Original Research Article

A study of maternal factors influencing birth weight in newborn in a tertiary care hospital

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ABSTRACT

Background: Low birth weight (LBW) is a major public health problem which needs to be addressed. The maternal factors play a major role in the child's weight. The main aim is to identify the risk factors in the mother and appropriately manage so as to reduce the effects on children. Aim was to study the maternal risk factors influencing the weight of the baby in a tertiary care hospital at Pondicherry.

Methods: A total of 225 babies were included in the study. Birth weight was recorded within 30 minutes after birth. Mother's details were collected using a questionnaire. The collected data was analyzed using statistical package for the social sciences (SPSS) version 21.

Results: A total of 225 babies and their mothers were enrolled in the study where 124 were males and 101 were females. 204 were term and 21 were preterm. Mean age of the mothers was 22.52±3.33 years, mean weight noted was 62.94±10.09 kg and mean height was 160.1±7.15 cm. The study showed associations between birth weight and mother's age, weight, height, hemoglobin (Hb) %, birth interval, income, bad obstetric history and complications.

Conclusions: This study concluded that maternal factors are associated with birth weight owing to mother's age, weight, height, anemia, birth interval, bad obstetric history with complications and family income. This calls for better management of mothers at the initial stages of pregnancy to reduce LBW and morbidity and mortality. Health education and large-scale awareness programs implementation can reduce and prevent this public health problem.

Keywords: Birth weight, Low birth weight, Maternal factors

INTRODUCTION

A well know slogan stated by the World Health Organization (WHO): healthy child is the wealth of our nation/child's health is tomorrow's wealth. A healthy child is born when the mother is healthy which is interrelated.[1] A birth weight of <2500 grams irrespective of gestational age is defined as low birth weight by WHO.[2] In India the incidence of low-birth-weight (LBW) range between 25-30% and majorly intrauterine growth restriction (IUGR) seems to be the biggest contributor.[3]

Many evident studies show the incidence of LBW is lower in developed countries when compared with developing countries of which some even suggested the rate is twice higher.[4] A developing country like India, gap in health care survival and complications of LBW stills remains a major challenge. Birth weight is a credible and accepted variable which is directly related with nutrition and health of the mother. LBW continues to be a public health problem causing disabilities and mortalities. Some of the factors that influence the birth weight are teenage pregnancies, malnutrition, anemia, reduced spacing between pregnancies and bad obstetric history. There is a need to reduce and prevent LBWs and should be a public priority.[4]

The present study was undertaken to assess the association between the baby weight and maternal factors influencing it.

Aim

Aim of the research was to study the maternal risk factors influencing the weight of the baby in a tertiary care hospital at Pondicherry.

Objectives

Objectives of the research was to determine the association between maternal risk factors and birth weight.

METHODS

Study design

The design of the study was cross-sectional. The study was conducted in the department of pediatrics at Aarupadai Veedu Medical College and Hospital, Puducherry**.**

Study population

All babies born in AVMC hospital were a part of the study population.

Study duration

The duration of the study was from November 2020 to October 2021.

Inclusion criteria

All babies born in AVMC, and participants willing to participate in the study with informed consent of the mother were included in the study.

Exclusion criteria

Babies with gross malformations, moribund babies, neonatal intensive care unit babies, and mothers unwilling for consent were excluded.

Sample size

Considering the prevalence of LBW in India to be 32.7%.[5] The sample size was calculated for our study using the given formula.

$$N = 4pq/L^2$$

Where p=32.7%, q=67.3% (100-p), and L=20%

Sample size works out to 197 subjects with the above formula and as the study progressed 225 babies were included in total.

Study procedure

After obtaining consent, the demographic and medical data of the babies were collected by obtaining detailed history, clinical examination and routine investigations. Weight of the baby was taken within half an hour after birth along with mothers' details were noted for all the participants.

Data collection tools

All the relevant parameters were documented using a standard and structured proforma. The proforma contained the following details: demographic parameters – like age, gender, educational status, occupation and income; medical illness – fever and other comorbid illness; all baseline parameters were checked (pulse, blood pressure, height, weight, and body mass index); and clinical examination findings were noted.

