Original Research Article

Comparative study of maternal socio-demographic factors and low birth weight of new-borns at a tertiary care hospital in Chennai, India

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Abstract

Introduction: Birth weight is an important indicator of a child's vulnerability to the risk of childhood illness and chances of survival. LBW results in a corresponding perinatal mortality. The identification of factors contributing to LBW is therefore of paramount importance. Low birth weight is a term used to describe babies who are born weighing less than 2,500 grams (5 pounds, 8 ounces). In contrast, the average newborn weighs about 8 pounds. Over 8 percent of all new-born babies in the United States have low birth weight. The primary cause is premature birth, being born before 37 weeks gestation; a baby born early has less time in the mother's uterus to grow and gain weight, and much of a fetus's weight is gained during the latter part of the mother's pregnancy. Another cause of low birth weight is intrauterine growth restriction. This occurs when a baby does not grow well *in utero* because of problems with the placenta, the mother's health or birth defects.

The aim of the study: To study the prevalence of low birth weight babies and to study the various socio-demographic factors associated with low birth weight.

Materials and methods: The present cross-sectional study was undertaken at Sree Balaji Medical College and Hospital in the year of 2015- 2016. Totally 100 babies were selected. In this study, all singleton new-born having a weight of <2.5kg was included as a case (n=50) and a weight of ≥2.5kg was included as a control (n=50). The relation of birth-weight to few maternal factors such as age, socio-economic status and occupation were studied.

Results: Our Study showed that the greatest number of mothers having LBW newborns was in the age group of 23 to 27years belonged to the low socio-economic group. The study finding showed maternal age, fetal sex, parity, number of antenatal care, gestational age, birth order, and history of abortion had an insignificant association with low birth weight (P-value <0.05). It was found that 70% of LBW babies were born to mothers who belonged to the labour class by occupation.

Conclusion: This study depicted that low birth weight is a public health problem in the study area. Hence, attention should be given to increase community awareness of antenatal care service, access to family planning, prevention of abortion and community mobilization to prevent early pregnancy. This study concluded with the findings that maternal factors like age, socio-economic status, religion and occupation of the mothers were related to LBW of the new-born improving the socio-economic status (SES) of people and providing better working.

Key words

Low Birth Weight (LBW), Socio-Economic Status, Early Pregnancy, Maternal Risk Factors.

Introduction

Preterm birth is the most common direct cause of newborn mortality. Preterm birth and being small for gestational age (SGA), which is the reasons for low-birth-weight (LBW), are also important indirect causes of neonatal deaths. LBW contributes to 60% to 80% of all neonatal deaths [1]. The global prevalence of LBW is 15.5%, which amounts to about 20 million LBW infants born each year, 96.5% of them in developing countries. Countries can reduce their neonatal and infant mortality rates by improving the care for the mother during pregnancy and childbirth of LBW infants [2]. The series of documents on II integrated Management of Pregnancy and Childbirth (IMPAC) provides practical guidance to health workers and the recent WHO guidelines. Optimal feeding of a low-birth-weight infant contains recommendations on what to feed when to feed and how to feed an LBW new-born. As per the WHO estimates, globally about 25 million LBW babies are born each year, nearly 95% of them in the developing countries [3]. According to the UNICEF estimate, almost every third new-born (30%) in India is LBW. The NFHS-3 reported the proportion of LBW babies about 23% for rural and 19% of the urban population. As per NFHS-3 data, the infant mortality rate is 49/1000 live birth for an average or large size baby, but it is 62/1000 live birth for a smaller than average baby and 129/1000 live birth for a very small baby. Experience from developed and low and middle-income countries have clearly shown that appropriate care of LBW infants, including their feeding, temperature maintenance, hygienic cord and skin care, and early detection and treatment of infections and complications including respiratory distress syndrome can substantially reduce mortality [4]. Interventions to improve care during pregnancy, childbirth and the postnatal period, as well as feeding, are likely to improve the immediate and longer-term health and well-being of the individual infant and have a significant impact on neonatal and infant mortality at a population level [5]. There are numerous factors contributing to LBW, both maternal and fetal. The maternal risk-factors are biologically and socially interrelated, most are however modifiable. Important among them are maternal malnutrition, infections, unregulated fertility, teenage pregnancy, low weight and height of the mother, poor BMI, high parity, lack of antenatal care, the presence of anemia, bad obstetrical history and medical condition of the mother, smoking during pregnancy, hypertensive disorders in pregnancy [6]. While recognizing that etiology of low birth weight is multi-factorial; with genetic, placental, fetal and maternal factors interplaying with each other; emphasis is given to those maternal factors that are amenable to change in short term. It is generally assumed that prevention of LBW results in a corresponding reduction in perinatal mortality. The identification of factors

contributing to LBW is therefore of paramount importance. The frequency of low birth weight reflects in a simple and comprehensible manner [7, 8].

