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Research article

IMPACT OF MATERNAL RISK FACTORS ON THE INCIDENCE OF LOW BIRTH WEIGHT NEONATES IN SOUTHERN INDIA

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ABSTRACT

Introduction: Birth weight is recommended as one of the twelve global indicators for monitoring the health of the community and is an important determinant of adverse perinatal and neonatal events. LBW infant carries five times higher risk of dying in the neonatal period and three times more in infancy. **Aims and Objectives:** To estimate the incidence of LBW and impact of various maternal and biosocial factors on the incidence of LBW neonates in the study population. **Material and methods:** This prospective observational study was carried out in Princess Esra hospital, a tertiary care hospital in south India, over a period of six months. All consecutive LBW (single ton) neonates admitted to the neonatal intensive care unit were enrolled, while those born of multiple gestation and those with major congenital malformations were excluded. **Results:** A total of 300 neonates were included in the present study out of which 150 were LBW and 150 weighed ≥2500 gm. Higher maternal weight (>60kgs) had low incidence of LBW neonates (p value-0.03). Illiterate women had a remarkably higher incidence of LBW babies (p value-0.001). In primigravida incidence of LBW was 61.2%. Higher incidence of LBW was seen in mothers with oligo hydramnio's. **Conclusions:** This study showed that maternal age, weight, literacy level and parity have a significant influence on the incidence of LBW. Incidence of LBW neonate in the study was 50%. Risk of having LBW neonates was higher in primigravida. There was a significant association between LBW with oligo hydramnio's and female gender.

Key words: Low Birth Weight, Neonate, Maternal weight, Age, Parity.

INTRODUCTION

The essential newborn care has been a challenge to the pediatrician, more so the care of low birth weight neonates. Birth weight is the single most important marker of adverse perinatal and neonatal events. Low birth weight (LBW) is defined by WHO as birth weight <2500gms irrespective of gestation13. Recognizing the importance of birth weight measurements 34th world health assembly in 1981 recommended it to be one of the twelve global indicators for monitoring health of the community[1, 2]. Low birth weight accounts for 70% of all perinatal and 50 % all infantile deaths. A low birth weight infant carries five times higher risk of dying in the neonatal period and 3 times more in infancy[3].According to WHO global estimates, out of 25 million low birth weight neonates born each year, which consisted 70% of all live births nearly 95% of them are found to be in developing countries of

which 26% of all the live births in india[4]. Birth weight is governed by two major processes; duration of gestation and intrauterine growth rate. Thus LBW is caused either by premature delivery or retarded intrauterine growth (or a combination of both). Prematurity is usually defined as a gestational age less than 37 weeks. The causes of LBW are multifactorial and the birth weight is determined by the interaction of the both socio-demographic and biological factors. [5]Many socio-biological factors have been postulated to determine the birth weight of the newborn. The causes are classified into three broad categories. Firstly, maternal causes in which maternal age, weight, height, education, socioeconomic status, ethnic differences, parity, birth spacing and dietary intake are the factors. Secondly, placental causes that includes: Fetoplacental and uteroplacental insufficiency. Lastly, Fetal causes: Normal Small Fetuses, fetal infection and fetal abnormalities. Other factors that might have an impact on the incidence of LBW are antenatal care, maternal smoking, hard manual labor, genetic factors, and sex of the neonate. The effect of these factors has been shown to be dependent on the geographic location of study[6].

MATERIAL AND METHODS

The current study was a Hospital based prospective observational study carried in Dept. of pediatrics in princess esra hospital, Deccan College of medical sciences, Hyderabad, Andhra Pradesh, India, over a period of six months. A total of 300 neonates were included in the present study, out of which 150 were LBW and 150 weighed ≥2500gms. All relevant maternal and neonatal data was documented on a predesigned and pretested structured Performa. Maternal details like maternal age, height, weight, parity, consanguinity and maternal hemoglobin were recorded after obtaining informed consent from the parents. Demographic details like maternal occupation, education, socioeconomic status, community and paternal age were noted. Numbers of antenatal checkups as well as antenatal complications were documented. Delivery details and neonatal details such as mode of delivery, gender of the neonate, birth weight and gestational age were documented. All consecutive LBW (singleton) neonates admitted to the neonatal intensive care unit were enrolled, while those born of multiple gestation and those with major congenital malformations were excluded.And Gestational age was assessed from last menstrual period of the mother and by using new Ballard scores in the neonate. Kuppuswamy's scale[7] was used to assess the socioeconomic status of the mother. All consecutive low birth weight (singleton) neonates admitted in the neonatal intensive care unit were enrolled, while those born of multiple gestation and those with major congenital malformations were excluded. This study involved the procedures which were very simple, using the instrument available in the hospital which did not cause any undue distress to the babies or mothers. Moreover, all the investigations were necessary. However a verbal consent was obtained from institutional ethics committee as well as from the enrolled subjects.

