ORIGINAL ARTICLE

Maternal correlates of birth weight of newborn: A hospital based study

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Abstract

Background: weight of the baby at birth is considered to be a major determinant of future health and survival of the child. It is one of the important factors which determine the readiness with which the newborn baby adjusts to its surrounding. Many maternal socio-biological factors influence birth weight. Objective: To determine maternal socio-biological factors influencing birth weight of newborn. Methodology: Hospital based cross- sectional study undertaken in Obstetrics and Gynaecology ward of Nehru hospital, Gorakhpur. The study period extended from July 2011 to August 2012. The study subject included recently delivered mothers and data was collected on semi-structured interview schedule to know various socio-biological variables such as mother's age, parity, inter-pregnancy interval etc, influencing the low birth weight of newborn. Chi-Square test was applied to observe the significance of association. Results: The overall proportion of low birth weight baby came out to be 32.06%. Out of various socio-biological factors taken the factors which came out to be statistically significant were age of mother, parity, inter-pregnancy interval, SLI, education. The factors which were not statistically significant were father's education, religion. Conclusions: It was concluded that teenage pregnancy, non-utilization of antenatal care practices, anaemia, illiteracy are unfavorable predictors of birth weight of newborn babies.

Key Words

Introduction

Birth weight of the baby is an important indicator of reproductive health and general health status of population. LBW is considered the single most important predictor of infant mortality, especially of deaths within the first month of life. It continues to remain a major public health problem worldwide especially in the developing countries. As per the WHO estimation about 25 million low birth weight babies are born each year, nearly 95% of them in developing countries. Across the world, neonatal mortality is 20 times more likely for LBW babies compared to heavier babies (≤2.5 kg). [1] There are numerous maternal and fetal factors contributing to LBW. Weight at birth is directly influenced by general level of health status of the mother. Maternal environment is the most important determinant of birth weight, and factors that prevent normal circulation across the placenta cause poor nutrient and oxygen supply to the fetus, restricting growth. The maternal risk factors are biologically and socially interrelated; most are, however, modifiable. Kramer has identified 43 potential factors for low birth weight. [2] Not that all the factors, should be present in a given area. The factors vary from one area to another, depending upon geographic, socioeconomic and cultural factors. The magnitude of low birth weight can be reduced if the maternal risk factors are detected early and managed by simple techniques.

Aims & Objectives

The study was planned with the aim to determine maternal socio-biological factors influencing birth weight of newborn.

Methods

The present study is a hospital based cross-sectional study undertaken in the postnatal care (PNC) wards of Nehru Hospital which is associated with BRD Medical College, Gorakhpur. The study was conducted over a period of one year from August 2011 to July 2012. The sample size was calculated using epi info 7 software keeping population size of 2500 based on average

number of deliveries taking place in our institution during the period of one year, expected frequency being 27.6% (based on national average of low birth weight) [3], confidence level of 5%, the sample size came out to be 270. The study subjects comprised of 271 recently delivered mothers who were admitted to the hospital with gestational age of >28 weeks and delivered singleton baby. A predesigned, pretested semi structured interview schedule was prepared for data collection; physical examination was undertaken after interview was over. The available health records were also reviewed. The results of investigations were recorded from the case sheets. Statistical analysis was done to find out the association between independent variables like mother's age, religion, education, SLI, parity, inter-pregnancy interval, anaemia, and physical activity and birth weight of newborn. Data was analysed using SPSS 16.0 software. Chi sqare test was used to study the association between discrete variables and fischer exact test was used where the expected values were small. Two tailed p value less than 0.05 was considered significant.

Result

In the present study, the overall proportion of low birth weight was found to be 35.06%. It was observed that low birth weight was more among mothers in two extremes of ages i.e. <20 years of age (87.50%) and >30 years of age (78.79%) whereas only (17.17%) of mothers between age of 20 and 30 years delivered low birth weight. [Table 1] The association between mother's age and birth weight of new born was found to be statistically significant. (p<0.01). Education of mother came out to be a favorable factor for birth weight of newborn. Among the mothers who delivered low birth weight almost 50% were illiterate while only 7.37% of mothers with higher education delivered low birth weight baby. This association came out to be significant (p<0.05). The statistical association between SLI of mother and birth weight of new born was also statistically significant (p<0.01). Among the total mothers who delivered low birth weight newborns, nearly 75% of mothers belonged to low SLI group. Father's education and religion showed no statistically significant association with the birth weight of baby.

