weight	Total
Yes	3	1	4
No	23	73	96
Total	26	74	100

Table 6

In this study efforts were also done to see for significant association of low birth weight neonatal outcome with gestational hypertension in mothers. The Table no 6 shows a clear association of pregnancy induced hypertension would definitely have an effect over the foetal weight. The chi-square statistic for above result is 5.1997 and the p-value is .022591 which is statistically significant at <0.05 .

Eclampsia	Low Birth Weight	Normal Birth Weight	Total
Yes	5	2	7
No	21	72	93
Total	26	74	100

Table 7

The study also revealed that there is a significant association of low birth weight in neonates born to the mothers suffering with Eclampsia as depicted in Table no 7. The chi-square statistic is 8.0736. The p-value is 0.004491. The result is significant at p-value of < 0.05 .

Anaemia (<10 GMS %)	Low Birth Weight	Normal Birth Weight	Total
Yes	12	36	48
No	14	38	52
Total	26	74	100

Table 8

Anemia in women of child bearing age is common problem in our society. Hence there was an effort made in our study whether there is any possible relation between anemias in pregnant mothers would affect the birth weight of the neonate. In our study however, we could not see any association between these two factors (as in Table no 8) as the p-value is 0.826622 which is not significant at <0.10 . The chi-square statistic for above calculation is 0.048.

Similarly, there was no possible association of low birth weight outcome of pregnancies with other maternal factors like thyroid disorders, oligohydramnios and antenatal visits in our study as shown in the following tables no's 9 and 10. The results for these parameters were not statistically significant.

Thyroid Disorders	Low Birth Weight	Normal Birth Weight	Total
Yes	1	4	5
No	25	70	95
Total	26	74	100

Table 9

The chi-square statistic is 0.0985 for the Table no 9. The p-value is .753663. The result is not statistically significant.

Oligohydramnios	Low Birth Weight	Normal Birth Weight	Total
Yes	1	5	6
No	25	69	94
Total	26	74	100

Table 10

The chi-square statistic is 0.289 for the Table no 10. The p-value is 0.590865. The result is not statistically significant.

DISCUSSION

This study was carried out with an aim to examine and assess the influence of maternal factors affecting the neonatal birth weight in term pregnancy. The main research question is how the socio-economic status of women and the context in which they live affect the birth weight of their babies.

The mean age of the mother was 24.85 years. Our study did not show any statistically significant relation between neonatal birth weights with maternal age. This was in correlation with other studies conducted by Negi et al.¹² However in one study conducted in Taiwan by Jahromi et al,¹³ it was noted that the incidence of low birth weight was more in primi parous older women of more than 40 years. In another study conducted by Parlington et al,¹⁴ it was seen that the low birth weight was more common in teenage pregnancies.

Although there was no direct statistical relation in our study between literacy status of the mother and neonatal birth weight, we have noticed that as educational status of the mother was increasing the incidence of low birth weight was decreasing. A study conducted in Bangladesh with multivariate approach showed that mother's educational status has great influence on birth weight of the baby.¹⁵

Consanguineous marriages, the unions between blood-related individuals with a common ancestor, are still surprisingly prevalent in certain regions of the world, more so in India.¹⁶ Hence in our study we have made some efforts to assess whether there was any association between the consanguinity factor and low birth weight. However, our study did not show any statistical relation in this aspect. In 1980, Rao and Inbaraj,¹⁷ also showed that in 20,000 pregnancies in India there were no differences in anthropometric measures between consanguineous and non-consanguineous marriages. No association was noticed between visits of pregnant women to antenatal clinics with birth weight of a newborn in our study. In a study conducted

by Uche.c, mentions that mothers who had less than 6 antenatal care visits had increased odds for a low weight baby compared to mothers who had at least 6 visits.

In our study, parity has statistically significant association (p -value < 0.05) with regards to birth weight of baby. More mothers delivered babies with birth weight less than 2.5 kgs are multiparous when compared with primi para women. The studies conducted by S. Mukherji et al,¹⁸ Khetua et al,¹⁹ and Bachani et al,²⁰ also showed similar results. One of the most important findings in our study was that there was a significant association of gestational hypertension and complication of PIH (Eclampsia) having adverse effect on the neonatal birth weight. The statistical significance showed a p -value of less than 0.05. Nadkarni et al,²¹ study had similar experiences in their study with an incidence of 51.7% LBW babies in PIH mothers.

The anaemic status of the mother, hydramnios and thyroid disorders got no influence on the birth weight of the baby in this study. However, in studies conducted by Khetua et al,¹⁹ S. Pachauri et al,²² and Shanti Ghosh et al,²³ it was concluded that maternal haemoglobin played a important role in the neonatal birth weight. In a systemic review and meta-analysis conducted by Gin Chiu et al,²⁴ it was concluded that hyperthyroidism in pregnancy was associated with a higher increased risk of LBW infants compared with normal thyroid function in pregnancy, whereas, no association was found between LBW newborns and maternal subclinical hyperthyroidism or hypothyroidism.

CONCLUSION

The present study revealed an incidence of 26% of low birth weight. This is in correlation with the national average and also with UNICEF report.²⁵ This study helps in understanding the social and biological factors of pregnant women influencing the neonatal birth weight. Although the cohort of this study was small, yet the study has analysed the effects of maternal factors on the newborn weight effectively. The study revealed an association of multi-gravida pregnancy having an adverse effect on the birth weight of newborn. Similarly, the study also established a relation that gestational hypertension and eclampsia in pregnant mothers are among the causes leading to low birth weight.

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