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Original Research Article

A study of maternal factors influencing very low birth weight babies

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ABSTRACT

Background: Very low birth weight (VLBW) infants present one of the greatest medical and ethical challenges to the medical field. Although they represent a small percentage of overall birth and NICU admissions, VLBW infants are often the most critically ill and at the highest risk for mortality and long-term morbidity of any NICU patients. The present study was conducted with aim to find out the maternal risk factors related to VLBW of newborn.
Methods: This prospective case control study was conducted in Govt. R.S.R.M Lying in Hospital, which is affiliated to Stanley Medical College, during the period from January 2005- December 2005. The data related to maternal and new born variables were collected and evaluated by using Chi square test. P value less than 0.05 was considered as statistically significant.
Results: The incidence of VLBW newborns was found to be 2.08%. The most common cause of VLBW is preterm delivery (84%). Maternal factors like age, weight, parity, literacy, mid arm circumference, income, bad obstetric history of the mother and birth interval showed a significant association with the incidence of VLBW of the infants (P <0.05). Antenatal visits, maternal occupation and maternal disease had no significant (P >0.05) influence on the delivery of VLBW babies.
Conclusions: In the present study, incidence of VLBW was associated with the maternal factors like age, parity, literacy, nutritional status, income, birth interval and previous history of bad obstetrics. Hence, the study concludes that pregnant women need to be careful of all these above factors so as to avoid VLBW babies.

Keywords: Maternal factors, New born variables, Very low birth weight

INTRODUCTION

The world Health Organization has defined low birth weight as babies weighing less than 2500 gm's at birth, irrespective of their gestational age.[1] In developed countries the incidence of low birth weight is less than 10% whereas in developing countries it is in the range of 15-30% of the total birth. In India about 30% of babies born are of low birth weight.[2,3] Out of this 30%, 10% is due to preterm deliveries and the remaining is due to intrauterine growth retardation. Due to improvement in health facilities and improvement in people's standard of living all over the world, the mortality and morbidity rates of low birth weight infants have been substantially reduced over the past years. Now the major concern, lies in reducing the mortality and morbidity rates of infants weighing less than 1500 gms (very low birth weight) at birth.

In developed countries because of improvement in health care facilities, and increased funds spent for health, the problem of very low birth weight has been reduced. But in developing country like India, where there are lacunae in health care facility and funds, the survival and long-

term complications of very low birth weight babies still remain the challenge.

The high incidence of neonatal morbidity and mortality in our country is due to neglect of nutrition, health and education of female children and poor status and empowerment of women in society. Early teenage marriages, frequent preganancies, maternal malnutrition, fewer antenatal consultations, bad obstetric history, medical diseases complicating pregnancy and maternal infections are important contributory factors for the increased incidence of very low birth weight in India.

There are various studies relating socio-demographic maternal factors in association with low birth weight. But only very few studies have been dealt with very low birth weight (VLBW) and maternal factors. Keeping all these in views, an attempt has been made to carry out a study on maternal factors, associated with very low birth weight babies (birth weight less than 1500 gms).

METHODS

This prospective case control study was conducted in Govt. R.S.R.M Lying in Hospital, which is affiliated to Stanley Medical College, during the period from January 2005- December 2005. Inclusion criteria were all newborns delivered in Govt. R.S.R.M. Lying in Hospital and admitted in NICU (Neonatal Intensive Care Unit) with birth weight less than 1500 gms (very low birth weight) irrespective of gestational age and only mothers of live-born singleton babies with no identifiable major congenital malformations and constituted as very low birth weight (VLBW) group. Exclusion criteria included still births, multiple pregnancies and newborns with major congenital anomalies and syndromes.

An equal number of newborns of weight more than or equal to 2500 gms selected by simple randomized technique on the very same day of the selection of study group, irrespective of gestational age were included in the study and constituted as normal birth weight (NBW) group. A total of 224 controls and 224 cases were enrolled in the study after meeting inclusion criteria.

The maternal study variables were age, parity, weight and height of the mother, birth interval, mid arm circumference, literacy of the mother, per capita income per month, family structure, mother's occupation, antenatal care, maternal disease during the antenatal period (anaemia, pregnancy induced hypertension, antepartum hemorrhage, heart disease complicating pregnancy/ diabetics mellitus, oligohydramnios, uti and chronic renal disease, viral hepatitis, structural anomalies of uterus and cervix, hydramnios, malaria, brochial asthma), bad obstetric history.

Newborn study variables were weight of the newborn, assessment of gestational age of newborn and sex of the child. Gestational age can be assessed by (1) calculating the expected data of delivery from the last menstrual period. (2) by ultrasound examination. In this study, the gestational age of newborn was confirmed by using modified Dubowitz (Ballard) examination for newborns. It assigns a score to various criteria, the sum of all of which is then extrapolated to the gestational age of the fetus. These criteria are divided into neurological and physical maturity. This scoring permits the estimation of age in the range of 26-44 weeks. The New Ballard Score is a modified scoring system of the above to include extremely pre-term babies i.e. up to 20 weeks.[4]

Statistical analysis between study and control group were analysed using Pearson Chi squared test and the test is considered significant if p value is less than 0.05.

