Role of Social Support and Spouse Abuse in Low Birth Weight: A Case–control Study from Puducherry, India

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Abstract

Background: Low birth weight (LBW) is a major cause of neonatal morbidity and mortality. In addition to medical/clinical risk factors, various socio-demographic factors also have an impact on birth weight. **Objective:** The objective of the study is to determine the association of antenatal social support and spouse abuse during pregnancy with LBW in Urban areas of Puducherry. **Materials and Methods:** A community-based case–control study was conducted in Puducherry. Mothers of 100 LBW infants and normal birth weight infants in 2016 were studied. Functional Social Support Questionnaire and Index of Spouse Abuse scales were used. Conditional logistic regression for matched pair studies was done for multivariate analysis. **Results:** Mean (± standard deviation) age and education of the study participants was 25.6 (±3.5) and 8.28 (±3.6) years, respectively. The proportion of girl child was 59% and 43% among cases and controls, respectively. Mothers with higher perceived social support (odds ratio [OR] = 0.5; 95% confidence interval [CI]: 0.4–0.7) had lesser odds of LBW. The odds of LBW was 3.6 (adjusted OR [aOR] = 3.6; 95% CI: 1.3–9.9) times and 6.9 (aOR = 6.9; 95% CI: 1.5–31.9) times greater among mothers who experienced nonphysical abuse and had pregnancy-induced hypertension respectively and it was statistically significant after adjusting for child's gender, social support, and parity. **Conclusions:** The presence of nonphysical abuse during the antenatal period increased the risk of LBW. The awareness should be created in the community to prevent maternal exposure to abuse.

Keywords: Domestic violence, low birth weight, social factors, social support, spouse abuse

Introduction

Low birth weight (LBW) which is defined as birth weight <2500 g includes preterm birth and intrauterine growth restriction. Twenty million infants (15.5% of all births) are born with LBW around the globe.[1] Among the global burden of LBW, 95.6% is from developing countries.[2] India contributes to 40% of global LBW burden with 7.5 million babies born with LBW.[1]

LBW-related complications are the most common cause of neonatal death which is a major contributor to infant death. Preterm birth, which is a component of LBW and related complications contribute to 35% of the neonatal deaths.[2] Reducing LBW was identified as the key strategy to decrease infant mortality as early as in 1985.[3] Apart from mortality, LBW children require neonatal intensive care unit care which increases the burden among parents due to indirect costs such as cost of care, travel expenses, and loss of wages. LBW children also have complications like poor growth in childhood, an impaired immune system and other adulthood diseases such as diabetes mellitus, hypertension, cardiovascular disease, other metabolic diseases, and long-term neurodevelopmental impairment during childhood.[4,5]

Various medical risk factors have been identified for LBW such as maternal malnutrition, anemia, hypertension, multiple pregnancies, maternal intrauterine infection, high parity, close birth spacing, and fetal chromosomal anomalies.[6-8] Sociodemographic characteristics such as socioeconomic status, parent's education, maternal age, and maternal occupation during pregnancy are also found to be associated with LBW

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and stillbirth.[9,10] Social factors might also have an impact on the psychology of pregnant women and can thereby affect the pregnancy outcome. In India, 28.4% of pregnant mothers were subjected to domestic violence by spouse[11] and 30.6% of pregnant mothers were subjected to domestic psychological violence.[12] If these factors are found to be associated with LBW, an effort can be made by the health professionals and community health workers to identify them early and ensure that mothers have safe pregnancy and outcome. Therefore, this study was done to find the association of social factors such as social support and spouse abuse during pregnancy on LBW.

MATERIALS AND METHODS

This was a community-based matched case–control study done from January 2016 to December 2016 in urban Puducherry, a Union Territory in southeast India. This study was done in the service area of Mettupalayam Urban Primary Health Centre (UPHC). The study participants were married postnatal mothers above 18 years of age who had registered at the UPHC and delivered a child without any congenital anomaly. Mothers who delivered LBW children (birth weight <2500 g) were included as cases and mothers who delivered children with birth weight ≥2500 g were included as controls. The list of all eligible cases and age-matched controls (±2 years) were collected from the birth register in the UPHC, and the residence of the cases and controls were visited. If there were more than one age-matched control per case, one control was selected randomly. If the mother was not available during the home visit, repeat visits were done within 2 months of delivery. If she was not available during repeat visits, she was considered as nonrespondent. During the study, there were 102 LBW deliveries. We could not contact two mothers because they changed their residence. Finally, we included 100 mothers with LBW deliveries as cases and 100 age-matched controls. Informed consent was taken from the available and eligible study participants, and the interview was conducted. Pretested semi-structured data collection form was used for the interview after developing a rapport with the participants and ensuring the privacy.

