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Sociodemographic and obstetrical factors associated with low birth weight: Community based retrospective study in an urban slum of Western India

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ABSTRACT

Aim: This study aimed to find out association between low birth weight (LBW) and sociodemographic factors, obstetrical factors and ante natal care. The study also helped to recognize whether the known risk factors of LBW still exists or their relation is modified in current era in urban slum area of Surat city in Western India. **Methodology:** This study is a part of large scale survey conducted to assess reproductive and child health services in Surat city in Western India. In this large scale study, out of 1004 community-based "Maternal and Child Day Care Centres," 30 center were selected by using cluster sampling design. In the selected areas, a household survey was conducted to assess maternal and child healthcare status. Birth weight <2500 g was considered as LBW and association of study variables with LBW was find out using Chi-square and odds ratio. **Results:** Among the 322 mothers interviewed, 51.6% were of 20-24 years of age; 97.2% were having antenatal registration; 35.7% had high risk pregnancy; 9.6% were working; 23.3% had birth interval ≤2 years. LBW rate was 20.5%. High risk pregnancy, preterm birth and birth interval ≤2 years shows statistically significant ($P < 0.05$) association with LBW. **Conclusion:** High risk pregnancy and ≤2 years of birth interval are good predictor of LBW.

KEY WORDS: Ante natal care, high risk pregnancy, low birth weight, obstetrical

INTRODUCTION

Although special attention has been paid to maternal and child health, India has been lagging behind achieving the target of Millennium Development Goal-4 of reducing the infant mortality [1,2]. Being one of the most predictive factors for infant mortality [3], it is necessary to understand phenomenon of low birth weight (LBW) to reduce infant mortality.

LBW (neonate weighing <2500 g) is multifactorial phenomenon [4]. It is one of the reliable indicators to measure the overall impact of maternal and child health services [5]. India contributes to a high proportion (about 40.00% among all of all Asian countries in aspect of LBW) [6].

Giving birth to a LBW infant is influenced by several factors including maternal variables and socioeconomic status [7-13]. Socio-demographic factors like maternal age, maternal education and maternal occupation were proven determinants affecting birth weight of the child [9]. The parity of mother and high risk pregnancy was also considered as important medical determinant, which affects outcome of pregnancy including weight of the child [9,12,13]. Severe anemia, hypertension, syphlilis, HIV+ve, ante partum hemorrhage, polyhydroamnios, elderly grand multipara, prolong pregnancy, cardiovascular disease, kidney disease, diabetes mellitus, respiratory distress syndrome, tuberculosis, liver disease, rh-ve, malaria were considered as high risk factors, which adversely affects the outcome of pregnancy including birth weight. As the parity [9,12] advances maternal nutritional status decreases if healthy diet is not taken regularly. This also affects nutrition status of subsequent child. It directly implies importance of birth interval [12], which is promoted by Family planning program. Migration among mother can affect mental status of mother, which indirectly affects birth weight. Poor past obstetric history can also suggest poor maternal physical status to carry a pregnancy, which can lead to LBW [9,12,13].

Above mentioned factor particularly socio-demographic and ante-natal care related factors may vary widely in different geographic and socio-cultural regions. In this context, this study was carried out to identify various local socio-demographic, obstetrical and ante-natal care related factors that are associated with LBW in Surat city.

METHODOLOGY

This study was a part of large scale study conducted during Dec 2013 to Jan 2014 to provide estimates on a large number of indicators on the situation of maternal and child health services living in the area where RCH services are provided by the Health Department of Surat Municipal Corporation. In the larger scale study, 30 cluster sampling design was used.

In India, various maternal and child health programs of government are implemented through a "Maternal and Child Day Care Centre" (commonly known as "Anganwadi") at community level. To calculate the sample size a pilot study was conducted in which three such centers near our institute were visited. In the pilot study, 70% (21 out of 28 children aged 1-2 years) children found fully immunized. This immunization rate was used to calculate sample size for the current study. The sample size was found to be 165 using formula sample size $n=Z^2_{\alpha/2}$ pq/E^2 ($Z_{\alpha/2}$=1.96 [at 5% level of significance], p = prevalence, q = [1-p] and E=allowable error, 10%). Now, because of cluster sampling the sample size was multiply by design effect of 2. Hence, the final calculated sample was 330. By using cluster sampling method [14] these samples were divided into 30 clusters of 11 mothers in each cluster.

The list of "Maternal and Child Day Care Centre" in the city was the main sampling domain. In the first phase the center was sampling unit and list of Centre provided by the SMC officials was used as sampling frame to draw samples.

There are 1004 "Maternal and Child Day Care Centre" in the city and among them sampling interval was identified by dividing it with 30. The calculated sampling interval was 33. All centers were arranged in alphabetical order according to their name. First center was selected randomly among the first 33 centers using computer generated random number table. The selected number became our starting point for center selection. The subsequent centers were selected by adding sampling interval of 33 to first selected number.

