ORIGINAL RESEARCH PAPER
VOLUME-6 | ISSUE-6 | JUNE-2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

Study of Socio-demographic Maternal Risk Factors for Low Birth Weight

Community Medicine

Dr Akanksha Khurana, PG Resident, Deptt. of Community Medicine, SGT Medical College, Budhera, Gurugram-122505, Haryana.

Dr Balbir S. Deswal Professor & Head, Deptt. of Community Medicine, SGT Medical College, Budhera, Gurugram-122505, Haryana.

Dr Poonam Taneja Associate Professor, Deptt. of Obstetrics & Gynaecology, SGT Medical College, Budhera, Gurugram-122505, Haryana.

Mr Praveen Bhatt Assistant Professor Statistics, Deptt. of Community Medicine, SGT Medical College, Budhera, Gurugram-122505, Haryana.

ABSTRACT

Background: Birth weight is the single most important factor determining survival, healthy growth and development of a newborn. Low birth weight (LBW) is one of the most serious challenges in maternal and child health in our country. Objectives: To determine the proportion of LBW babies among hospital births and study various maternal sociodemographic factors which might be associated with birth weight. Methods: This cross-sectional study was carried out at a tertiary care hospital in Gurugram, Haryana from 1st July 2015 to 30th June 2016. All live born infants satisfying the inclusion criteria and their mothers were included in the study. Statistical analyses were performed using SPSS Version 20.0. Results: In this study, 30.32% mothers delivered LBW babies. Proportion of LBW was comparatively higher among babies born to mothers who were below 20 years of age (60.46%), illiterate (50.0%), engaged in unskilled work (52.32%), belonging to low socioeconomic class (61.54%), living in a 3-generational family (39.62%) and Muslim by religion (36.06%). Maternal education, maternal occupation, socioeconomic status and type of family were found to be significantly associated with LBW on multivariate analysis. Conclusion: Improving some modifiable socio-demographic variables like female literacy and socioeconomic status of mothers would go a long way in reducing the incidence of low birth weight in India.

KEYWORDS:

Low Birth Weight, Maternal factors, Socio-demographic Variables

INTRODUCTION

Birth weight is the single most important factor determining survival, healthy growth and development of a newborn. Worldwide, in 2013, nearly 22 million newborns – an estimated 16 per cent of all babies born globally that year – had low birth weight i.e. below 2500 gm.[1] In India, the incidence of low birth weight (LBW) was 21.5 per cent according to the NFHS - 3 survey.[2] Several studies have attempted to report the factors associated with birth weight. There is an urgent need to investigate the risk factors of low birth weight in various regions of the country before planning meaningful interventions. The present study was undertaken to ascertain the prevalence of LBW and the contribution of some maternal sociodemographic factors associated with it.

MATERIALS AND METHODS

The study was a hospital based, cross sectional study, conducted at SGT Hospital, Gurugram in Haryana state f from 1st July 2015 to 30th June 2016 after taking ethical clearance.All live born infants delivered in SGT hospital over the study period and their mothers were included in the study. Still born foetuses, newborns with any congenital anomalies or malformations as well as mothers who did not give their consent for the study were excluded. This came out to 720 to 780 deliveries in a year. This sample size was considered adequate to draw valid statistical inferences. The study was conducted as per a predesigned and pretested schedule which was precoded and tested in a pilot study on 30 subjects and finalized after suitable modifications. These subjects were also included in the study. Data were collected on a day to day basis by interviewing the mothers and examining the mothers as well as their newborn babies. All babies were weighed as soon as feasible (within 24 hours of birth) on an electronic baby weighing scale up to 10 gm accuracy. The weighing machine was calibrated periodically to minimize the instrumental error.

Collected data was first entered in the MS Excel spreadsheet and was analysed using Pearson's chi-square test. All the risk factors which were found to be significantly associated by Chi-square test ($p < 0.05$) were further analysed by multivariate analysis using the linear regression model using SPSS ver 20.0 package.

