Epidemiological determinants of birth weight in a metropolitan city

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ABSTRACT

Background: One of the poor outcomes of pregnancy that has caught the attention of the World Health Organization is low birth weight (LBW). An infant's weight at birth is an important indicator of maternal health and nutrition before and during pregnancy and a predictor of infant growth and survival. **Objectives:** (i) To find out the percentage of LBW of baby. (ii) To study the various maternal factors associated with LBW. **Materials and Method:** A prospective longitudinal study was conducted on pregnant women attending antenatal clinic in tertiary care hospital by convenience sampling method over a period of 2 years including 407 women after taking consent using semi-structured questionnaire and followed up after delivery and record birth weight of newborn from record. **Results:** The proportion of LBW in the present study was found to be 34.64%. 50% and 55.07% teenage and advanced age women delivered LBW babies, respectively. Nearly, 68.18% LBW babies were born to tobacco addicted women. Women having less than adequate antenatal care (ANC) visits had a higher proportion of LBW babies (46.77%). Women who registered late in pregnancy had more proportion of babies delivered with LBW (56.63%). Weight gain of mother in pregnancy and birth weight of newborn was found to be statistically significant ($P < 0.01$). 87.5% pre-term delivered babies were LBW. **Conclusion:** More emphasis should be given on ANC services to identify the various risk factors to reduce the incidence of LBW in the community.

KEY WORDS: World Health Organization; Maternal Factors; Low Birth Weight; Antenatal Care

INTRODUCTION

A child has only one chance to develop normally, and the protection of that one chance, therefore, demands the kind of commitment that will not be superseded by other priorities.[1] All women, whether their pregnancies are complicated or not, need good quality maternal health services during pregnancy, delivery and in the postpartum period to ensure their health and that of their infants. The quality, character, and health of the child depend on the mother that bears the child. A multifactorial relationship exists between the environment, health, and nutritional status, social status of a woman, and the growth of the fetus.[2]

Every year, 17 million infants in developing countries are born with low birth weight (LBW) (Pojda and Kelly 2000), and there are little chances of reaching full growth potential for infants who manage to survive. According to UNICEF, the proportion of LBW was 30% in 1991,[3] increased to 33% in 1995;[1] from 1995 to 2000 it has decreased to 26%.[4] The percentage of LBW must be regarded as an index of our status of public health in general and of maternal health and nutrition in particular.

Globally, LBW is a good summary measure of a multifaceted public health problem that includes long-term maternal malnutrition, ill health, hard work, and poor pregnancy health care.

The present study was therefore undertaken to identify the percentage of LBW and study various epidemiological factors associated with it.

MATERIALS AND METHODS

A prospective, longitudinal study was carried out in antenatal care (ANC) Clinic in tertiary care hospital, Mumbai. A total sample of 425 pregnant women was selected by convenience sampling method, presuming 33% drop out rate after taking their consent to enroll in the study. Women who registered in the tertiary care hospital, going to deliver in the same institute were included while cases that came in emergency and not registered were excluded from the study. The study subjects were followed up till delivery. The study continued for 2 years from October 2012 to October 2014. All the study subjects were found to be residing around area in metropolitan city. Ethical clearance was obtained from the Institutional Ethics Committee of the Institution.

All babies were weighed within 1 hr after birth[5] on a standard baby weighing scale, to the nearest 100 g and were assessed for any complications. As per the guidelines of CSSM program, infants with birth weight <2500 g were considered as LBW and with birth weight ≥2500 g as normal. The birth weight was recorded from child's birth record. Out of 425 studies sample, 407 women were analyzed at the end of the study. The remaining 18 women were lost to follow-up.

Essential data were collected on performed structured pro forma containing relevant information. Every attempt was made to collect the information accurately, and the results were then compiled and analyzed. The data were statistically analyzed by SPSS package on computer and was presented by employing descriptive epidemiological study method.

RESULTS

According to CSSM classification, <2499 g are LBW newborns and >2500 g are normal birth weight newborns. Taking into account the above criteria, in the recent study, 141 women delivered LBW newborns, while 266 women delivered normal birth weight newborns. Hence, the percentage of LBW newborns in the present study was found out to be 34.64% (Table 1).