Ethical issues

Ethical clearance was obtained from the institutional human ethical committee. Informed consent was obtained after elaborating the risks and benefits of the study and in a language participant could understand. Confidentiality of the study participants was maintained throughout the trial conduction and dissemination of the study results.

Data entry and analysis

The data collected was coded, entered on a Microsoft excel work sheet and exported to statistical package for the social sciences (SPSS). The data was analyzed using SPSS version 21. Data is presented as percentage in categories and presented as tables. Paired test was used for test of significance.

RESULTS

The total number of subjects in the present study was 225 babies were 124 were males and 101 were females (Table 1). Table 2 shows the demographic distribution where majority of the subjects were Hindus, 50.7% had secondary education and 35.6% were graduates. Most of the subjects were unemployed/housewife (68.5%) followed by 13.3% were working professionals. 92.9% of the subjects belonged to upper class and 6.2% belonged to upper middle class. Table 3 shows the distribution of babies according to birth weight were 190 of them were normal weight and 35 were low birth weight. The mean birth weight was 2.91±0.43 kg. Out of the 225 babies 204 were term babies and 21 were pre-term. The mean age of the mothers was 22.52±3.33 years, mean weight noted was 62.94±10.09 kg and mean height was 160.1±7.15 cm (Table 4).

Table 5 shows the maternal factors where the interval between pregnancies was above 2 years in 118 women and below 2 years in 25. The mothers were divided based on their hemoglobin (Hb) % were 108 had level above 11g/dl, 96 had level between 9-10.9g/dl (mild anemia), 21 mothers' level was between 7-8.9 g/dl (moderate anemia) and none had severe anemia. Bad obstetric history was

seen in 107 mothers and 133 had complications during pregnancy.

Table 1: Distribution of subjects according to sex.

Sex	Frequency	Percent (%)
Males	124	55.1
Females	101	44.9
Total	225	100

Table 2: Sociodemographic distribution of the mothers.

Sociodemographic parameters	Frequency	Percent (%)
Religion		
Hindu	204	90.7
Muslim	09	4
Christian	12	5.3
Education		
Primary	33	14.7
Secondary	114	50.7
Degree	78	35.6
Occupation		
Service	30	13.3
Skilled	14	6.2
Semi-skilled	09	4
Unskilled	11	4.9
Self employed	07	3.1
Unemployed/house wife	154	68.5
Socio-economic status		
Upper (>7008)	209	92.9
Upper middle (3504-7007)	14	6.2
Middle (2102-3503)	02	0.9

Table 6 shows the association between baby weight and maternal factors where the association was noted among all the parameters. A highly significant (p<0.001) association was noted when the weight of baby was compared with the mothers' age, weight, height, Hb%, interval between pregnancies, bad obstetric history, complications during pregnancy and Income.

Table 3: Distribution of subjects according to weight and gestational age of baby.

Weight	Frequency	Percent (%)
Low birth weight	35	15.6
Normal birth weight	190	84.4
Mean birth weight: 2.91±0.43 kgs		
Gestational age		
Term (37-40 weeks)	204	90.7
Pre-term (<37 weeks)	21	9.3
Total	225	100

Table 4: Distribution of mothers according to age, weight and height.

Maternal factors	Mean
Age	22.52±3.33 years
Weight	62.94±10.09 kg
Height	160.1±7.15 cm

Table 5: Distribution of maternal factors.

Factors	Frequency	Percent (%)
Interval between pregnancies (years)		
>2	118	52.4
<2	25	11.1
Primi	82	36.4
Anemia (g/dl)		
Normal (>11)	108	48
Mild (9-10.9)	96	42.6
Moderate (7-8.9)	21	9.4
Severe (<7)	--	--
Mean Hb level: 10.83±1.38 g/dl		
Bad obstetric history		
Yes	107	47.5
No	118	52.5
Complications		
Yes	133	59.1
No	92	40.9

Table 6: Association between weight of the baby and maternal factors.