RESULTS

A total of 738 deliveries took place in SGT hospital during the study period. Out of the 729 babies which were born alive, 221 babies had birth weight less than 2500 g. Hence the proportion of low birth weight babies among hospital livebirths was 30.32 per cent.

Table 1: Distribution of newborn babies as per birth weight

Birth weight group (gm)	No. of newborns	Percentage
< 1500	9	1.23
1500 – 1999	36	4.94
2000 – 2499	176	24.14
2500 – 2999	303	41.56
3000 – 3499	150	20.58
3500 – 3999	51	7.0
4000 +	4	0.55
Total	729	100.0

As only 700 births satisfied the inclusion criteria, further analysis was done only for these 700 singleton livebirths.

Maternal Age and Low Birth Weight

Table 2: Distribution of newborn birth weight as per maternal age

Maternal age (years)	No. of women	Birth weight < 2500 gm		Birth weight ≥ 2500 gm	
< 20	86	52	(60.46%)	34	(39.53%)
20-30	512	122	(23.82%)	390	(76.17%)
> 30	102	36	(35.29%)	66	(64.70%)
TOTAL	700	210		490	

$\chi 2 = 48.657$, df = 2, $p < 0.001$

Majority of the mothers (73.14%) belonged to age group 20-30 years. However, the percentage of LBW babies was maximum among mothers in age group below 20 years of age (60.46%). The incidence decreased in the age group 20-30 years, but again increased in higher age group as evident from the table. The association between maternal age and low birth weight of newborns was found to be statistically significant with a p value < 0.001.

Maternal Education and Low Birth Weight

Table 3: Distribution of newborn birth weight as per maternal education

Maternal education	No. of women	Birth weight < 2500 gm		Birth weight ≥ 2500 gm	
Illiterate	140	70	(50.0%)	70	(50.0%)
Primary	336	120	(35.71%)	216	(64.29%)
High school	192	16	(8.33%)	176	(91.67%)
College	32	4	(12.50%)	28	(87.50%)
Total	700	210		490	

$\chi 2 = 79.478$, df = 3, p < 0.001

As evident from the table, almost half of all the mothers (48%) included in the study were educated only up to the primary level. Half of the women who were illiterate, gave birth to babies who weighed less than 2500 g at birth, however only 8.33% of all women who had completed their high school education delivered low birth weight babies. A higher percentage of mothers (12.50%) who were college graduates had LBW deliveries in comparison to ones who were high school graduates. The association between maternal education and low birth weight of newborns was found to be statistically significant with p value < 0.001.

Maternal Occupation and Low Birth Weight

Table 4: Distribution of newborn birth weight as per maternal occupation

Maternal occupation	No. of women	Birth weight < 2500 gm		Birth weight ≥ 2500 gm	
Unskilled	172	90	(52.32%)	82	(47.67%)
Semi-skilled	468	114	(24.36%)	354	(75.64%)
Skilled	60	6	(10.0%)	54	(90.0%)
TOTAL	700	210		490	

$\chi 2 = 59.344$, df = 2, p < 0.001

Table reveals that the majority (66.86%) of women were engaged in semi-skilled work. However, the maximum percentage (52.32%) of low birth weight babies were born to women who were engaged in unskilled work compared to the mere 10% of LBW deliveries by women performing skilled work. A statistically significant association was found between maternal occupation and low birth weight of newborns (p < 0.001).

Socio Economic Status and Low Birth Weight

Table 5: Distribution of newborn birth weight as per socio economic status

Socio economic status (Class)	No. of women	Birth weight < 2500 gm		Birth weight ≥ 2500 gm	
I	38	8	(21.05%)	30	(78.94%)
II	206	32	(15.53%)	174	(84.47%)
III	280	64	(22.86%)	216	(77.14%)
IV	150	90	(60.0%)	60	(40.0%)
V	26	16	(61.54%)	10	(38.46%)
TOTAL	700	210		490	

$\chi 2 = 105.380$, df = 4, p < 0.001

As shown in the table, maximum percentage of women (40%) belonged to the middle socioeconomic class (III). However, the maximum percentage of low birth weight babies were delivered by women belonging to the lower class (61.54%), followed closely by those belonging to lower middle class (IV) at 60%. The least percentage of babies who were born weighing less than 2500 g were delivered by mothers belonging to upper middle class (II) (15.53%). The association between maternal socio economic status and low birth weight of newborns was found to be statistically significant with p value < 0.001.

