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The Pharma Innovation

ISSN: 2277- 7695
TPI 2016; 5(7): 54-57

www.thepharmajournal.com
Received: 12-05-2016
Accepted: 13-06-2016

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Study of influence of maternal age, parity and haemoglobin on neonatal birth weight

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Abstract
Conception and motherhood are the most beautiful and unique experiences for women in a lifetime. Normally growth and development of fertilised ovum in utero continues to maturity till 40 weeks. This growth is controlled by a multiplicity of factors. In both underdeveloped and developing countries, the problem of LBW's is alarming and it is an important factor affecting neonatal mortality and childhood morbidity.
Aims and Objective: The Aim of the study is to find out some maternal factors affecting the neonatal birth weight
Material & method: Study was done in obstetrics wing of LLRM Medical College and SVBP hospital, Meerut. The antenatal mothers having 2 nd half of pregnancy who knew their LMP are the case study cases. But those suffering from chronic diseases hampering the physiological process such as maternal malnutrition, infections, hypertensive disorders, and toxaemia of pregnancy, haemolytic diseases, multiple pregnancy and diabetes were excluded from the study. Neonates with congenital malformation and haemolytic diseases were also excluded. Only 100 singleton pregnancy delivering in the hospital were taken. The results are tested statistically Chi-square test, to test the difference of two proportions. In our study the critical age of mother is 17-20 years and ≥ 36 years for LBW (33.33%).The incidence of LBW is 30%. Most of LBW's weight between 2100-2400 gms. Multiparity (parity≥4) delivered maximum number of LBW. Critical level of hemoglobin is ≤ 7.5 gm/dl for delivery of 62.5% of LBW. Significant link is found between maternal hemoglobin and neonatal birth weight.

Keywords: LBW - Low Birth Weight, NBW - Normal Birth Weight

1. Introduction
Birth weight is the most important determinant of prenatal, neonatal and post-natal out comes so the purpose of the study is to find out the maternal factors that could confound or modify the neonatal birth weight and to determine whether the result of the research would be helpful for the obstetricians to change the guidance for the maternal factors to have fruitful neonatal birth weight.
The best available global estimates of the prevalence LBW were produced by WHO in 1980. The highest were reported from Asia, with LBW rates ranging from 30-40% in the Indian subcontinent and 5-6% in China and Japan. Lowest LBW rates were reported from North America and Europe with rates in the range of 4-8%. LBW infants have an increased risk of developing cerebral palsy [1].
On the other end of the scale high birth weight more than 4 g are also at a higher risk for adverse outcomes including motility, meconium aspiration, clavicular fracture, brachial plexus injury and birth asphyxia [2].
Of the various factors influencing the birth weight of the new born, maternal factors constitute and important group and rank high when priorities are assigned for tackling the problems of LBW in underdeveloped countries the resources are limited for tackling the maternal factors simultaneously.

2. Review of Literature
Studies by Arora *et al.*, Karn and Penrose, Achar and Yankauer and Mukherjee & Bishwas showed a rise in the birth weight with a rise in parity. Trivedi CR and Mavalankar 1986 on 489 births delivered at Sheth Chinai maternity home Ahmedabad showed that mother's weight is significantly associated with birth weight. Younger mother having given birth to more of LBW babies. Bhargava *et al.* showed 38.5% incidence of LBW in primies as compared to 19.9% in multiparae.
Kamaladoss *et al.* 1992 found that the LBW rate was high for parity 1 (36.8%) as compared to parity 3 (15.3%).

Steer *et al.* in 2000 studied a large database (data on 1, 53, 602 pregnancies, collected in the North West Thames region of London between 1988-1991) recorded the lowest hemoglobin concentration measured in each pregnant woman during her pregnancy (usually at 28 weeks) to discover the values associated with the largest infant birth. The highest mean birth weight (less than 2.5 kg) occurred in association with the hemoglobin concentration of 9.52-10.5 gm/dl.