Table 2 shows that extremes of the maternal age affect the birth weight of babies. Considering the teenage pregnancy LBW was 50%, and in advanced age, pregnancy LBW was found in 38 (55.07%). Whereas among the 20-30 years of age maximum, i.e., 226 (70.63%) were normal weight babies. This difference was found to be statistically significant (P = 0.000). In the overall tobacco addicted respondents, 30 (68.18%) had LBW babies as compare to 111 (30.58%) in non-addicted respondents. Tobacco addiction in current

pregnancy was found to be statistically significant with a birth weight of babies.

Table 3 illustrates those women having less than adequate ANC visits (46.77%) had a higher proportion of LBW babies compared to more ANC visits women (29.33%). This difference was found to be statistically significant (P = 0.001). Furthermore, women who registered late in pregnancy had more proportion of babies delivered with LBW (56.63%) and women who registered in early pregnancy had 67.97% babies de livered with normal birth weight. This difference was found to be statistically significant (P = 0.000). 46 (69.70%) respondents delivered LBW babies who had gained only 1-4 kg during pregnancy followed by 84 (32.18%) LBW who had 5-8 Kg gain and 11 (13.75%) LBW who had 9 to >11 Kg gain. This difference shows statistical significance between weight gain of mother in pregnancy and birth weight of newborn (P < 0.01). Out of total 407 respondents maximum, i.e., 380 (93.37%) delivered at full term with only 127 (33.42%) having LBW as compare to 253 (66.58%) having normal weight babies. While in pre-term deliveries 14 (87.5%) newborn delivered with LBW while only 2 (12.5%) with normal weight babies. This difference shows statistical significance (P = 0.000).

Table 4 shows that on multivariate analysis, all the independent variables were (age, addiction, pregnancy registration, gestational age, and weight gain) showed significance with a birth weight of newborn. It is interesting to see that results of univariate analysis correlated well with the results of multivariate analysis.

Table 1: Distribution of newborn according to their birth weight in grams

Birth weight (in grams)	Number of newborn (%)
<2500	141 (34.64)
>2500	266 (65.36)
Total	407 (100)

Table 2: Relation of maternal age and tobacco addiction with birth weight of newborn

Character	LBW	Normal	Total	Statistical significance
Age (in Years)				
<20	9 (50)	9 (50)	18	χ^2=18.52
20-30	94 (29.38)	226 (70.63)	320	d.f=2
>30	38 (55.07)	31 (44.93)	69	P=0.000*
Total	141 (34.64)	266 (65.36)	407	
Addiction				
Yes	30 (68.18)	14 (31.82)	44	χ^2=24.51
No	111 (30.58)	252 (69.42)	363	d.f=1
Total	141 (34.64)	266 (65.36)	407	P=0.000*

*Numbers in parenthesis represents percentage, LBW: Low birth weight

Table 3: Antenatal care and birth weight of newborn

Character	LBW	Normal	Total	Statistical significance
ANC visit				
<4	58 (46.77)	66 (53.23)	124	χ^2=11.59 d.f=1 P=0.001
>4	83 (29.33)	200 (70.67)	283	
Total	141 (34.64)	266 (65.36)	407	
ANC registration (in weeks)				
Upto 12	49 (32.03)	104 (67.97)	153	χ^2=23.41 d.f=2 P=0.000*
13-24	45 (26.32)	126 (73.68)	171	
>25	47 (56.63)	36 (43.37)	83	
Total	141 (34.64)	266 (65.36)	407	
Weight gain (in Kg)				
1-4	46 (69.70)	20 (30.30)	66	χ^2=51.939 d.f.=2 P=0.000*
5-8	84 (32.18)	177 (67.82)	261	
9- >11	11 (13.75)	69 (86.25)	80	
Total	141 (33.33)	266 (65.36)	407	
Gestational age				
Full term	127 (33.42)	253 (66.58)	380	χ^2=25.82 d.f.=2 P=0.000*
Pre-term	14 (87.5)	2 (12.5)	16	
Post dated	0 (0)	11 (100)	11	
Total	141 (33.33)	266 (65.36)	407	

*Numbers in parenthesis represents percentage, LBW: Low birth weight

Table 4: Results of multiple logistic regression analysis

Characteristics	P	DF	Odds ratio	95% CI
Age	0.046	2	2.116	1.117-4.011
Addiction	0.049	1	2.255	1.002-5.078
Registration of pregnancy	0.038	2	2.367	1.216-4.606
Gestational age	0.045	2	0.000	-
Weight gain	0.000	2	0.539	0.239-1.213

DISCUSSION

Globally, LBW is a good summary measure of a multifaceted public health problem that includes long-term maternal malnutrition, ill health, hard work, and poor pregnancy health care. The percentage of LBW in the present study was found to be 34.64%.