Type of Family and Low Birth Weight

Table 6: Distribution of newborn birth weight as per type of family

Type of family	No. of women	Birth weight < 2500 gm		Birth weight ≥ 2500 gm	
Nuclear	206	66	(32.04%)	140	(67.96%)
Joint	388	102	(26.29%)	286	(73.71%)
	106	42	(39.62%)	64	(60.38%)
Total	700	210		490	

$\chi 2 = 7.627$, df = 2, p = 0.022

The table reveals that maximum percentage (55.43%) of women lived in a joint family. However, 39.62% of all women belonging to a 3-generational family gave birth to babies who were LBW, while only 26.29% of mothers who lived in a joint family delivered low birth weight newborns. The association between type of family and low birth weight of newborns was found to be statistically significant with a p value of 0.022.

Religion and Low Birth Weight

Table 7: Distribution of newborn birth weight as per religion

Religion	No. of women	Birth weight < 2500 gm		Birth weight ≥ 2500 gm	
Hindu	524	150	(28.63%)	374	(71.37%)
Muslim	122	44	(36.06%)	78	(63.93%)
Other	54	16	(29.63%)	38	(70.37%)
TOTAL	700	210		490	

$\chi 2 = 2.612$, df = 2, p = 0.271

As evident from table, around three fourths (74.86%) of all mothers were Hindu by religion, while 17.43% were Muslim by religion. However, the maximum percentage of low birth weight babies were delivered by mothers who were Muslim by religion (36.06%). The proportion of LBW newborns was the lowest (28.63%) in Hindu mothers. A statistically significant association was not found between mother's religion and low birth weight of newborns (p = 0.271).

Multivariate Analysis for Low Birth Weight

Multivariate analysis was then done on all the risk factors found to have a statistically significant association with low birth weight on chi-square test, to assess the independent effect of each variable on the outcome i.e. low birth weight of newborn. The results were as follows.

Table 8: Multivariate Analysis for Low Birth Weight

Variable	Value of coefficient (β)	t	'p' value (Level of significance)
Maternal age	0.022	0.454	> 0.05
Maternal education	0.192	4.181	< 0.05
Maternal occupation	0.184	4.078	< 0.05
Socio economic status	-0.049	-2.229	< 0.05
Type of family	-0.076	-2.977	< 0.05

The above table shows that maternal age was not found to be significantly associated with low birth weight on multivariate analysis.

DISCUSSION

In this study, the proportion of low birth weight babies among hospital

livebirths was found to be 30.32 per cent. This was slightly lower than the percentage of LBW babies reported in other hospital-based studies carried out by Joshi et al[4], Idris et al[5], Kaur et al[6] as well as Sachdeva et al.[7]

In the present study, maternal age was not found to be significantly associated with low birth weight on multivariate analysis. This was in concordance with results of Kramer's meta-analysis[8] as well as studies by Sachdeva et al[7], Shahnawaz et al[9] and Dasgupta et al.[10] However, these results did not add support to the findings of Bisai et al[11] and Taywade et al[12] ,who found maternal age to be an independent risk factor for low birth weight. In general, it has been observed that pregnancy outcomes including birth weight and gestational age are less favourable among women under 20 years and over 35 years of age.