Parity of mother came out to be a statistically significant factor for the birth weight of baby. [Table 2] Nearly 52% of primiparous mothers and 81% of grand-multiparous (parity >4) mothers delivered low birth weight baby while only 18% of multiparous (parity <4) mothers delivered low birth weight (p<0.05). Mothers with inter-pregnancy interval of less than 18 months were more prone to deliver a low birth weight baby as compared to mothers with inter-

pregnancy interval of more than eighteen months. Thus as the period between previous pregnancy and index pregnancy increased, the birth weight increased and this association came out to be statistically significant (p<0.01). Among the mothers who received ≥3 ANC visits only 11% delivered low birth weight newborns whereas mothers who did not receive any ANC visits almost 58% delivered low birth weight newborns , this association between ANC visits received by mother and birth weight was statistically significant (p<0.01). Our study revealed that maternal anaemia was an unfavorable factor for weight of new borns. Almost 81% of mothers with haemoglobin level less than 7 gm% delivered low birth weight baby, this association between haemoglobin level and birth weight was statistically significant (p<0.05). Among the mothers who did hard physical activity during their antenatal period, 70% delivered low birth weight while only 15% of mothers who performed light physical activity delivered low birth weight baby. The association between physical activity of mothers during pregnancy and birth weight of baby came out to be statistically significant (p<0.05).

Discussion

Birth weight is a very important indicator for both mortality and morbidity of the neonate. The mean birth weight of newborn babies was 2.54±0.31 kgs. The proportion of low birth weight came out to be 35.06%. Khatib et al, Agarwal et al, Kaushal et al found similar percentage comparable with present study. [4-6] Som et al, Mumbare et al found lower percentage of low birth weight than in present study. [7, 8]

The proportion of low birth weight babies was higher in teenage mothers. This finding corroborates finding from other studies done by Agarwal et al, Kaushal et al. Som et al, Deshpande et al, [5-7,9] whereas Mumbare et al, Mavalankar et al, Acharya et al found no association between age of mother and birth weight of baby. [8, 10, 11]

The percentage of low birth weight was inversely proportional to educational standards of mother. Kaushal et al, Som et al, Deshpande et al, Das et al found similar findings in their studies. [6, 7, 9, 12] Whereas Mumbare et al, Deswal et al, Dasgupta et al reported that there was no significant association between education of mother and birth weight. [8, 13, 14]

It was found that percentage of low birth weight was inversely proportional to SLI of mother. Similar findings were seen by Das et al, Som et al, Mumbare et al, Deshpande et al, Deshmukh et al [7-9, 15]

The percentage of low birth weight baby was high among primipara mothers followed by grand multi-para mothers. Whereas least percentage was seen among multipara mothers. Thus there was statistically

significant association between parity of mother and birth weight of newborn baby. Agarwal et al, Kaushal et al, Som et al, Das et al, Deshmukh et al found similar findings in their study, while Mumbare et al, Deshpande et al, Dasgupta et al did not find any association between parity and birth weight of baby. [5-7,12,15,8,9,14]

It was found that as the interval between previous and index pregnancy increased there was favorable effect on the birth weight of the baby delivered in index pregnancy. Deshpande et al, Das et al found statistically significant association between low inter pregnancy interval and low birth weight, while Agarwal et al, Deshmukh et al found no significant association between inter pregnancy interval and birth weight. [9, 12, 5, 15]

It was found that mothers who had anemia were more prone to deliver a low birth weight baby Agarwal et al, Mumbare et al, Dasgupta et al, Deshmukh et al, found statistically significant association between anemia and low birth weight. [5, 8, 14, 15] This finding is similar to the finding of study done by Mumbare et al. [8]

The percentage of low birth weight was highest (57.50%) among mothers who did not receive any ante natal care and it decreased to 10.61% when visits were increased to 3 or more. A significant relationship was found between number of ANC visits and birth weight. Das et al also found significant association between ante natal care and birth weight, while Kamaldoss did not find any association. [12, 16]

It was found that 70% of mothers who were involved in hard physical activity delivered low birth weight babies, while among the mothers who were involved in moderate physical activity 40.41% delivered low birth weight babies. Thus it was found that the mothers who were involved in hard physical activity were more prone to deliver low birth weight babies. This association was statistically significant (chi square = 20.16; df=2; P<0.05). Study done by Agarwal et al, Deshpande et al also shows that there is association between physical activity and low birth weight of baby. [5, 9]

Conclusion

Given the fact that maternal correlates like parity, inter-pregnancy interval, maternal anemia, and 3 ANC visits are significantly associated with low birth weight in newborns, it is imperative that basic primary health care facilities be strengthened in the country in order to bring down the prevalence of low birth weight.