Sociodemographic details collected were mother's age, education, previous occupation, monthly family income, smoking status, alcohol consumption details, socioeconomic status, and type of house. Clinical details collected were parity, gap between subsequent pregnancies, number of living children, history of abortions, pregnancy-induced hypertension (PIH), gestational diabetes mellitus, malnutrition, and anemia. Child details collected were birth-weight and gender.

Socioeconomic status was determined using Modified BG Prasad classification 2016 in which classes V and IV were clubbed and considered as lower class. Classes I and II were clubbed and considered as "upper class." Smoking and alcohol consumption is defined as a history of smoking and alcohol consumption by the spouse, any time in the past 1 year, respectively. Mothers whose prepregnancy weight was <45 kg was considered malnourished, and mothers with hemoglobin <11 g during pregnancy were considered anemic.

Study instruments

Social support was measured using the Functional Social Support Questionnaire (FSSQ) which is an 8-item questionnaire validated in English with a test-retest correlation coefficient of 0.66 and Cronbach's alpha of 0.81.[13,14] Responses are on a 5-point scale ranging from 1 to 5. Mean scores of all the 8 items was calculated for each participant and considered as FSSQ score. Higher score indicates a higher perceived social support. The median score was used as the cutoff to categorize the social support as higher and lower perceived social support.

Spouse abuse was measured using the Index of Spouse Abuse scale (ISA) which consists of two components ISA physical (ISA-P) and ISA nonphysical (ISA-NP) with Cronbach's alpha of 0.90. Responses were on a 5 point scale from 1 to 5. Participants with ISA-P scores more than 10 and ISA-NP scores more than 25 are considered to have the physical and nonphysical abuse respectively. By using these cutoff scores, this scale correctly classifies 90.7% of the sample for both ISA-P and ISA-NP.[15] The study tools were translated in the local language, and linguistic validation was done with linguistic experts.

Sample size calculation

The sample size was calculated to be 90 pairs with expected proportion of physical abuse among the cases to be 17% and expected odds ratio (OR) of 3.9, 80% power, 5% alpha error for matched case–control study using sample size software nMaster 2.0 (Vellore, Tamil Nadu, India).[16,17] Ninety pairs of cases and controls were required for the study; however, it was decided to round it off to 100 cases and 100 age-matched (±2 years) controls.

Statistical analysis

Data were single entered using EpiData software version 3.1 and analysis was done using IBM PASW Statistics version 19.0 (SPSS, IBM Corp, Armonk, New York) and STATA statistical software version 11 (StataCorp LCC, Lakeway Drive College Station, Texas, USA). McNemer Chi-square test was used to find the significance of the association for binary variables. For categorical independent variables with more than two categories, conditional logistic regression for matched pair studies was used to find the significance of the association. Those independent variables with a $P < 0.05$ in the bivariate analysis were included in the multivariate analysis using conditional logistic regression to get the adjusted outcomes. The results were considered statistically significant if the $P < 0.05$.

Ethical considerations

The protocol was submitted to Institute Ethics Committee of Jawaharlal Institute of Postgraduate Medical Education, and Research and approval was obtained. Permission was obtained from Deputy Director of Public Health, Puducherry, to conduct the study in UPHC service area and to coordinate with staffs of UPHC. Informed consent was taken from all the study participants. Confidentiality of the data was strictly maintained.

RESULTS

A total of 100 cases and 100 age-matched controls were

recruited into the study during the study period. Mean (±standard deviation [SD]) age of the study participants was 25.6 (±3.5) years. Mean (± SD) years of schooling among the cases and controls were 8.28 (±3.6) and 7.44 (±4.0), respectively. Sociodemographic characteristics and clinical and social characteristics of the study participants are given in Tables 1 and 2, respectively. Among cases, 65% and among controls, 75% were working mothers before or during pregnancy. Univariate and multivariate analysis for association of LBW with various risk factors are described in Table 3 Lower socioeconomic status was prevalent among 28% of cases and 40% of controls. The odds of the child being female was more among cases (59%) when compared to controls (43%), and it was statistically significant (OR = 1.3; confidence interval [CI]: 1.05–1.7). Higher social support was present in 59% of controls and 35% of cases (OR = 0.5), and it was statistically significant. Physical abuse by the spouse was present in 18% of cases and 15% of controls whereas nonphysical abuse was present in 47% of cases and 17% of controls and the difference was statistically significant.

