

Biosocial determinants of birth weight in a rural PHC of North Karnataka: a cross-sectional study

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Abstract

Background: Birth weight is influenced by various biosocial factors, and many unfavorable conditions may affect the health and general well-being of the mother. One particular factor cannot be attributed to the incidence of low birth weight (LBW).

Objective: To determine the biosocial determinants of birth weight in rural Karnataka, India.

Materials and Methods: This was a cross-sectional study conducted at a rural Primary Health Centre of Belgaum district of Karnataka. All the 159 women delivered during the time of study period were included in the study. Proportion and χ^2 -test were applied to see the association between different variables.

Results: The prevalence of LBW was 27.7%. The birth weight of children was associated with age, educational status, socioeconomic status, and interpregnancy interval of the mothers ($p < 0.05$).

Conclusion: The study suggests that the awareness about the locally available nutritious food for dietary intake should be increased. The culture of marrying the daughter of age less than 18 should be discouraged by imparting the health education regarding its impact on health.

KEY WORDS: Birth weight, interpregnancy interval, biosocial determinant, pregnancy

Introduction

Low birth weight (LBW) still remains a major public health problem in developing countries and the major concentration is seen in two regions, namely, Africa and Asia. Birth weight is influenced by biosocial factors, and a variety of unfavorable conditions may affect the health and general efficiency of mother.^[1] This entails a better understanding of

the multifactorial origins of LBW in India, in which social and economic factors contribute significantly.^[2] LBW is one of the serious challenges in maternal and child health in both developed and developing countries. Its public health significance may be ascribed to numerous factors: its high incidence; its association with mental retardation and high risk of perinatal and infant mortality and morbidity; human wastage and suffering; the very high cost of special care and intensive care units; and its association with socioeconomic under development, a birth weight below 2,500 g contributes to a range of poor health outcomes.^[3]

Globally, more than 20 million infants are born with LBW. The level of LBW in developing countries (16.5%) is more than double the level in developed regions (7%). More than 95% LBW babies are born in developing countries. In India, 18 million LBW infants are still born, the prevalence of LBW stands at 27.6%.^[4] There are more than 1 million infants born with LBW in China and nearly 8 million in India.^[5]

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It is difficult to find out a particular single factor that influences the incidence of LBW. Some of the biosocial factors, such as maternal age, maternal education, parity, sex of the baby, antenatal care, height, weight, gestation, maternal illness, and socioeconomic conditions, besides others have been postulated to determine the birth weight of the newborn. Babies having LBW are more susceptible to infection and they do not grow to their full potential of physical and mental abilities and start life at disadvantage.^[6] Several studies have explored biosocial determinants of LBW, but not so much in rural Primary Health Centre (PHC) of north Karnataka, India, in recent times. This study was conducted at the rural setting of Belgaum district to determine the biosocial determinants of birth weight.

Materials and Methods

Table 1: Distribution of sociodemographic variables

Variables		Frequency (n = 159)	Percentage (%)
Age of the mothers in completed years	≤20	28	17.6
	21–25	50	31.4
	26–30	47	29.6
	31–35	34	21.4
Educational status of the mothers	Illiterate	35	22.0
	Primary	41	25.8
	Secondary	40	25.2
	Preuniversity	43	27.0
Religion of the mothers	Hindu	86	54.1
	Muslim	52	32.7
	Christian	21	13.2
Occupation of the mothers	Housewife	97	61.0
	Farmer	23	14.5
	Business	13	8.2
	Employee	14	8.8
	Others	12	7.5

This was a cross-sectional study conducted at a rural PHC of Belgaum district, Karnataka, for a period of 1.5 years, from August 1, 2011 to March 31, 2013. All the women (n = 159) delivered during this period were included in the study. The weight of newborns was measured using standardized Salter Weighing Scale. The weighing machine was tested from time to time using standard weights. Weight was determined by placing the neonate on the weighing machine within few minutes after birth. The Auxiliary Nurse Midwife was trained on weighing the newborns. The socioeconomic status (SES) was assessed and categorized into five classes using updated B.G. Prasad social classification.

A pretested questionnaire was used to collect the information regarding biosocial determinants of birth weight. External review of the tools and necessary ethical clearance from institutional ethics committee of Jawaharlal Nehru Medical College, KLE University, Karnataka, India, was obtained for the study. Proportion and χ^2 -test were applied to see the association between different variables. The Statistical Package for Social Sciences software, version 16 (SPSS 16), was used to analyze the data.

Results

The sociodemographic characteristics are given in Table 1. In this study, the prevalence of LBW was found to be 27%; Table 2 indicates the proportion of LBW was higher among teenage mothers (75%) and progressively decreased as age of mother increased. Age of the mothers ($p < 0.05$) was found to be statistically significant with the birth weight of newborns. The proportion of LBW newborns of mothers who were illiterate was high (54.1%) followed by mothers with primary (34.1%), secondary (17.5%), and pre university (11.6%) level of education. The LBW decreased as the literacy standards increased. It is obvious that the higher the literacy rate, the better the outcome of pregnancy. Educational status of the mothers ($p < 0.05$) was found to be statistically significant with the birth weight of newborns.