Materials and methods

The present cross-sectional study was undertaken at Sree Balaji Medical College and Hospital in the year of 2015- 2016.Totally 100 babies were selected. In this study, all singleton new-born having a weight of <2.5kg was included as a case and a weight of ≥2.5 kg was included as a control. All the consecutive mothers delivering LBW child and normal weight child were included in our study. After selection of an LBW case as defined, the next available newborns that could have fulfilled the criteria for controls were recruited in the sample to ensure a case: control ratio of 1:1.Case (Group:1): Low birth weight children; infants with birth weight less than 2500 gm are low birth weight, irrespective of the age of gestation.Control (Group:2): Normal Birth Weight (NBW): Infant birth weight ≥2500 gms. Case group Control: 1:1, age and sex matched.

Inclusion criteria

- Women with completed 6th months of pregnancy
- Women agreed to follow the intervention protocol during 3rd trimester
- Pregnant women supposed to be delivered at PHC.

Exclusion criteria

- Mothers who did not give consent
- Mothers who were not available for giving information
- Mothers having multiple births.

A questionnaire specially designed to collect information on variables relating to the study was used. A pilot study was conducted to test the feasibility and validity of the questionnaire, and necessary corrections were incorporated. The mothers with LBW and NBW neonates were also interviewed. General physical examination was performed for all mothers with LBW and NBW neonates. Anthropometric measurements of mothers height and weight were measured while the women wore light outer garments, but not shoes. Weight gained during pregnancy was calculated by subtracting the weight of the mother before pregnancy or weight at ≤12 weeks of gestation, from her weight at labor. Body mass index (BMI) was calculated as weight divided by height in meter squared (kg/m2) using her weight before pregnancy or ≤12 weeks of gestation. Eligibility Criteria for both the cases and controls were to deliver a live newborn weighing less than 2500 gms and weighing 2500 grams or above. Mother of babies with birth weight of 2500 grams who were born consecutively after each case constituted the control group. All the babies were weighed within one hour after birth. The nursing staff of the Labour Room was specially trained to record the birth weight of the newborns using the digital weighing scale.

Data analysis

SPSS software version 18.00 was used. The collected data were cleared and checked again and analyzed using descriptive statistics, t-test, ANOVA. This test was used in order to compare the mean birth weight.

Results

The above table shows the age distribution of pregnant mothers included in the study. Age distribution was categorized as 4 categories.

Up to 20 years in cases group was around 13 (8.3%) and in controls were around 17 (9.8%) were found to be statistically significant. Of p value<0.001**

Age group of mothers between (21-30) years in the case group was 20 (12.5%) and in controls were around 15 (8.2%) were found to be statistically significant. Of p value<0.001**

Age group of mothers between 30-35 years in case group was around 10 (6.3%) and the control group was 13 (8.3%) were found to be statistically less significant. p value<0.005*.

Above 35 years in the case of the group was around 7 (4.2%) and in control group 5 (3.3%) were found to be statistically less significant <0.005* (**Table – 1**).

Table - 1: Distribution of mothers according to age in the both groups.

Age group (years)	Cases (%) (n - 50)	Controls (n - 50)	P value
Up to 20	13 (8.3%)	17 (9.8%)	<0.001**
21-30	20 (12.5%)	15 (8.2%)	<0.001**
30-35	10 (6.3%)	13 (8.3%)	<0.005*
Above 35	7 (4.2%)	5 (3.3)%	<0.005*

Table – 2: Anthropometric measurements of neonates at birth.

Parameters	NBW (n=50) Control –A Group	LBW (n= 42) case B [1] Group	VLBW (N= 8) case B [2] Group	P value
Weight (kg)	3.82±0.3	2.3±0.1	1.33±0.12	<0.0001**
Height (cm)	41.83±3.82	39.17±0.98	32.65±0.34	<0.0001**
Head circumference (cm)	29.12±7.6	26.73±2.8	22.37±3.82	<0.087

(NBW = Normal birth weight, LBW = Low birth weight, VLBW = Very low birth weight)

Table – 3: Category of nature of work of pregnant women in the study population.

Category of work	Control group (%) (n= 50)	Cases (%) (n=50)	P value
Class –A	5(4.0%)	1 (0.1%)	<0.0001**
Class -B	18(15%)	5 (4.0%)	<0.0001**
Class -C	20 (16%)	24 (19.3%)	<0.0001**
Class –D	7(5.3 %)	20 (16.3%)	<0.0001**

Table - 2 shows the Anthropometric measurements of neonates at birth. The weights of the neonates were divided into three categories such as NBW = Normal birth weight, LBW = Low birth weight, VLBW = Very low birth weight. The weight of the neonates in control group is around (3.82±0.3), in case group LBW was around (2.3±0.1) and very low birth weight was around (1.33±0.12) of p-value <0.0001** which was found to be statistically more significant. Height was around (41.83±3.82) in control group, in LBW the height was found to be (39.17±0.98) and in VLBW height was around (32.65±0.34) p-value <0.0001**which was found to be statistically more significant. Head circumference was around (29.12±7.6) in control group, in LBW the height was found to be (26.73±2.8) and in VLBW height was around (22.37±3.82) p-value <0.087which is found to be not statically significant.