Data analysis: Epi info 2000 and SPSS version 10software were used to obtain the statistical results. Odds ratio, with confidential interval for various risk factors of LBW were done. Chi square test was used for calculating P value and was considered significant if < 0.05.

RESULTS

During this observational study, a total of 300 neonates were included out of which 150 were LBW and 150 weighed ≥2500 grams. Incidence of LBW was 50 %. Maternal age ranged from 13 to 35 years and was classified into 3 groups as <20 years, 20-29 years and >30 years.

Mothers in the age group of 20-29 had given birth to babies with birth weight >2500 grams, which was statistically significant as shown in (fig 1). This group was further divided into two age groups of 20-24 and 25-29 years. In this division statistical significance was found in maternal age group of 25-29 years (p-value: 0.028). Higher maternal weight had higher birth weights which showed statistical significance (p-value: 0.03). The P value was significant in mothers weighing >60 kg (fig 2). However, maternal height did not influence the incidence of low birth babies.

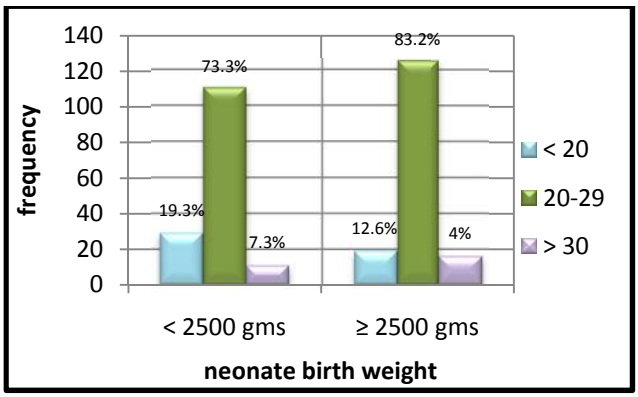

Fig 1: Correlation between maternal age and neonate birth weight.

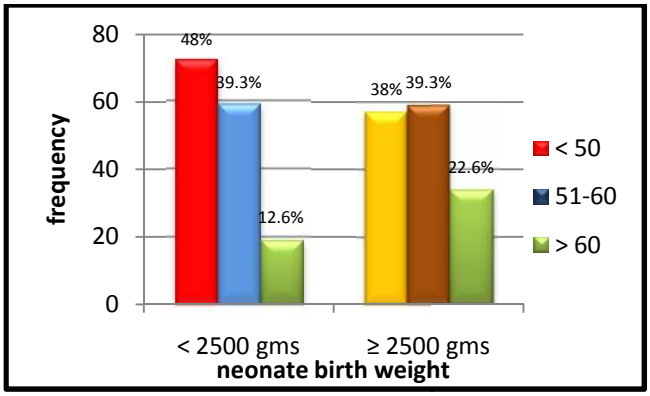

Fig 2: Influence of maternal weight on neonate birth weight.

Lower birth weights were seen in neonates of manual laborers with an incidence of 65.3%which had a trend towards statistical significance (p-value: 0.07). Working women with professional occupation had significantly higher number of normal birth weight babies.

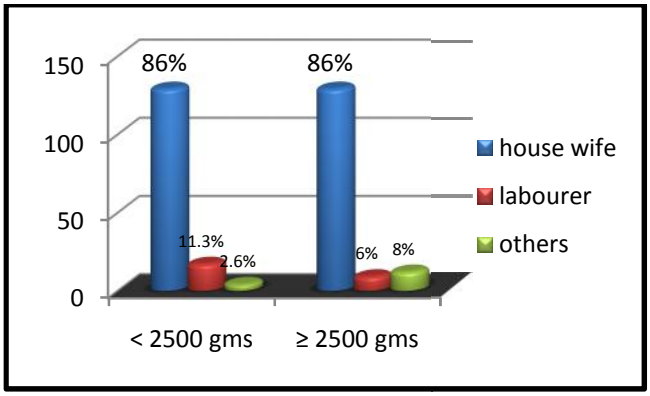

Fig 3: Impact of maternal occupation on neonate birth weight.