3. Methodology

The study was done in the collaboration with the department Obstetrics wing of LLRM Medical College and associated SVBP hospital Meerut. The study was done in cases that attend the antenatal clinic of SVBP hospital and booked cases that delivered in obstetric department retrospectively. The prior approval of the ethical committee was taken for the conduct of the study. The subject for our study were

- Mothers who came for delivery to SVBP hospital(Singleton pregnancies)
- Their baby's (Live born babies) birth weight
- Mothers age, gravidity and parity and their hemoglobin estimation were tested by Sahili's hemoglobinometer method. Blood was collected in hemoglobin pipette and N/10 HCl was added to it, after few minutes it was diluted and the resulting mixtures was compared with the standard.
- Delivery data means mode of delivery (spontaneous normal vaginal or forcep or caesarean section). Neonatal birth weight was measured to the nearest of 20 gm on a standard weighing machine 10 kg calibration, the accuracy of which was checked from time to time. All the observation in the study were evaluated statistically by Chi-Square test ($\chi 2$ test) to test the difference of the two proportions.

4. Result & Discussion

The incidence of LBW was 30% taking 2.5 kg as standard for LBW in the study as per data from the obstetric wing of SVBP hospital, LLRM medical college, Meerut

Table 1: Influence of Maternal Age on Neonatal Birth Weight

Maternal Age(Years)	LBWs		NBWs		Total No. Of Cases	LBW%	NBW%
	No	%	No	%			
17-20	2	6.67	4	5.71	6	33.33	66.66
21-25	7	23.33	18	25.72	25	28	72
26-30	11	36.67	25	35.71	36	30.56	69.44
31-35	8	26.66	19	27.14	27	29.63	70.37
≥ 36	2	6.67	4	5.71	6	33.33	66.67
Total	30		70		100		

X^2 (1) = 0.02

P>0.05 Statistically insignificant incidence of LBW.

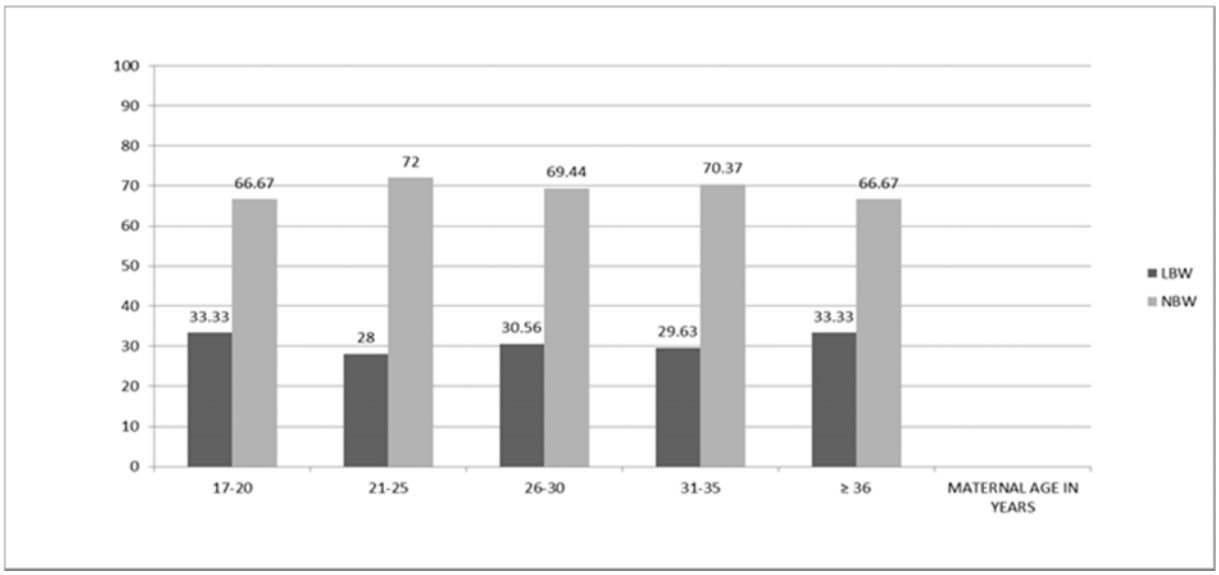

Chart 1: Influence of Maternal Age on Neonatal Birth Rate

Table 2: Influence of Maternal Parity on Neonatal Birth Weight

Parity	LBWs		NBWs		Total No Of Cases	LBW%	NBW%
	No	%	No	%			
PRIMI	12	40	31	44.29	43	27.91	72.09
2nd	8	26.67	17	24.29	25	32	68
3rd	3	10	11	15.71	14	21.43	78.57
≥ 4	7	23.33	11	15.71	18	38.89	61.11
Total	30		70		100		

