IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 3 Ver. 1 March. (2018), PP 54-59
www.iosrjournals.org

Prevalenceand Determinants of Low Birth Weight: An Experience from a Secondary Referral Unit Of BurdwanDistrict, West Bengal (India)

Dr. Sanjay Kumar[1], Dr. Rakesh Kumar[2],Ms.Aparna Tewari[3],Dr. Richa[2],Dr. Sasthi Narayan Chakraborty[2],Dr. Tapas Kumar Som[2]
[1](Associate Professor, Dept. of Community Medicine, IQ City Medical College & Narayana Hospital, India)
[2](Assistant Professor, Dept. of Community Medicine, IQ City Medical College & Narayana Hospital, India)
[3](9th Semester MBBS Student, IQ City Medical College & Narayana Hospital, India)
Corresponding author:Dr.Rakesh Kumar

Abstract:*Low birth weight (LBW) defines a heterogeneous group of infants: some are born early, some are born growth restricted, and others are born both early and growth restricted.While the immediate consequences of LBW may be respiratory failure, hypoxia, intra-ventricular hemorrhage, its effect may manifest in adulthood causing a range of non communicable disease like cerebro-vascular accidents, Ischemic heart disease, cancer, metabolic syndrome Our study aims to determine the prevalence and determinants of LBW in a secondary referral unit of Burdwan district, West Bengal (India).This cross-sectional, observational study was conducted among women delivered between may-june 2016 at a secondary referral unit and mother. A total of 332mothers who delivered during data collection period were included in study. Prevalence of LBW was found to be 27.4%. Maternal age<20 years & ≥30 years, Low Maternal education, Rural residence, BPL status, prematurity, high gravid & parity and maternal anaemia & severe maternal complications adversely & significantly (p<.05) favored occurrence of LBW. ANC registration, ≥ 4 ANCand IFA consumption significantly (p<.05) protected against LBW.*

Key Words:*Low Birth Weight, Newborn weight, Severe Maternal Complications, ANC*

Date of Submission:20-02-2018 Date of acceptance: 06-03-2018

I. Introduction

Low birth weight (LBW) has been defined by the World Health Organization (WHO) as weight at birth of less than 2,500 grams (5.5 pounds) [1]. Low birth weight defines a heterogeneous group of infants: some are born early, some are born growth restricted, and others are born both early and growth restricted. It is generally recognized that being born with low birth weight is a disadvantage for the baby.LBW infants are approximately 20 times more likely to die than normal weight babies[2]. WHO estimates that about 25 million LBW babies are born every year, about 95% of them take birth in developing world[3]. Prevalence of LBW varies across regions and within countries. Regional incidence of LBW is 28% is South Asia and is highest among all regions[4]. Prevalence of LBW in different parts of West Bengal ranges between 28%-31.3%[5-6]. Determinants of Birth weight include maternal age, maternal nutrition, non pregnant weight, Gravida & parity, Educational status, etc[7]. Severe maternal complications (SMC) are defined as "potentially life threatening condition"[8] especially pre-eclampsia /eclampsia are associated with LBW[9]. LBW is a public health problem and one of the strongest determinants of infant mortality and morbidity. While the immediate consequences of LBW may be respiratory failure, hypoxia, intra-ventricular hemorrhage, its effect may manifest in adulthood causing a range of non communicable disease like cerebro-vascular accidents, Ischemic heart disease, cancer, metabolic syndrome[10]. Most of the factors responsible for LBW are potentially modifiable and preventable, identification of these risk factors may guide targeted program modification and intervention to address this problem. This study was planned to determine the prevalence and determinants of LBW in a secondary referral unit of Burdwan district, West Bengal (India).

II. Material and Methods

This cross-sectional study was conducted among mother who delivered at a secondary referral unit of Burdwan district, West Bengal (India) between May-June 2016. A total 332 mother participated in this study.

Study Design: Cross-sectional

Study Location: Secondary Referral unit of Burdwan district, West Bengal (India).

Study Duration: May-June 2016.

Sample size: 332

Sample size calculation: Considering 28% prevalence of LBW in West Bengal[5] minimum sample size **(n)** = $Z\grave{\alpha}^2pq/d^2$.Where, $Z\grave{\alpha}$ =1.96 (95% confidence level), p (prevalence) = 0.28, q= (1-p), d=20% of p assuming, possible non-response rate of 10%. Minimum sample size calculated was 293 but we took all those who delivered during study period and consented to participate in study.

Sampling procedure: Non probability, Consecutive sampling.

Study population: Allmothers who delivered at secondary referral unit during data collection period.

Inclusion criteria:
1. Singleton delivery

Exclusion criteria:
1. Twin delivery

Operational Definition[1]:
Normal birth weight: 2500gm-4000gm
Low birth weight: <2500gm

Data Collection:

After obtaining written informed consent, mothers were interviewed using pre-tested, semi structured schedule. Data were collected on the clinic-social variables i.e., age, religion, education, Gravid & parity, mode of delivery, birth weight of baby. Maternal and Child Protection (MCP) card were reviewed to know details of Ante natal checkups (ANC). Bed head tickets (BHT) were also reviewed to collect data regarding complication during pregnancy, delivery outcome and birth weight of baby.