Maternal education ranged from illiteracy to graduation. Maternal education was divided into three groups as illiterates, primary education, and secondary education and above. Illiterate women had a higher incidence of LBW babies which had statistical significance.

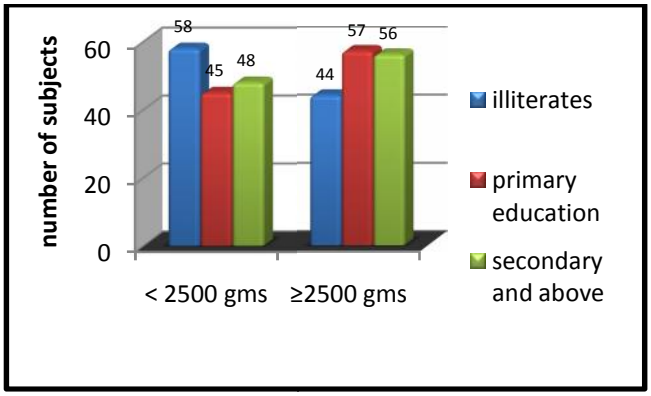

Fig4: Educational status of mother and its influence on neonate birth weight.

The mothers in this study were divided into four classes according to Kuppu swami scale taking into consideration of maternal education, occupation and family income[6]. Most of the mothers were in socio economic class III. There was a higher incidence of LBW in class IV though there was no statistical significance. As the socioeconomic status improved the birth weights increased. Parity ranged from 1-5 and was classified into three groups as Primigravida, Multigravida and Grand Multi. There was a higher incidence of LBW in primigravidas (p-value: 0.003).

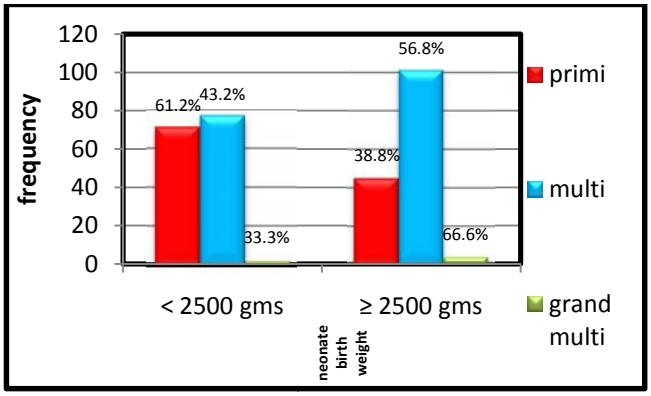

Fig 5: Parity distribution in neonate birth weight

As the parity increased incidence of LBW decreased. In primigravidas the incidence of LBW was 61.2%. Whereas in Multigravida the incidence was 43.2 %, which was significant statistically (p-value: 0.006). Higher incidence of LBW was seen with oligo hydramnios during pregnancy. Out of 21 mothers with oligohydramnios, 18 had LBW neonates (18/21=86%). This was statistically significant with a p value-0.001. Odds ratio was 6.7. As the study was done in a tertiary level, all the modes of delivery were noted. Cesarean included both emergency and

elective. Vaginal deliveries included spontaneous, episiotomy and forceps deliveries. A higher incidence of LBW was seen in caesarean section delivery compared to vaginal mode. Among 168 caesarean section, 41.6% were low birth babies and among 132 vaginal deliveries 60.6% were low birth weights which showed statistical significance (p-value: 0.001). Male babies were higher in number compared to female babies in this study. Among male babies 45.1 % were LBW and among female babies 55.9 % were LBW. There was a trend towards a lower incidence of LBW in male babies (p-value: 0.08).

Number of antenatal checkups ranged from 0-12. Mothers were classified into three groups- who did not have any antenatal checkups, who had 1-3 ante natal checkups and those with 4 checkups and above. Among the mothers who did not have any antenatal checkups the incidence of LBW was 48.6%. Among those who had more than 4 checkups the incidence was 48.6 %. There was no statistical significance between number of checkups and birth weight. The difference between 4 or more antenatal checkups and those who did not have any checkups was nearly insignificant. There was no correlation between birth weight and paternal age. No association was noted for consanguinity with birth weight.