Further, low education level of mothers was found to be an independent causal factor for low birth weight delivery in the present study on multivariate analysis. These findings were in concordance with results of studies carried out by Joshi et al[13], Boratne et al[14] and Narain et al.[15] They were however in contravention to the findings of studies by Thomre et al[16] and Bala et al.[17]

Maternal education being a significant risk factor for low birth weight could be explained by the fact that educated women have an increased awareness regarding available health services, in turn leading to a change in their health seeking behaviour and intake of adequate nutrition. It is also likely that women with no or low level of education may practice poor health and lifestyle habits (e.g. poor personal hygiene and lack of sanitation, substance abuse etc.). Additionally, they may be very poor and lack access to adequate healthcare resources like medications, iron supplements etc. which consequently influence foetal growth.

The present study revealed unskilled work by women during pregnancy to be a significant risk factor for low birth weight deliveries even after multivariate analysis. These findings were consistent with the results of studies done by Ray et al[18], Anand et al[19] and Phalke et al[20], but in contravention with those of a study carried out by Nagargoje et al[21] where no significant association was found between maternal occupation and risk of LBW delivery.

Since heavy physical activity by mother during pregnancy has also been found to be a risk factor for LBW deliveries, a probable reason for maternal unskilled work (including farm and construction work) being a risk factor for low birth weight in the present study could be that the same women who are engaged in heavy physical activity, technically are also doing unskilled work. Still, more studies need to be carried out in various settings before coming to a definite conclusion on the role of maternal occupation in the causation of low birth weight.

Low maternal socioeconomic status (SES) was found to be independently associated with low birth weight delivery in the present study after multivariate analysis. These findings were consistent with results from studies carried out by Som et al[22], Dasgupta et al[10] as well as Phalke et al.[20] The findings of the present study regarding correlation of SES with low birth weight delivery were however not supported by studies conducted by Sharma et al[23] and Shahnawaz et al.[9]

Women belonging to a low socioeconomic class are more likely to have inadequate food intake during pregnancy, shorter birth intervals, unhygienic housing and lack of sanitation, a higher incidence of systemic and/or genital infections and be more likely to smoke and/or chew tobacco. They may also have less access to antenatal care as well as a reduced ability to purchase medicines and supplements during their pregnancy. All the above could affect the birth weight of their infants. Thus, accumulated and reported information on low socioeconomic status as a risk factor for LBW deliveries seems to be remarkably consistent.

Religion of mother was not found to be a statistically significant risk factor for delivery of LBW babies in the present study. These results were in agreement with findings of studies carried out by Joshi et al[4], Taywade et al[12] and Velankar et al[24] who all reported no significant association between religion of mother and low birth weight of infant.

These findings were in contravention with those of studies carried out by Agarwal et al[25] and Ray et al[18], who found religion to be a significant risk factor associated with low birth weight in their respective studies. This association between religion and low birth weight could be because religion has some significance on various cultural practices, which may in turn affect the birth weight. However, there have been conflicting reports as to which religion is the one which has the most risk potential for causing low birth weight, with many studies concluding it to be Islam while a few stating it to be Hinduism.

CONCLUSION

It can be concluded that improving some modifiable socio-demographic variables like female literacy and socio-economic status of mothers would go a long way in reducing the incidence of low birth weight in India.