Statistical analysis:

Data were codified and analyzed using SPSS 20.0. Frequency of clino-social variables was calculated. Chi-square test was used to show association between categorical variables and independent t-test was used to show difference in mean weight among low birth weight and normal birth weight babies.

III. Result

Out of 332 newborn 91 (27.4%) were LBW and rest newborn babies were normal weight. Range of Birth weight was 1000-3700gm and mean weight was 2677.29±454.59gms. Table-1 shows the clinic-social characteristics of the study population. Minimum and maximum age of study subjects were 18 years and 40 years respectively .Mean age of the study subjects was 22.85±4.18 years. 66.6% of the study subjects were in the age group of 20-29 years followed by 25.6% and 7.8% in the age group of < 20 years and ≥ 30 years respectively. Majority (84.3%) of the study subjects were Hindu followed by Muslim (15.7%). Most (33.7%) of the participants belonged to Scheduled caste followed by general caste (33.1%), Schedule tribe (17.5%) and other backward caste (15.7%). Majority (78.9%) of the subjects was from rural area and about 51.8% were below poverty line. 38.3% of study subjects received education up to class V, followed by class VI-X (36.1%) and > class X (25.6%). About $2/3^{rd}$ (67.5%) were full term delivery while about $1/3^{rd}$ (32.5%) were preterm. 53.0% study subjects were primi-gravida, 43.4% were multi gravida and 3.6% were grand multi gravid. 53.9% of the subjects were primipara followed by P_{1-2} (42.6%) and P_{3-4} (4.5%). Out of 332 study subjects only 298 (89.8%) registered for ANC and only 53.9% had ≥ 4ANC. While all registered women received Iron & Folic Acid (IFA) tablets, only 72.1% of them actually consumed it. 66.3% were normal deliveries and rest (33.7%) was Lower uterine caesarian section(LUCS). 39.8% of study subjects had anemia. While no maternal deaths were reported during study period 31.9% of study subjects' experienced severe maternal complications. Most common complications was pre-eclampsia (59.3%) followed by Post partum hemorrhage (8.9%), infection (6.2%) and Dystocia (2.7). Table-2 shows the association of factors influencing LBW. Maternal age <20 years & ≥ 30 years, BPL status, less education, rural residence, prematurity, high gravid & parity, anemia and severe maternal complications significantly favored the occurrence of LBW, while, ANC registration, ≥4 ANC and IFA consumption were significantly protected against LBW. Mean birth weight difference between LBW and

normal weight babies were 694.9 grams (table-3). Difference in birth weight of babies was statistically significant.

Table no 1: Shows clinic-social characteristics of study subjects.

Clinico-Social characteristics	n (%)	Clinico-Social characteristics	n(%)
Age		Number of ANC	
<20yrs	85(25.6)	<4	119 (35.9)
20-29 yrs	221 (66.6)	≥4	179 (53.9)
≥30 yrs	26 (7.8)	No ANC	34 (10.2)
Religion		IFA Consumption	
Hindu	280 (84.3)	Yes	215 (72.1)
Muslim	52 (15.7)	No	83 (27.9)
Caste		Anemia	
SC	112 (33.7)	Yes	132 (39.8)
ST	58 (17.5)	No	200 (60.2)
OBC	52 (15.7)	Low Birth Weight	
General	110 (33.1)	Yes	91 (27.4)
Residence		No	241(72.6)
Rural	262 (78.9)	Mode of Delivery	
Urban	70 (21.1)	Normal Vaginal Delivery	220 (66.3)
BPL card holder		LUCS	112 (33.7)
Yes	172 (51.8)	Severe maternal complications(SMCs)	
No	160 (48.2)	Yes	106 (31.9)
Educational status		No	226 (68.1)
Up to class V	127 (38.3)	Disease wise frequency of SMCs*	
Class VI-X	120 (36.1)	Pre-eclampsia/eclampsia	86 (59.3)
>Class X	85 (25.6)	PPH	13 (8.9)
		Infection	9 (6.2)
Gestational age at the time of delivery		Dystocia	4 (2.7)
<37 weeks	108 (32.5)	*total >106 as more than one SMC was present in few study subjects.	
≥37 weeks	224 (67.5)		
Gravida			
Primi-gravida	176 (53.0)		
Multi-gravida (2-4)	144 (43.4)		
Grand Multi-gravida (≥5)	12 (3.6)		
Parity			
P_0	179(53.9)		
P_1-P_2	138(41.6)		
P_3–P_4	15(4.5)		
ANC Registration			
Yes	298 (89.8)		
No	34 (10.2)		