In Table 2, it is revealed that at both extremes of maternal age birth weight of newborn were low. About 50% babies were low weight in teenage pregnancy, and 55.07% were in advanced age pregnancy. Whereas in the ideal age for pregnancy maximum, i.e., (70.63%) newborn were delivered with normal weight. It was observed that in the respondents who were addicted to tobacco had delivered maximum,

i.e., 30 (68.18%) LBW babies as compare to 30.58% babies with LBW in non-addicted respondents.

Considering the ANC care 58 (46.77%) had LBW babies who had utilized less antenatal care as compared to 83 (29.33%) LBW babies who had more than 4 antenatal visits in tertiary health-care center. Those who delayed their registration till the 3rd trimester has more chance of having LBW babies. In the present study, maximum, i.e., 56.63% LBW babies were born to respondents who registered during their late third trimester. While those who registered in the first trimester 49 (32.03%) were LBW babies.

46 (69.70%) respondents who delivered LBW babies had gained less than 4 kg during pregnancy and only 20 (30.30%) had babies with normal weight followed by 84 (32.18%) LBW babies who had gained 5-8 Kg and 11 (13.75%) LBW babies who had gained 9->11 Kg. This difference was statistically significant thus stating that a woman should gain about 10-12 kg weight in full pregnancy to have a normal weight baby.

Multivariate analysis shows, all the independent variables were (age, addiction, pregnancy registration, gestational age, and weight gain) showed significance with birth weight of newborn.

In the study conducted by Valenkar Deepa et al.[6] (2009) at an urban slum community situated in the outskirts of Mumbai found that 67% LBW babies were in teenage pregnancy and as mother's age increases, the percentage of low baby weight decreases significantly. Sengupta Paramita et al.[7] (2009) in their study found that 6% LBW in teenage pregnancy and 8% in advanced maternal age pregnancy. Deshpande Jayant et al.[8] (2011) conducted a case–control study in rural area of western Maharashtra on maternal risk factors, and LBW found that in teenage and advanced maternal age pregnancy 15.5% babies was LBW while 9.5% babies were normal weight babies. In this study, maternal age was not significantly associated with LBW. Biswas et al.[9] (2008) in their study in their epidemiological study in West Bengal found that 32.4% respondents who were addicted, delivered LBW babies. Deshmukh et al.[10] (1998) in their study on LBW and associated maternal factors in an urban area on cohort of 210 pregnant women found that 54.1% tobacco addicted respondents were LBW and 32.1% were normal birth weight babies. This finding is similar to our study. Pratinidhi Asha et al.[11] (2010) in their study on use of "Mishri" a smokeless form of tobacco on perinatal outcome found that 19.3% newborn were LBW in Mishri users. In the study conducted by Valenkar Deepa et al.[6] (2009) at an urban slum community situated in the outskirts of Mumbai found that 56.8% babies were LBW with <4 ANC visits whereas 28.8% in more than 4 visits. Whereas 50.7% LBW babies were born to respondents who registered in third trimester and only 33.3% in those who registered in the first trimester. This finding is similar to our

study. Joshi et al.[12] (2005) in their study in Allahabad found that proportion of LBW was maximum (61.76%) in mothers who did not receive any antenatal care, followed by those who received inadequate care, in whom LBW proportion was 46.57%. There was a significant association between birth weight and utilization of antenatal care by mothers. Sengupta Paramita et al.[7] (2009) in their a case–control study in Punjab found that 80% were LBW babies in respondents with <10 kg maternal weight gain during pregnancy whereas only 20 % were LBW with weight gain more than 10 kg. Maternal weight gain of ≤10 Kg during the pregnancy as significant independent risk factors for LBW. Deshpande Jayant et al.[8] (2011) in their case–control study in a tertiary care teaching hospital in rural area of western Maharashtra found that 83 (41.5%) were LBW in respondents who had late ANC registration. LBW was strongly associated with inadequate antenatal care.

As this study was conducted in tertiary care center with limited sample size, thus the results cannot be applied on the general population, because this sample size may not be the true representative of the general population.

CONCLUSION

More emphasis should be given on ANC services to identify the various risk factors to reduce the incidence of LBW in the community. Selectively targeted interventions such as maternal education, nutrition, and advocacy programs aimed at mobilizing religious leaders as agents of sensitization and change may help in ensuring adequate care and better birth outcomes in their respective communities taking regional disparities into consideration.

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