Gender of the child, PIH, parity, perceived social support, and nonphysical abuse, found to have a statistically significant association in univariate analysis were included in the multivariate analysis model using conditional logistic regression. Only nonphysical abuse by spouse and PIH were found to be significantly associated with LBW children after adjusting for gender, PIH, and perceived social support. The odds of LBW was 6.9 (adjusted OR [aOR] = 6.9; 95% CI: 1.5–32) times greater among mothers with PIH when compared

to mothers who did not have PIH. The odds of LBW was 3.6 times greater among mothers who experienced nonphysical abuse when compared to mothers who did not experience non-physical abuse (aOR = 3.6; 95% CI: 1.3–9.9).

DISCUSSION

The present study found that PIH, child's gender, parity, lower social support, and presence of nonphysical abuse during pregnancy were significantly associated with LBW in univariate analysis. In multivariate analysis, PIH and nonphysical abuse by the spouse were significantly associated with LBW. Female children had 1.3 times higher odds of having LBW when compared to males (OR = 1.3; 95% CI: 1.05–1.7) similar to the findings from studies done in Columbia, Iran, and China.[7,18] This result was also consistent with the findings from secondary analysis of Indian data from NFHS 3.[6] Parity might be a reason for this association. Hence, we did a subgroup analysis for association of gender of the child with LBW stratified by parity and found that the odds of female children having LBW was more among nulliparous mothers (OR = 2.9) when compared to multiparous mothers (OR = 1.2). Primiparous mothers have not experienced childbirth and might have less knowledge about pregnancy care. Lower maternal age of primiparous mothers might also be another reason which was also evident from the stratified analysis based on the age group. The odds of female children having LBW was more among younger mothers (OR = 2.4) when compared to older mothers (OR = 1.1). PIH is an

Table 1: Sociodemographic characteristics of the study participants according to birth weight, 2016, (*n*=200)				
Characteristics	Cases (*n*=100), *n*	Controls (*n*=100) , *n*	*n*	Crude OR (95% CI)#
Maternal age				
≤20	10	6	0.235#	1.9 (0.65-5.7)
21-25	43	50		1
26-30	35	33	0.512#	1.2 (0.65-2.3)
>31	12	11	0.610#	1.2 (0.5-3.1)
Maternal education (grade)				
<8th	53	67		1
≥8th	47	33	0.061*	0.8 (0.6-1.0)
Maternal occupation				
Unemployed	65	75		1
Employed	35	25	0.157*	1.4 (0.8-2.2)
Socioeconomic status				
Lower class (<1882)	28	40	0.027#	0.42 (0.2-0.9)
Middle class (1883-3138)	41	41	0.181#	0.61 (0.2-1.2)
Upper class (>3139)	31	19		1
Spouse's alcohol consumption				
Present	59	61	0.768*	0.9 (0.5-1.7)
Absent	41	39		1
Passive smoking				
Present	5	4	0.726*	1.2 (0.3-3.9)
Absent	95	96		1
Child's gender				
Female	59	43	0.018*	1.3 (1.05-1.7)
Male	41	57		1

*P value from Mc. Nemer's Chi square's test, #Results from conditional logistic regression analysis. OR: Odds ratio, CI: Confidence interval

Table 2: Clinical and sociological characteristics of the study participants according to birth weight, 2016, (*n*=200)

Characteristics	Cases (*n*=100), *n*	Controls (*n*=100), *n*	*P**	Crude OR (95% CI)#
Parity				
Multiparous	42	55	0.032	0.76 (0.5-0.9)
Primiparous	58	45		1
Pregnancy induced hypertension				
Present	19	4	0.001	4.7 (1.6-13.3)
Absent	81	96		1
Maternal malnutrition				
Present	15	9	0.220	1.6 (0.7-3.8)
Absent	85	91		1
Maternal anemia				
Present	60	60	1.0	1 (0.8-1.2)
Absent	40	40		1
Social support				
Higher	35	59	<0.001	0.5 (0.4-0.7)
Lower	65	41		
Nonphysical abuse				
Present	47	14	<0.001	3.3 (2.0-5.6)
Absent	53	86		1
Physical abuse				
Present	18	15	0.563	1.2 (0.6-2.2)
Absent	82	85		1