RESULTS

A total number of 252 newborns with birth weight less than 1500 gms were admitted in NICU out of 12104 live births in one year. In that 24 are multiple births and 4 had major congenital malformations. On excluding both multiple births and congenital malformations, only 224 newborns were included in the study for one year. The incidence of VLBW newborns was found to be 2.08%.

The most common cause of VLBW is preterm delivery (84%). In that preterm AGA constitutes 74% and preterm SGA constitutes 10%. The remaining 16 % is from term SGA babies (40).

Table 1: Gestational maturity of newborns less than 1500 grams.

Gestational age	Count	%
Preterm AGA	166	74.1
Term SGA	36	16.1
Preterm SGA	22	9.8
Total	224	100.0

Table 2 presents the maternal factors in relation birth weight of the babies. The frequency of very low birth weight babies is more among women aged less than 20 years than mothers with aged more than 20 years.

The incidence of VLBW is more among primis when compared with the other two groups. In this study, 98 primis were excluded from the study group and 70 primis from control group. Mothers with birth interval less than 2 years were found to have more very low birth weight babies than mothers with birth interval more than 2 years.

No correlation found between mother’s height and infants with very low birth weight. Out of 224 mothers in both the groups, 150 mothers in VLBW group and 168 mothers in NBW group were registered before 12 weeks of gestation and others were excluded.

It was found that lower the mothers weight higher the incidence of babies with very low birth weight and the

difference was found to be statistically significant. In mothers with mid arm circumference less than or equal to 20 cm, the incidence of very low birth weight is centpercent.

Table 2: Maternal factors in relation very low birth weight of the babies.

Maternal factors	VLBW group n (%)	NBW group n (%)	Total n (%)	P value
Age (in years)				
<20 years	58 (67)	28 (33)	86 (100)	P =0.002
21-30 years	150 (46)	176 (54)	326 (100)	
>30 years	16 (44)	20 (56)	36 (100)	
Total	224	224	448	
Gravida				
Primi	98 (58)	70 (42)	168 (100)	P =0.017
2 and 3	118 (46)	140 (54)	258 (100)	
>3	8 (36)	14 (64)	22 (100)	
Total	224	224	448	
Birth interval				
< 2 years	80 (57)	58 (43)	138 (100)	P =0.00
> 2 years	46 (32)	96 (68)	142 (100)	
Total	126	154	280	
Mothers height				
<=140 cm	18 (47)	20 (53)	38 (100)	P =0.453
141-149 cm	70 (55)	58 (45)	128 (100)	
=>150 cm	136 (48)	146 (52)	282 (100)	
Total	224	224	448	
Mothers weight				
≤40 kg	38 (68)	18 (32)	56 (100)	P =0.002
41-49 kg	62 (46)	74 (54)	136 (100)	
≥50 kg	50 (40)	76 (60)	126 (100)	
Total	150	168	318	
Mid arm circumference				
≤20 cm	42 (75)	14 (25)	56 (100)	P =0.00
21-22 cm	74 (47)	84 (53)	158 (100)	
>22 cm	108 (46)	126 (54)	234 (100)	
Total	224	224	448	
Mothers literacy				
Illiterate	64 (64)	36 (36)	100 (100)	P =0.006
Primary and middle school	110 (45)	132 (55)	242 (100)	
High school & above	50 (47)	56 (53)	106 (100)	
Total	224	224	448	
Per capita income				
<500	96 (62)	58 (38)	154 (100)	P =0.001
500-999	78 (42)	108 (58)	186 (100)	
≥1000	50 (46)	58 (54)	108 (100)	
Total	224	224	448	
Family structure				
Nuclear	98 (45)	118 (55)	216 (100)	P =0.059
Joint	126 (54)	106 (46)	232 (100)	
Total	224	224	448	
Maternal occupation				
Housewife	176 (52)	162 (48)	338 (100)	P =0.300
Light work	30 (42)	40 (58)	70 (100%)	
Heavy work	18 (45)	22 (55)	40 (100)	
Total	224	224	448	
Antenatal visits				

Cont….Table 2

Maternal factors	VLBW group n (%)	NBW group n (%)	Total n (%)	P value
No visits	8 (57)	6 (43)	14 (100)	
<5 visits	90 (54)	78 (46)	168 (100)	
≥visits	126 (47)	140 (53)	266 (100)	
Total	224 (100)	224 (100)	448	
Maternal disease				
PIH	42(57)	32 (43)	74 (100)	
Anemia	26 (42)	36 (58)	62 (100)	P =0.426
APH	14 (58)	10 (42)	24 (100)	
Others	32 (52)	30 (48)	62 (100)	
Total	114	108	222	
Bad obstetric history				
Present	46 (72)	18 (28)	64 (100)	
Absent	178 (46)	206 (54)	384 (100)	P =0.00
Total	224	224	448	
Sex of the baby				
Male	104 (48)	114 (52)	218 (100)	
Female	120 (52)	110 (48)	213 (100)	P =0.345
Total	224	224	448	

The incidence decreases with an increase in mid arm circumference. There is a significant relation between the educational status of the mother and the child's birth weight. As the literacy rate of the mother increases weight of the baby also increases. There is a clear-cut relation between the per capita income and the incidence of very low birth weight. As the per capita income decreases the incidence of very low birth weight increases which is statistically significant. There is no relation found between family structure, mother's occupation, antenatal visits and the incidence of very low birth weight.