Recommendation

Since low birth weight is the prelude to protein energy malnutrition and is generally followed by childhood morbidity and mortality, the problem of low birth weight needs to be tackled by adequate provision of primary health care by strengthening of national programs like RCH-II to improve awareness level and health and nutrition status of the mothers.

Authors Contribution

SK-Concept and design, data collection, analysis and preparation of manuscript AKU, DKS, RS-Concept and design ONP-statistical analysis.

References

1. UNICEF: Low birth weight, Country Regional and Global estimates. [http://www.unicef.org/publication/index_24840.html].
2. Kramer MS. Determinants of low birth weight: methodological assessment and meta-analysis. Bull World Health Organ. 1987;65(5):663-737. Review. PubMed PMID: 3322602; PubMed Central PMCID: PMC2491072. [PubMed]
3. www.tradingeconomics.com/india/low-birthweight-babies-percent-of-bir.
4. Khatib N, Zahiruddin QS, Gaidhane AM, Waghmare L, Srivatsava T, Goyal RC, Zodpey SP, Johrapurkar SR. Predictors for antenatal services and pregnancy outcome in a rural area: a prospective study in Wardha district, India. Indian J Med Sci. 2009 Oct;63(10):436-44. PubMed PMID: 19901482. [PubMed]
5. Agarwal K, Agarwal A, Agarwal VK, Agarwal P, Chaudhary P. prevalence and determinants of "low birth weight" among institutional deliveries. Annals of Nigerian Medicine. 2011; vol 5(2): 48-52. [Google Scholars]
6. Kaushal, S. K., Misra, S. K., Gupta, S. C., & Singh, R. (2012). A Study of Maternal Factors And Birth Weight In A Border District Of Uttar Pradesh. Indian Journal of Community Health (IJCH), 24(2), 86-90. [Google Scholars]
7. Som S Jr, 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 Sep;10(2):159-71. Epub 2004 Sep 15. PubMed PMID: 22691737. [PubMed]
8. Mumbare SS, Maindarkar G, Darade R, Yenge S, Tolani MK, Patole K. Maternal risk factors associated with term low birth weight neonates: a matched-pair case control study. Indian Pediatr. 2012 Jan;49(1):25-8. Epub 2011 May 30. PubMed PMID: 21719926 [PubMed]
9. Deshpande J.D, Phalke DB, Bangal V B, D Peeyuusha, Bhatt S. Maternal risk factors for low birth weight neonates: a hospital based case-control study in rural area of western Maharashtra, India. National Journal of Community Medicine.2011;2(3): 394-98. [Google Scholars]
10. Mavalankar DV, Trivedi CR, Gray RH. Levels and risk factors for perinatal mortality in Ahmedabad, India. Bull World Health Organ. 1991;69(4):435-42. PubMed PMID: 1934237; PubMed Central PMCID: PMC2393232. [PubMed]
11. Acharya D, Nagraj K, Nair NS, Bhat HV. Maternal determinants of intrauterine growth retardation: a case control study in Udupi District, Karnataka. Indian J Community Med. 2004;29:181-3. [Google Scholars]
12. Das JC, Paul N. association of maternal socio-biological factors with birth-weight of newborn baby. JCMCTA 2008; 19 (1):37-42.
13. Deswal BS, Singh JV, Kumar D. A Study of Risk Factors for Low Birth Weight. Indian J Community Med.1999;24 : 127-131. [Google Scholars]
14. Dasgupta S, Saha I, Mandal AK. A study on profile of stillbirths. J Indian Med Assoc. 1997 Jun;95(6):175, 178. PubMed PMID: 9420394. [PubMed]
15. Deshmukh JS, Motghare DD, Zodpey SP, Wadhva SK. Low birth weight and associated maternal factors in an urban area. Indian Pediatr. 1998 Jan;35(1):33-6. PubMed PMID: 9707902. [PubMed]
16. Kamaladoss T, Abel R, Sampathkumar V. Epidemiological co-relates of low birth weight in rural Tamil Nadu. Indian J Pediatr. 1992 May-Jun;59(3):299-304. PubMed PMID: 1398861. [PubMed]