*P value from McNemar's Chi square's test, #OR from conditional logistic regression analysis. OR: Odds ratio, CI: Confidence interval

Table 3: Multivariate analysis of independent predictors for low birth weight children

Parameter	Exposure level	Crude OR	aOR	CI	*P*
Gender of child	Male	1	1	-	
	Female	1.3	1.8	0.8-4.1	0.141
Parity	Primiparous	1	1	-	
	Multiparous	0.76	0.45	0.2-1.0	0.066
PIH	Absent	1	1	-	
	Present	4.7	6.9	1.5-32.0	0.012
Social support	High	1	1	-	
	Low	0.5	0.6	0.2-1.7	0.394
Nonphysical abuse by spouse	Absent	1	1		
	Present	3.3	3.6	1.3-9.9	0.011

OR: Odds ratio, CI: Confidence interval, aOR: Adjusted odds ratio, PIH: Pregnancy-induced hypertension

established risk factor for LBW which is also supported by the present study (aOR = 6.9; 95% CI: 1.5–32). The wide CI for PIH might be due to the limited sample size, but the interval does not include the null value.[8,10,19,20]

The current study found that mothers with higher social support during pregnancy had lesser odds of having LBW children (OR = 0.5, 95% CI: 0.4–0.7) but aOR was not statistically significant (aOR = 0.6, 95% CI: 0.2–1.7). Similar results were also found in a study done in Ethiopia.[21] A meta-analysis done by Hetherington *et al*. which included studies from high- and middle-income countries, concluded that there was no significant association between LBW and antenatal social support (pooled OR = 1.22, 95% CI: 0.84–1.76).[22] However, this meta-analysis did not include studies from low-middle income countries in which the sociodemographic scenario is very different from high-income countries. In low- and middle-income countries,

women are more dependent on men for emotional, financial, instrumental, informational support, and decision-making. This might be the reason for the difference in results. Lack of social support to the mother might have led to stress, depression, and anxiety which might have led to LBW.[23]

The present study found that physical abuse during pregnancy increased the odds of LBW by 20%, but the association was not significant (OR = 1.2, 95% CI: 0.6–2.2). Similar results were found in a study done in Canada.[24] However, few other studies found that physical abuse during pregnancy significantly increased the risk of LBW with OR ranging from 1.37 to 3.9.[16,25] This difference in results might be due to different tools used to measure physical abuse and definition of physical abuse. Furthermore, the prevalence of physical abuse in antenatal mothers was very less in this study, and it is almost equally distributed in both cases (18%) and controls (15%).

The power was back-calculated with the results of the study for the association between physical abuse and LBW which was 10%. Less effect size might be the reason for having lesser back calculated power (10%). For nonphysical abuse, the present study showed significantly increased odds of LBW by 3.3 times (crude OR = 3.3, 95% CI: 2.0–5.6 and aOR = 3.6, 95% CI: 1.3–9.9). Another study from Florida also reported similar results.[25] Nonphysical abuse causing emotional distress might result in the mother not receiving adequate prenatal care and nutrition thereby leading to LBW. The often neglected mental and psychological state of the mother resulting from the social factors like spousal abuse during pregnancy is playing an important role for LBW in this community of urban Puducherry with much better health indicators. The scenario might be worse in societies with greater gender disparity. Therefore, this factor cannot be ignored if the burden of LBW and neonatal mortality is to be controlled in India.

There are few strengths to the study. This is one of the first such studies which explored the role of social support and spouse abuse during pregnancy on LBW in an Indian setting where research in this area is lacking. This was a community-based study, and therefore, results are generalizable to urban Puducherry. Validated scales were used to measure social support and spouse abuse, which were also linguistically validated for this study setting. However, there are certain limitations. First, since the past exposure to social support and spouse abuse were measured in the postnatal period, recall bias might have been there. Second, social desirability bias might also be there as this study was done in a setting where husbands are considered superior and always correct, and wives might not disclose about the abusive husband. Third, other medical causes of LBW like prematurity, maternal infection are not included in the study.

CONCLUSIONS AND RECOMMENDATIONS

To conclude, the social factors such as social support and nonphysical abuse also affect the birth weight of the child which needs to be addressed through health education among mothers, family members and creation of awareness about it among health professionals. Studies need to be conducted in other Indian settings to find the effect of these social factors on LBW.

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Conflicts of interest
There are no conflicts of interest.

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