Table 2: Association of age and education of the mother with birth weight of newborns

Birth weight (g)	Age (years)				Total
	<20	21–25	26–30	31–35	
≤2,500	21 (75%)	10 (20%)	7 (14.9%)	6 (17.6%)	44 (27.7%)
>2,500	7 (25%)	40 (80%)	40 (85.1%)	28 (82.4%)	115 (72.3%)
Total	28 (17.6%)	50 (31%)	47 (29%)	34 (21%)	159 (100%)

$$\chi^2 = 38.348, df = 3, p = 0.000$$

Birth weight (g)	Education status of the mother				Total
	Illiterate	Primary	Secondary	Preuniversity	
≤2,500	18 (54.1%)	14 (34.1%)	7 (17.5%)	5 (11.6%)	44 (27.7%)
>2,500	17 (48.6%)	27 (65.9%)	33 (82.5%)	38 (88.4%)	115 (72.3%)
Total	35 (22%)	41 (25.7%)	40 (25.1%)	43 (27%)	159 (100%)

$$\chi^2 = 18.326, df = 3, p = 0.000$$

Table 3: Association of socioeconomic status of the mother with birth weight of newborns

Birth weight (g)	Socio economic status					Total
	Class I	Class II	Class III	Class IV	Class V	
≤2,500	5 (10.9%)	6 (15.8%)	9 (36%)	10 (38.5%)	14 (58.3%)	44 (27.7%)
>2,500	41 (89.1%)	32 (84.2%)	16 (64%)	16 (61.5%)	10 (41.7%)	115 (72.3%)
Total	46 (28.9%)	38 (23.9%)	25 (15.7%)	26 (16.4%)	24 (15.1%)	159 (100%)

$$\chi^2 = 22.821, df = 4, p = 0.000$$

Table 4: Association of interpregnancy interval with birth weight of newborns

Birth weight (g)	Interpregnancy interval (months)			Total
	<12	12–24	>24	
≤2,500	10 (55.6)	14 (31.1%)	6 (15.8%)	30 (29.7%)
>2,500	8 (44.4%)	31 (68.9%)	32 (84.2%)	71 (70.1%)
Total	18 (17.8%)	45 (44.6%)	38 (37.6%)	101 (100%)

$$\chi^2 = 9.327, df = 2, p = 0.009$$

LBW was found higher in mothers who belonged to socioeconomic class V (58.3%). The LBW decreased as SES increases. In this study, birth weight of newborns was found to be statistically significant ($p < 0.05$) with SES of mothers [Table 3].

This study showed that the proportion of LBW newborns was high (55.6%) when interpregnancy interval was less than 12 months and it was lower among mothers who had interval of more than 24 months. The proportion of LBW newborns decreased with increase in interpregnancy interval. In this study, birth weight of newborns was found to be statistically significant ($p < 0.05$) with interpregnancy interval [Table 4].

Discussion

The prevalence of LBW in this study (27%) was almost same compared to the LBW incidence in the general population in India, which stands at 27.6%.^[9] A study conducted in Mumbai urban showed that the prevalence of LBW was 28.35%.^[7] Another study conducted in rural urban Nagpur showed that the prevalence of LBW newborns was 37.68%.^[11] In another study conducted at Goa showed the prevalence of LBW was 33.6%.^[8] The findings of our study showed the similar trends as of other places.

In this study, biosocial factors are significantly associated with the birth weight of the newborns. Age of the mother was significantly associated with birth weight of newborns. Mothers below the age of 20 years gave birth to higher proportion of LBW newborns. It was observed that as the educational status of mothers increases the incidence of LBW newborns decreases. Socioeconomic classes IV and V constituted the highest number of LBW newborns. Lesser the interpregnancy interval, more the risk of delivering LBW.

This study showed that the proportion of LBW was high (75%) among the mothers whose age was less than 20 years. Similar results observed in the study conducted

at Nagpur reported higher proportion of LBW among teenage mothers (41.9%).^[11] Higher (36.5%) proportion of LBW was found in the mothers whose age was between 16 and 20 years in a study conducted at Mumbai.^[7] Despite the efforts made by the government to prevent child and teenage marriages, the trends have not reduced, especially at rural side. From our study it is evident that many delivered mothers got married and conceived before even reaching 18 years of age.

The proportion of LBW was high (54.1%) among illiterate mothers in this study. Same results were found in the studies conducted at Hyderabad and Assam,^[9,6] with the proportion of LBW among the illiterate mothers being 73% and 28.6%, respectively. Higher number of LBW newborns was found in the socioeconomic class IV (38.5%) and V (58.3%). Our results have similarity with the findings of the study conducted at Vientiane, Japan, where 68.9% belonged to the upper class and 19.1% to the middle class.^[10] Low SES often results in poor nutrition of the pregnant mother. Despite all the efforts made by the government through the national programs, such as reproductive and child health program and the WHO program for multiple micronutrient supplementation for women during pregnancy, the issue of incidence of LBW babies due to poor nutrition has not been addressed.^[11,12] In our study, we found that 22% of our participants were illiterate; although the government is making effort to educate the Indian women through programs such as Mahila Samakhya Programme, the literacy rate is still low in rural part of the India.^[13] It is a hard reality to know the prevalence of LBW is still higher in developing countries.

Conclusion

Birth weight remained an important factor affecting the neonatal and infant mortality and morbidity. LBW babies are more likely to have disabilities in form of developmental

delay, poor growth, and mental disabilities. This cross-sectional study conducted in rural delivered women showed evidence of an association between few biosocial factors such as age, education, SES, and interpregnancy interval of the mother with birth weight of newborns.

The awareness about the locally available food for dietary intake should be increased. Focus should be given on strengthening the counselling programs to increase the knowledge of ANC checkup and the birth spacing at community level. The culture of marrying the daughters of age less than 18 should be discouraged by imparting the health education regarding its impact on health.

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