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Tables

TABLE NO. 1 SOCIO-DEMOGRAPHIC FACTORS OF MOTHER AND BIRTH WEIGHT OF NEWBORN

Variables	LBW	NBW	Total	Result
Mother's Age				
<20 Years	35 (87.50%)	5 (12.50%)	40 (100)	
20-30 Years	34 (17.17%)	164 (82.83%)	198 (100)	
>30 Years	26 (78.79%)	7 (21.21%)	33 (100)	
Total	95 (35.06%)	176 (64.94%)	271 (100)	P<0.01
Mother's Education				
Illiterate	48 (50.53%)	33 (18.75%)	81 (29.89%)	
Up To Primary	28 (29.47%)	78 (44.32%)	106 (39.11%)	
Up To High School	12 (12.63%)	36 (20.45%)	48 (17.71%)	p<0.05
Intermediate and above	7 (7.37%)	29 (16.48%)	36 (13.28%)	
Total	95 (100%)	176 (100)	271 (100%)	
Father's Education				
Illiterate	28 (29.47%)	19 (10.80%)	47 (17.34%)	
Up To Primary	25 (26.32%)	34 (19.32%)	59 (21.77%)	
Up To High School	22 (23.16%)	68 (38.64%)	90 (33.21%)	p>0.05
Intermediate And Above	20 (21.05%)	55 (31.25%)	75 (27.68%)	
Total	95 (100%)	176 (100%)	271 (100%)	
Standard of Living Index				
Low	72 (75.79%)	53 (30.11%)	125 (100%)	
Medium	19 (20.00%)	112 (63.64%)	131 (100%)	
High	4 (4.21%)	11 (6.25%)	15 (100%)	P<0.01
Total	95 (35.06%)	176 (64.94%)	271 (100%)	
Religion				
Hindu	59 (28.78%)	146 (71.22%)	205 (100%)	
Muslim	36 (54.55%)	30 (45.45%)	60 (100%)	
Total	95 (35.06%)	176 (64.94%)	271 (100%)	p>0.05

TABLE NO. 2 ANTE NATAL CARE RELATED VARIABLES OF MOTHER AND BIRTH WEIGHT OF NEWBORN

Variables	Low Birth Weight	Normal Birth Weight	Total	Result
Parity				
Primiparous	39 (52.70%)	35 (47.30%)	74 (100%)	
Multi-Parous	30 (18.18%)	135 (81.82%)	165 (100%)	
Grand-Multiparous	26 (81.25%)	6 (18.75%)	32 (100%)	P<0.05
Total	95 (35.06%)	176 (64.94%)	271 (100%)	
Interpregnancy Interval (in months)				
<18	41 (78.85%)	11 (21.15%)	52 (100%)	
18-24	9 (18.00%)	41 (82.00%)	50 (100%)	
>24	6 (6.32%)	89 (93.68%)	95 (100%)	P<0.01
Total	56 (28.43%)	141 (71.57%)	197 (100%)	
Haemoglobin (gm%)				
<7 gm%	25 (80.65%)	6 (19.35%)	31 (100%)	
7-10 gm%	60 (49.18%)	62 (50.82%)	122 (100%)	
10-11 gm%	7 (7.78%)	83 (92.22%)	90 (100%)	P<0.01
>11 gm%	3 (10.71%)	25 (89.29%)	28 (100%)	

Variables	Low Birth Weight	Normal Birth Weight	Total	Result
Total	95 (35.06%)	176 (64.94%)	271 (100%)	
Ante Natal Care				
Nill	23 (57.50%)	17 (42.50%)	40 (100%)	
<3 ANC Visits	65 (39.39%)	100 (60.61%)	165 (100%)	
≥3 ANC Visits	7 (10.61%)	59 (89.39%)	66 (100%)	
Total	95 (35.06%)	176 (64.94%)	271 (100%)	P<0.05
Physical Activity				
Light	10 (14.71%)	58(85.29%)	68 (100%)	
Moderate	78 (40.41%)	115 (59.59%)	193 (100%)	P<0.05
Hard	7 (70.00%)	3 (30.00%))	10 (100%)	
Total	95 (35.06%)	176 (64.94%)	271 (100%)	