Association	Mean	SD	95% CI		P value
			Lower	Upper	
Weight of baby × age of mother	19.60	3.37	20.049	19.16	<0.001*
Weight of baby × weight of mother	60.03	10.02	61.352	58.719	<0.001*
Weight of baby × height of mother	157.24	7.002	158.169	156.329	<0.001*
Weight of baby × mothers Hb%	7.92	1.43	8.115	7.737	<0.001*
Weight of baby × interval between pregnancies	1.754	0.566	1.660	1.847	<0.001*
Weight of baby × bad obstetric history	1.384	0.664	1.296	1.471	<0.001*
Weight of baby × complications during pregnancy	1.504	0.632	1.421	1.588	<0.001*
Weight of baby × income	15936.8	10317.7	17295.36	14575.28	<0.001*

*Statistical significance ≤0.05

DISCUSSION

In the present study majority of the mothers were educated above secondary school. Meresa et al suggested 72.4% were educated.[6] Out of the 225 babies 35 were low weight and 190 were normal, with regards to gestational age 21 were preterm and 204 were term babies Nirmali study among 300 babies showed 78 were below 2.5 kgs (LBW), 35 were preterm and 265 were term babies.[7] The mean age, weight and height of the mothers were 22.52±3.33 years, 62.94±10.09 kg and 160.1±7.15 cm. Meresa et al reported 26.9±5.86 years, 63.3% were >50 kgs and 90.9% of the mothers were above 150 cms.[6] A study by Christopher et al showed 28.6±5.85 years was the mean age and 72.6±12.55 kgs.[8] Out of the 225 subject's mothers 52.4% of them, the interval between pregnancies was above 2 years and 11.1% were below 2 years. A study by Meresa et al suggested 87% of the subjects had 2 years inter-pregnancy gap.[6] In the present study 117 mothers had hemoglobin levels below 11 g/dl whereas a study by Singh et al on comparison between LBW and control group reported 55 subjects had Hb% <11 g/dl.[9] The present study was also consistent with Muftah where anemic mothers had odds higher to deliver low weight babies.[10] The study done by Meresa et al showed 18.8% had bad obstetric history and 11% had complications during pregnancy whereas our study showed 47.5% and 59.1% respectively.[6] In a study by Singh et al mentioned hypothyroid, gestational diabetes, hypertension, malpresentations, fetal distress and preterm were major contributors of bad obstetric history.[9]

The present study showed maternal factors had influence on the weight of the baby which was statistically significant (p<0.001). A study by Nirmali, Kramer et al and Mavalankar shows age and height of the mother had influence on the babies' weight whereas on a contrary Amin et al reported there was no significant association.[7,11-13] The weight of the baby was highly influenced by the interval between pregnancies in this study and a strong significant association was noted. The studies by Seidman, et al and Maruoka et al also suggested an evident association between birth interval and weight of the baby.[14,15] Bad obstetric history played a role influencing the weight of the baby which was also suggested in the study by Singh et al were hypertension (p<0.001), malpresentations (p=0.03) and preterm (p<0.001) were found associated and considered as bad obstetric history.[9] Complications and bad obstetric history was also reported to be associated in a study by Bener et al were gestational diabetes mellitus (GDM), antepartum hemorrhage; anemia, consanguinity and smoking were significant.[16]

A study by Rebecka et al reported LBW was prevalent among low socio-economic families which was comparable with this study.[17] Raje et al in their study suggested higher income group had association with birth weight were mothers gained weight throughout the pregnancy and babies were heavier.[18]

CONCLUSION

The present study concluded maternal factors are associated with birth weight mainly owing to mother's age, weight, height, anemic condition, interval between pregnancies, bad obstetric history with complications and income of the family. This calls for better management of mothers at the initial stages of pregnancy in order to reduce LBW and even mortality. Health education and large-scale awareness programs need to be implemented to reduce and prevent this public health problem.

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