The second phase of sampling was done in selected 30 centers. A household became sampling unit in this phase of sampling. In the selected "Maternal and Child Day Care Centre," a household was selected randomly to start the survey. Then survey team moved on the left hand side of first household and continues to visit more and more household till desired sample size of 11 mothers delivered in previous year (1st Dec 2012 to 30th Nov 2013) was achieved. In case of joint family, where more than one eligible mother was found, socio-cultural environment and health seeking behavior would be almost similar for both mothers, so only one mother was included in the study.

In the study, high risk pregnancy was defined as pregnancy having any of the following conditions: severe anemia, hypertension, height <140 cm, >30 years of age, syphlilis, HIV +ve, ante partum hemorrhage, twins, polyhydroamnios, elderly grand multipara,prolong pregnancy, cardiovascular disease, kidney disease, diabetes mellitus, respiratory distress syndrome, tuberculosis, liver disease, Rh-ve, malaria.

Informed written consent was taken from all the participants after persuading the patients about the details of the study. Strict confidentiality of the data was maintained.

Data were entered using Microsoft excel software and Epi Info. Fisher's exact test or Chi-square test was applied for categorical variables to find out association. $P \leq 0.05$ was considered significant. Odds ratio (OR) and confidence interval were calculated to measure strength of association.

RESULTS

Totally 322 children were included in the survey. Table 1 shows that 276 (85.8%) mothers were between age 20 to 30 years; 313 (97.2%) were registered for ante natal care; 115 (35.7%) had high risk pregnancy; and 31 (9.6%) were working women. It also shows that 163 (50.6%) male and 159 (49.4%) female children were born to these mothers. Further data revealed that 66 (20.5%) children were LBW (≤2499 g), 243 (75.5%) were having ≥2500 g of birth weight. Birth weights of 13 children were not known.

Table 1: Background characteristics

Variables	Numbers	Percentage
Maternal age (in years)		
<19	12	3.7
20-24	166	51.6
25-29	110	34.2
30-34	26	8.1
>35	8	2.5
Religion		
Hindu	236	73.3
Muslim	86	26.7
Antenatal registration		
No	9	2.8
Yes	313	97.2
Maternal risk category		
High risk	115	35.7
Low risk	207	64.3
Maternal occupation		
Working woman	31	9.6
Housewife	291	90.4
Birth interval		
≤2 year	75	23.3
>2 years	100	31.0
Not applicable*	147	45.7
Birth weight (g)		
<2499	66	20.5
>2500	243	75.5
Birth weight not known	13	4
Gender of new born		
Female	159	49.4
Male	163	50.6

*not applicable in case of single child

Table 2: Association between birth weight and covariates

Variable	Birth weight		*P* value	OR	95% CI
	≤2499	≥2500			
Maternal age					
20-34 years	65 (22.4)	225 (77.6)	0.1169*	5.200	0.681-39.69
Others	1 (5.3)	18 (89.7)			
Still born					
Yes	3 (30)	7 (70)	0.7262*	1.605	0.4036-6.386
No	63 (21.1)	236 (78.9)			
Post term					
Yes	1 (50)	1 (50)	0.7642*	3.723	0.2298-60.32
No	65 (21.2)	242 (78.8)			
Pre term					
Yes	9 (90)	1 (10)	<0.001*	38.29	4.746-307.7
No	57 (19.1)	242 (80.9)			
Past history of spontaneous abortion					
Yes	7 (21.2)	26 (78.8)	0.9826	0.9902	0.4096-2.398
No	59 (21.4)	217 (78.6)			
Maternal occupation					
Working woman	3 (10)	27 (90)	0.1102	0.381	0.1119-1.297
Housewife	63 (22.6)	216 (77.4)			
Literacy of mother					
Illiterate	13 (25.5)	38 (74.5)	0.43	1.323	0.658-2.66
Literate	53 (20.5)	205 (79.5)			
High risk pregnancy					
High risk	46 (40.4)	68 (59.6)	<0.001	5.911	3.265-10.73
Low risk	20 (10.3)	175 (89.7)			
Religion of mother					
Hindu	51 (22.7)	174 (77.3)	0.3587	1.348	0.7112-2.556
Muslim	15 (17.9)	69 (82.1)			
Type of delivery					
Caesarian section	13 (22.8)	44 (77.2)	0.7677	1.109	0.5571-2.209
Normal	53 (21.0)	199 (79.0)			
Birth interval					
≤2 year	21 (30)	49 (70)	0.004	3.071	1.392-6.776
>2 years	12 (12.2)	86 (87.8)			
Migration					
Migrant	42 (22.5)	147 (77.5)	0.5589	1.183	0.6735-2.077
Local	24 (19.7)	98 (80.3)			
Antenatal registration					
No	3 (37.5)	5 (62.5)	0.4636*	2.267	0.5275-9.74
Yes	63 (20.9)	238 (79.1)			
Gestational age at the time of 1st ANC visit					
>3 months	17 (29.5)	41 (70.7)	0.08363	1.767	0.9221-3.385
<=3 months	46 (19.0)	196 (81.0)			
Number of live children					
>2 children	17 (24.6)	52 (75.4)	0.4509	1.274	0.6779-2.395
<=2 children	49 (20.4)	191 (79.6)			