The category of work of both control and case group showed a statistically significant value among the study population in the control group and cases (n=100). Class C worker was found to be more 20 (16%) and 24(19.3%) as per **Table - 3**.

Discussion

Prevalence of low birth weight in the present prospective study, an attempt has been made to understand maternal factors that influence the birth of LBW infants in the KSA. As mentioned, there are not many studies pertaining to the birth of LBW infants in the KSA or the Middle Eastern region, and hence, comparison of the results has to be made with similar studies predominantly from the Western countries [9]. The gestational age of LBW, VLBW, and ELBW infants were 36, 32.7 and 29.5 weeks,

respectively. These results demonstrate that the infant's birth weight diminished with a decrease in their gestational age. These results are slightly higher than those of Madhavan S, et al. who has reported that GA for VLBW was 28.5 to 30.9 weeks, and for ELBW was 24.8 - 27.6 weeks. Other researchers have merely reported that GA for LBW is less than 37 weeks. Factors associated with low birth weight (LBW), often termed as 'risk factors', and their presence in an individual woman indicates an increased chance, or risk, of bearing an LBW infant [10]. In the present case-control study from a rural area, age and socio-economic status of the mother were not significantly associated with LBW. However, religion and occupation of mothers have been identified as significant risk factors for LBW babies [11]. Early age of marriage and early confinement is an established custom in India. Teenage girls are physically and psychologically immature for reproduction, hence pregnancy in very young women is generally considered to be a very high-risk event. In addition, there are some other factors like illiteracy, inadequate prenatal care, poor socio-economic conditions etc. that affect the outcome of pregnancy in teenage girls [12]. In our study, an association of maternal age and LBW was statistically insignificant (p=0.375). Our findings are consistent with the studies conducted by Ferreira *et al*. also found no significant relationship between maternal age and low birth weight. The present study shows that the incidence of LBW newborns is high among young mothers of age group 21-25 yrs. Similar observations were also reported by Dasgupta, S, Roy B, et al. observed that a greater number of LBW babies (36%) were born to mothers who were less than 20 years of age [4, 6, 11]. The relationship between maternal age and LBW was not found to be statistically significant (p>0.05). One of the important factors associated with the LBW of new-borns is the maternal occupation around the period of conception or during the first trimester of pregnancy. Over the past quarter of a century, pregnant women have increasingly remained in the workforce [13]. Despite the increasing time spent by women in the workplace, there have been few studies investigating the effects of specific maternal occupations on the birth weight of newborns. In our study, the greatest number of LBW new-borns belonged to the mothers who were labourers by occupation, and they had 7.14 times higher chances of getting LBW new-borns as compared to those in the service class. The difference was found to be highly significant (p<0.001). Similar observations were documented in earlier studies [14]. Prevalence of delivering LBW among women with high socioeconomic status was low. The women with high socioeconomic status have better nutrition, good environmental condition and have better care than women with poor socioeconomic status. This, in fact, is further corroborated by this study. It corresponds with the findings of Tegegne BA, Enquoselassie F, et al. reported that maternal education, per capita income, birth interval, parity and maternal age was significantly associated with birth weight. Similar maternal factors were also identified in the present study [15]. Majority of women i.e. 75.4% had Hb% below 11g%. The survival percentage for LBW, VLBW, and ELBW infants are 100%, 86.6% and26.6%, respectively, indicative of a significant decrease in their survival with reducing birth weight. Tema T, et al. have observed a survival rate of 98.8 to 100% for VLBW and 63.9% to 91.6% for ELBW infants which are significantly higher, especially for the ELBW group. This could be attributed to the type and quality of antenatal care [16]. The survival percentage for ELBW was 1% in 1960, 40% in 1985 and 80% in the 2000 year in the United States. With the advancement in medical technology and availability of the facilities in the United States, there has been a dramatic improvement in the survival rate of LBW infants [18, 19, 20].

Conclusion

This finding of this study depicted that LBW is still a public health problem in the study area. It also revealed that LBW is statistically associated with maternal reproductive and socio-demographic characteristics. Out of the factors

studied, significant relationships were found between religion and the occupation of mothers and low birth weight of the newborn. Other factors such as age and socio-economic status of the mother were not significantly associated with LBW. Thus, it is a multi-factorial phenomenon. Hence, interventional programs should be encouraged not only in health sectors but in all those sectors concerned with social development and social welfare programs.

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