Table 3: Prevalence of maternal diseases in both the study groups.

Maternal diseases	VLBW group	NBW group
Oligohydramnios	6	5
Diabetes mellitus	3	6
Heart disease complicating pregnancy	4	2
UTI/Renal disorders	5	4
Hepatitis	3	2
Malaria	4	6
Uterus and cervical anomalies	3	0
Hydramnios	2	3
Bronchial Asthma	2	2

Out of 224 mothers, 114 from the study group and 108 from control group were found to have maternal diseases. The remaining 226 mothers from the study and control group were excluded. There is no relation between medical diseases complicating pregnancy and the incidence of VLBW as shown in Table 2. Women with other diseases are less in both study as well as in control group as presented in Table 3.

From Table 2 it was noticed that a strong relation was existing between bad obstetric history in the previous pregnancies and VLBW but the sex of the baby had no influence on VLBW babies.

DISCUSSION

The frequency of low birth weight was significantly declining in India over the past years due to improved standard of living of the people, and increased fund allocation for health care by the government. But the incidence of VLBW (less than 1500 gms) is static in nature in our country. It may be due to various factors like socio demographic, maternal obstetric, anthropometric, fetal, genetic and idiopathic.

In country like India where there are economic constraints the present study was done to find the relationship between socio demographic factors, obstetric and anthropometric factors with very low birth weight so that appropriate measures can be taken to reduce the incidence.

In this study, the incidence of very low birth weight is 2.08%. The most common cause of VLBW is preterm delivery which is around 84%.

In this study, the risk of VLBW was significantly higher in young mothers (<20 years). This is in accordance with the studies of Roth et al.[5]

A significant association between primiparity and VLBW was observed in this study. This was comparable with the previous studies of Amin et al, Mallik et al.[6,7]

The incidence of VLBW is high when birth interval is less than 2 years than compared to birth interval more

than 2 years. This may be due to a minimum period of 2-3 years for the mother's nutrition and general condition to attain the pre-pregnancy level. This is supported by Dhar et al and Deshmukh et al.[8,9] From the results, it was evident that mother's height has no relation to the birth weight of the child. But mother's weight showed a significant association with very low birth weight. This incidence of VLBW is higher in women weighing less than 40 kg when compared to women weighing more than 40 kg. These observations are in accordance with the results of Chhabra et al.[10]

Mid-arm-circumference of the mother was cent percent related to incidence of VLBW. Mid-arm-circumference tells the real status of maternal nutrition. The incidence of very low birth weight is high in women with mid-arm-circumference <20 cm.[11] This was similar with the previous study results of Zhang X et al, (43).

Mother's Literacy had a strong relation with VLBW in this study. The incidence of VLBW is more in mothers who are illiterate than in literate mothers. To imply significance of the literary with VLBW, further studies are required which involves the father's education, which is not considered in this study due to reduced feasibility. This is supported by previous studies by Dickute et al.[12]

In the present study, a strong relation between per capita income and very low birth weight was observed. The incidence of VLBW is more when the percapital income is less than 500 per month. This is because nutrition of the mother mainly depends on the percapita income and education.[13] This relation is in accordance with the results of Deshmukh et al.[9]

In this study, there was no significant association between family structure, maternal occupation and antenatal visits with VLBW of the babies. These observations were similar with the studies of Johnson et al.[14] No significant association was seen between the incidence of VLBW and the maternal diseases. This may be due to associated fetal or genetic factors operating both in study and control group.[15] Similar results was noticed by Johnson et al.[14] But in the previous studies of Arif et al a strong association was observed between pregnancy induced hypertension and ante partum hemorrhage with very low birth weight.[16] Another study conducted by Deshmukh et al and Lawoyin et al, a strong association between anemia and VLBW was seen.[9,17] Ndiaye et al, Oct had found an association between renal disorders and very low birth weight. Even though the percentage of VLBW babies is more in mothers with uterine and cervical anomalies, when compared to control group, the significance ratio cannot be attributed because of reduced number of women is both groups.[18] In this study, there is a cent percent relation between bad obstetric history (BOH) in previous pregnancies with VLBW. The incidence of VLBW is more in mother's who had any one of the BOH mentioned before than the control group. This is supported by Maruoka et al.[19]

In the present study, there is no significant relation between the sex of the child and VLBW. But Mondal et al, in his study had found a relation between sex of the child and VLBW.[20]

CONCLUSION

The overall result of the study concludes that VLBW of the infants was significantly associated with the maternal factors like age, parity, literacy, nutritional status, income, birth interval and previous history of bad obstetrics. Hence, the study implies that pregnant women should be counselled continuously by skilled health persons and nutritionists. There by the health and nutritional status of the same will be improved and the occurrence of very low birth weight babies can be avoided.

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