*Fisher's Exact Test was used to calculate *P* value. Other *P* values were calculated using Chi-square test. CI: Confidence interval. # Age of mothers ≤19 and ≥35 years, OR: Odds ratio

Table 2 shows association between birth weight and various study variables. LBW (<2500 g) was found significantly associated with pre term delivery ($P < 0.01$), high risk pregnancy ($P < 0.01$) and birth interval of ≤2 year ($P < 0.01$). OR for association between LBW and pre term delivery was 3.1 while it was 5.9 for high risk pregnancy and 38.3 for preterm birth.

DISCUSSION

This paper evaluated and documented known risk factors of LBW in Surat city, which were mentioned in previous studies [1,8-10,12]. Birth weight of newborn is one of the most important factors associated with their healthy growth, development and survival [15]. In this study, age group of mother 25-29 years has 34.2% women which has increase in compared to similar study done in Tanzania in 2007 where the proportion of mother was 24.6% [9]. This change can be due to increase in maternal education; increase in age at marriage and their involvement in various occupations; and various programs for increasing awareness among population about birth control and birth spacing. In this study, there is positive strong relationship between prematurity and LBW. Similar results were also found in other study [9]. Maternal age and parity had not been found correlated with LBW, similar to earlier study [12]. Studies conducted in India [16,17] and in Pakistan [18] also support that birth weight has no relation with maternal age.

Previous studies had indicated that mothers with lower education gave birth to LBW neonates [8,12]. However in this study, association was not found between LBW and maternal education. Similar findings were also found in a study conducted in Iran [15]. In the present study association between LBW and maternal occupation was not found, which was opposite to an earlier study results [12]. There were very less number of working women in present study group, and hence we avoided further dividing them into groups of heavy, moderate, and mild workers. No significant difference in birth weight of neonates and working status of mother might be due to lifestyle of non-working women (mostly housewives) in Indian society where housewives bear physical work similar to moderate worker by doing all household chores by themselves [19,20].

High risk mother has higher chances of delivering a LBW child, which is consistent with finding of similar study done in Ahmedabad [15] and Maharashtra [12]. In contrast to a study done in Queen Mary Hospital [21], in this study there is no relation of LBW with ante natal registration, time of first visit, previous history of still born or previous history of spontaneous abortion.

Birth interval had positive correlation with birth weight in present study which is similar to other study done in Maharashtra [12]. In this study, there was 3.071 times higher chances of getting LBW child when birth interval is ≤2 year in compare to birth interval more than 2 years. This may be due to increase spacing between child birth gives time to mother to recover nutritional losses during last delivery.

There was no relation between LBW and migration in population, type of delivery, religion and presentation of fetus at time of delivery. This statement suggests that migratory population also get equal health benefits as local population. Even they were aware of various maternal health schemes, and their health seeking behavior was also equal to local population. In other terms, study says that there was no bias in health services of local or migratory population. Religion was thought to have relation with LBW under the concept that Hindus have lesser fertility rate (total fertility rate 2.0) compare to Muslims (total fertility rat 3.4) [22]. However, such correlation was not established in this study.

Post term babies have longer stay in maternal womb, which directly expands the period of getting nutrition from maternal body. That is related to normal birth weight or even higher birth weight. Hence, it is quite obvious that post term babies could not be related to LBW. The present study supports the same finding.

Limitations

Only well recorded risk factors were included in the study, which is an inherent limitation of retrospective study. However, the selected variables were also sufficient to fulfill the objectives of the study.

Weight and nutritional status of mother during antenatal period are also another important factors, which we could not able to include in the study because of poor availability of information on initial weight and nutritional status (e.g., Hemoglobin level) of mothers.

Socio-economic status is also important determinant for birth weight. However, in this study Socio-economic status wise comparison was not possible as this study was conducted in slum areas of the city and all study participants are from lower socio economic strata.

High risk pregnancy was defined using multiple factors. Effect of each risk factor on birth weight is not possible to analyze as the numbers are too small to do this.

CONCLUSIONS AND RECOMMENDATIONS

High risk pregnancies and mothers with ≤2 years of birth spacing could be good predictor of LBW. Mothers having these two factors during pregnancy should be focused during antenatal period for maternal nutrition. Factors associated with high risk pregnancy should be handled effectively. There is a need to put efforts in direction to increase birth spacing.

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