REFERENCES

1. UNICEF. Undernourishment in the womb can lead to diminished potential and predispose infants to early death. Available from http://data.unicef.org/topic/nutrition/low-birthweight/ [Accessed 4 July 2016].
2. International Institute for Population Sciences (IIPS) and Macro International. National Family Health Survey (NFHS-3), 2005–06: India: Volume I. Mumbai: IIPS; 2007.
3. World Health Organization. International Statistical classification of diseases and health problems. 10th revision, 2nd ed. World Health Organization, Geneva, 2004;2:136-137.
4. Joshi HS, Subba SH, Dabral SB, Dwivedi S, Kumar D, Singh S. Risk factors associated with low birth weight in newborns. Indian J Community Med. 2005;30(4):142-143.
5. Idris MZ, Gupta A, Mohan U, Srivastava AK, Das V. Maternal health and low birth weight among institutional deliveries. Indian J Community Med. 2000;25(4):156-160.
6. Kaur S, Upadhyay AK, Srivastava DK, Srivastava R, Pandey ON. Maternal correlates of birth weight of newborn: A hospital based study. Indian J Community Health. 2014;26(2):187-191.
7. Sachdeva S, Nanda S, Sachdeva R. Comparative analysis of birth weight in a hospital over a decade: Low birth weight still a major problem. J Nepal Paediatr Soc. 2013;33(1):15-20.
8. Kramer MS. Determinants of low birth weight: Methodological assessment and meta-analysis. Bull WHO. 1987;65(5):663-737.
9. Shahnawaz K, Choudhary SK, Sarker G, Das P, Pal R, Kumar L. Association between maternal socio-demographic factors and low birth weight newborn in a rural area of Bihar, India. SEAJPH. 2014;4(1):30-34.
10. Dasgupta A, Basu R. Determinants of low birth weight in a block of Hooghly, West Bengal: A multivariate analysis. Int J Biol Med Res. 2011;2(4):838-842.
11. Bisai S, Sen A, Mahalanabis D, Datta N, Bose K. The effect of maternal age and parity on birth weight among Bengalees of Kolkata, India. Human Ecology. 2006;14:139-143.
12. Taywade ML, Pisudde PM. Study of sociodemographic determinants of low birth weight in Wardha district, India. Clin Epidemiol Glob Health. 2016;148:1-7.
13. Joshi S, Pai NP. Effects of the maternal bio-social determinants on the birth weight in a slum area of Greater Mumbai. Indian J Community Med. 2000;25(3):121-123.
14. Boratne AV, Gupta SS, Datta SS, Mehendale AM, Garg BS. Determinants of low birth weight in rural Wardha. Indian J Matern Child Health. 2012;14(2):1-9.
15. Narain S, Prasad T. Socioeconomic and nutritional determinants of low birth weight babies: A hospital based study. Indian J Community Health. 2014;26 Suppl 2:152-155.
16. Thomre PS, Borle AL, Naik JD, Rajderkar SS. Maternal risk factors determining birth weight of newborns: A tertiary care hospital based study. IJRTSAT. 2012;5(1):3-8.
17. Bala K, Kumar D, Mengi V. Association of maternal bio-social determinants with birth weight in urban slums of Jammu city. JK Science. 2012;14(1):30-33.
18. Ray S, Choudhury AR, Ram R, Chakraborty M, Saha JB, Rout AJ et al. Bio-social determinants of mothers of LBW babies and association of their health knowledge regarding low birth weight babies: A community based study in an urban slum (Dilawarganj) near MGM Medical College, Kishanganj, Bihar. J Evolution Med Dent Sci. 2015;4(72):12594-12602.
19. Anand K, Garg BS. A study of factors affecting LBW. Indian J Community Med. 2000;25(2):57-61.
20. Phalke VD, Phalke DB, Bangal VB, Avachat SS, Deshpande JD, Palve SB. A cross sectional study of maternal factors influencing low birthweight. Ind Med Gaz. 2012;146(6):226-228.
21. Nagargoje MM, Chaudhary SS, Deshmukh JS, Gupta SC, Misra SK. A case control study for risk factors of low birth weight in Nagpur city of Maharashtra. Indian J Community Health. 2010;22:4-7.
22. Som S, Pal M, Adak DK, Gharami AK, Bharati S, Bharati P. Effect of socio-economic and biological variables on birth weight in Madhya Pradesh. Malays J Nutr. 2004;10(2):159-171.
23. Sharma M, Kumar D, Huria A, Gupta P. Maternal risk factors of low birth weight in Chandigarh India. The Internet Journal of Health. 2008;9(1):7363.
24. Velankar DH. Maternal factors contributing to low birth weight babies in an urban slum community of Greater Mumbai. Bombay Hosp J. 2009;51(1):26-35.
25. Agarwal K, Agarwal A, Agrawal VK, Agrawal P, Chaudhary V. Prevalence and determinants of "low birth weight" among institutional deliveries. Ann Nigerian Med. 2011;5:48-52.