X^2 (2) = 0.16

$p \geq 0.05$

Statistically insignificant

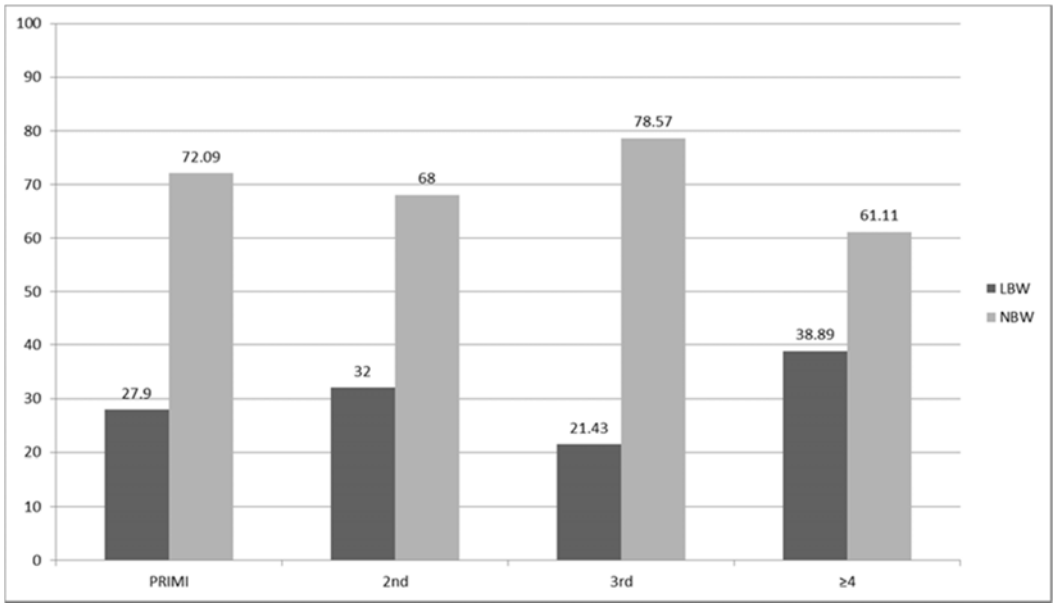

Chart 2: Influence of Maternal Parity on Neonatal Birth Weight

Table 3: Effect of Maternal Hemoglobin on Neonatal Birth Weight

Hemoglobin /dl	LBWs		NBWs		Total No. Of Cases	LBW%	NBW%
	No	%	No	%			
≤ 7.5	5	16.67	3	4.29	8	62.50	37.50
7.6-10.0	15	50	28	40	43	34.88	65.12
10.1-12.5	7	23.33	34	48.57	41	17.07	82.93
≥ 12.6	3	10	5	7.14	8	37.50	62.50
Total	30		70		100		