DISCUSSION

LBW is one of the most serious challenges in maternal and child health, especially in developing countries like India. LBW neonates are at risk of both short term (immediate) neonatal morbidity as well as long term neonatal morbidities. Short term neonatal complications include metabolic derangements like hypoglycemia, hypocalcaemia, hypomagnesaemia and infection related consequences like meningitis, bone and joint infections. Long term consequences like cerebral palsy, hearing deficits and ocular abnormalities are also highly prevalent in LBW neonates[8]. These LBW neonates are at high risk of mortality due to anatomical and functional immaturity of various body organs. The present prospective study was undertaken to estimate the incidence and determinants of LBW, as majority of the published studies were retrospective in nature. Maternal age had a significant influence on the incidence of LBW in the current study. Mothers aged between 20-29 years gave birth to neonates with normal birth weight. Subgroup analysis showed a significantly lower incidence of LBW neonates among mothers aged between 25-29 years. This study was similar to a study done by K.D as and Ganguly et al where the higher birth weight of neonates was found in mother's aged 25-29 years[9]. Similarly maternal weight and neonatal birth weight showed a positive relationship on linear regression analysis. As the weight of the mother increased the birth weight of the babies increased. These findings were similar to a study done by Sushma Malik et.al.[3]Maternal height and father's age did not have any influence on the neonatal birth weight in our study. Mothers who were manual labors had higher incidence of LBW neonates. This was similar to the study by Saroj Pachauri and Marwah et al [6, 10.] Illiterate mothers had significantly higher incidence of LBW neonates, Illiteracy is usually associated with poverty and maternal malnutrition, hence may be associated with higher incidence of low birth weight neonates. This was supported by the study carried out by SarojPachauri and S. M. Marwah et. al[6, 10]. However, on linear regression analysis, a higher socioeconomic status was associated with a lesser incidence of low birth weight. This was similar to a study done by N. Sreekumaram Nairetal[11]. Statistically, there was no association between neonatal birth weight and community and also there was no significant association between consanguinity, number of antenatal checkups and low birth weight. This shows that the number of antenatal checkups is not the only criteria, but also the quality of antenatal care. There was a significant association between parity and Birth weight. A Multiparous woman is likely to have neonates with higher birth weights. With successive pregnancy, neonatal birth weight increases till 4th pregnancy. Studies done by SushmaMalik[3], D.K. Mukherjee et al and N.J. Sethna et.al[12]also showed similar results. In this study, mothers with systemic diseases and obstetric complications were also included. Subjects with systemic diseases were less and did not impart any significance. However, patients presented with obstetric complications like pregnancy induced hypertension (PIH), oligo hydramnios, ante partum

hemorrhage (abruption and placenta pravia) and premature rupture of membranes showed significant influence on the incidence of LBW. Out of 21 mothers with oligohydramnios, 18 had LBW neonates (18/21=86%). This was statistically significant with a p value-0.001, of LBW babies. The incidence of LBW neonates was 80% with maternal ante partum hemorrhage (APH), 66% with maternal premature rupture of membranes and 59% with maternal pregnancy induced hypertension PIH. However, it was not statistically significant. According to WHO, hemoglobin<11 gm % is considered as anemia during pregnancy. In India Hb < 10gm % is considered as anemia in pregnancy[11]. Taking this into consideration, 18 % of the mothers were anemic. There was no significant association between maternal hemoglobin percentages with neonatal birth weight. On statistical analysis a significant association was found between birth weight and mode of delivery, with statistically significant value in the caesarean group. As majority of the mothers with antenatal complications underwent caesarean section and gave birth to LBW babies, caesarean section was associated with a higher incidence of LBW. Male neonates had higher birth weights when compared to female neonates and hence lower incidence of LBW babies, which was similar to a study done by Makhija k and Murthy et al [6.13.] As male fetuses grow faster than female fetuses, the incidence of LBW is lower in male fetuses.

CONCLUSION

This prospective study was conducted to determine the impact of various maternal and bio social factors on the incidence of low birth neonates. There was a remarkable relation between maternal weight, age, parity and neonatal birth weight. Neonatal birth weight is positively influenced by maternal weight and parity. Maternal age between 20-29 years was significantly associated with normal neonatal birth weight. Mothers who were manual laborers had higher incidence of low birth weight babies. Risk of LBW was higher in primigravida. There was a significant association between LBW and oligohydramnios. Female neonates were more prone to low birth weight than male babies as male fetuses grow faster than female fetuses, the incidence of LBW is higher in female fetuses. Paradoxically the number of antenatal checkups did not have any significant influence on the neonatal birth weight. Maternal height, education, socioeconomic class, paternal age, community and consanguinity also did not have any significant impact on the neonatal birth weight in the current study.

Strengths & limitations: This study being a prospective observational study has the advantages of any prospective study.

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Conflict of interest: Authors declare no conflict of interest in with regard to this article**.**

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