X^2 (1) = 4.21
p<0.05
Statistically significant

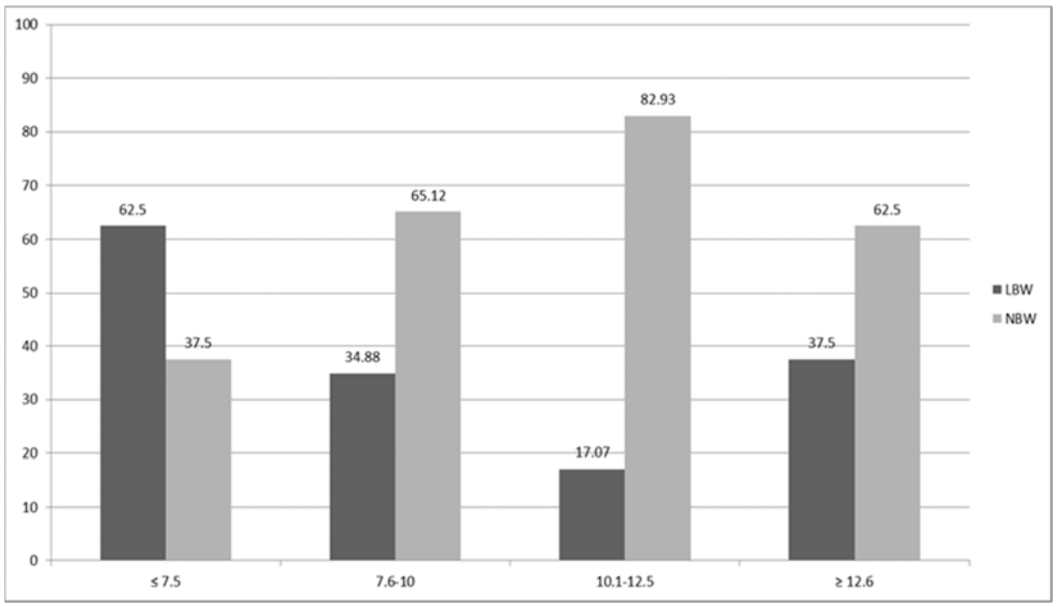

Chart 3: Effect of Maternal Hemoglobin on Neonatal Birth Weight

5. Discussion

The study revealed that an association of LBW babies (30%) with maternal age, though the incidence of LBW babies was higher in maternal age group of ≤ 20 years and ≥ 36 years (33.33%) as reflected in table 1. This association was statistically insignificant (p>0.05)

The literature is revealing conflicting report about the significance of maternal age and birth weight of the babies. Some workers found insignificant, but majority found significant association. The present study is in accordance with the results shown independently by Abolins (1981) [7], Mc Keown and Gibson whose study indicated that maternal age has

practically no influence on the birth weight.

Our study did not match with the studies independently carried out by Mills & Seng, Fraccaro, Paul and Ahluwalia found that younger mothers (15-20) had smaller babies as compared to others. Saigal & Srivastava, Trivedi CR & Mavalankar (1986) [3], Pachuri & Marwah (1970) [10], found that multiparity increased the risk of LBW. They showed that of the various factors influencing the birth weight, maternal factors particularly maternal age constitute an important group and rank high when priorities are assigned for tackling the problem of LBW in underdeveloped countries where LBW incidence is high and resources are limited.

The study revealed a decreasing pattern of incidence of LBW with maternal anemia from sever to normal grade. Maximum LBW incidence (62.55%) (Table 3) is found in severely anemic mothers and decreases approximately half to moderately anemic mothers. But the incidence again increased (37.5%) in mothers with hemoglobin levels more than 12.6 g/dl suggestive of rale of other maternal factors besides hemoglobin. So an inverse relationship had been expressed between maternal hemoglobin and LBW babies. Such an association was found to be statistically significant ($p \leq 0.05$). most of the literature available are coinciding with present study Ankegowda & Sumitra (1976) [11], Shah & Shah (1979) [12] in different studies independently emphasised that out of many factors effecting fetal nutrition to the neonatal birth weight, maternal nutrition is the most vital factor.

The data in our present study are in partial agreement with the study of Steer (2000) [6] in the Indian scenario. It may be due to dietary hygienic presence of infection infestations might be responsible for such differences under Indian and Western studies.

6. Conclusion

1. In our study the critical age of mother is 17-20 years and ≥ 36 years for LBW (33.33%)
2. The incidence of LBW id 30%. Most of LBW's weight between 2100-2400 gms.
3. Multiparity (parity ≥ 4) delivered maximum number of LBW.
4. Critical level of hemoglobin is ≤ 7.5 gm/dl for delivery of 62.5% of LBW.
5. Significant link is found between maternal hemoglobin and neonatal birth weight.

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