Table no 2: Clinico-social determinants of LBW

C-S Factors	Low Birth Weight Yes (%)	No (%)	Total n (%)	χ^2 (df)	p value
Age Group					
<20 years	39 (45.9)	46 (54.1)	85 (100.0)		
20-29 years	33 (14.9)	188 (85.1)	221 (100.0)	59.1 (2)	0.000
≥30 Years	19 (73.1)	7 (26.9)	26 (100.0)		
Religion					
Hindu	77 (27.5)	203 (72.5)	280 (100.0)		
Muslim	14 (26.9)	38 (63.1)	52 (100.0	0.007 (1)	0.540
BPL status					
BPL	57 (33.1)	115 (66.9)	172 (100.0)		
Not BPL	34 (21.3)	126 (78.8)	160 (100.0)	5.9 (1)	0.019
Educational Status					
≤ Class V	47 (37.0)	80 (63.0)	127 (100.0)		
Class VI- X	28 (23.3)	92 (76.7)	120 (100.0)	10.1 (2)	0.007
>Class X	16 (18.8)	69 (81.2)	85 (100.0)		
Residence					
Rural	80(30.5)	182(69.5)	262(100.0)		
Urban	11 (15.7)	59 (84.3)	70 (100.0)	6.1(1)	0.015
Gestational Age					
< 37 weeks	83 (76.9)	25 (23.1)	108 (100.0)		
≥ 37 weeks	8 (3.6)	216 (96.4)	224 (100.0)	196.7 (1)	0.000
Gravida					
Primi-gravida	50 (28.4)	126 (71.6)	176 (100.0)		

Multi-gravida(2-4)	30 (20.8)	114 (79.2)	144 (100.0)	28.1 (2)	0.000
Grand-gravida(≥5)	11 (91.7)	1(8.3)	12 (100.0)		
Parity					
P_0	47 (26.3)	132 (73.7)	179 (100.0)		
P_1.P_2	33 (23.9)	105 (76.1)	138 (100.0)		
P_3-P_4	11 (73.3)	4 (26.7)	15 (100.0)	16.9(2)	0.000
ANC Registration					
Registered	72 (24.2)	226 (75.8)	298 (100.0)		
Un-Registered	19 (55.9)	15 (44.1)	34 (100.0)	15.4(1)	0.000
IFA Consumption (n=298)*					
Consumed	37 (17.2)	178 (82.8)	215 (100.0)		
Not Consumed	35 (42.2)	48 (57.8)	83 (100.0)	20.4(1)	0.000
Number of ANC(n=332)					
<4	52 (43.7)	67 (56.3)	119 (100.0)		
≥4	23 (12.8)	156 (87.2)	179 (100.0)	41.5(2)	0.000
No ANC	16 (47.1)	18 (52.9)	34 (100.0)		
Anaemia					
Yes	85 (64.4)	47 (35.6)	132 (100.0)		
No	6 (3.0)	194 (97.0)	200 (100.0)	150.6(1)	0.000
Severe Maternal Complications					
Yes	37 (34.9)	69 (65.1)	106 (100.0)		
No	54 (23.9)	172 (76.1)	226 (100.0)	4.4(1)	0.047
Mode of Delivery					
NVD	59 (26.8)	161 (73.2)	220 (100.0)		
LUCS	32 (28.6)	80 (71.4)	112 (100.0)	0.115(1)	0.795

*n=298 because only 298 study subjects were registered for ANC

Table no 3: Independent t-test showing Mean birth weight among newborns (n=332)

Birth Weight (gms)	n=332	Mean±SD	MeanDifference	t test	p-value
< 2500	91	2172.9±304.7	-694.9	16.9	0.000
≥2500	241	2867.76±342.4			

IV. Discussion

In this study, the prevalence of LBW was found to be 27.5%. Mean birth weight came out to be 2677.29±454.59 grams. Studies from other parts of West Bengal reported prevalence of LBW to be between 28%-30%[5-6]. In a study done by Dasgupta A & Basu R, the prevalence of LBW in Sigur block of West Bengal was found to be 28.8%[11]. However, many other National studies conducted in other regions of India (South-11.8%, North India-23.8%) and International studies (Nepal-11.9%, Iran-5.2%, Vietnam-7.9-12.5%, and Northern Ethiopia-10%) reported lower prevalence of LBW than this study[12-17]. As per DLHS-4 (2012-13)[18], prevalence of LBW in West Bengal is 12.4% which is much lower than our study. One possible reason for this may be selective referral of high risk cases to the secondary referral unit. 45.9% of teenage mother and about 3/4th of the elderly mother delivered LBW. This high prevalence of LBW among teenage might be due to lack of awareness, poor nutritional status during adolescents and among elderly may be due to having inadequate spacing between successive pregnancies. Many other studies have reported similar association of teenage & elderly age mothers with the high prevalence of LBW[5,13,19-21].Like many other studies, BPL and less educated women had significantly higher proportion of LBW[6,20-23]. Low birth weight was significantly higher among rural study population. It might be due to lack of accessibility to the health care facility for regular ANC and/or habit of strenuous work habit among rural women. Similar findings were reported by other researchers from across India & outside India[24-27]. Prematurity was significantly associated with low birth weight, which can be justified by the fact that maximum foetal weight gain occurs in the last trimester of pregnancy. Carmen R et al[28]& Jadhao et al[29] reported similar association of prematurity with LBW. Increasing Parity and Gravida was significantly associated with LBW, which may be due to the inadequate spacing. Many other researchers found similar results[5, 13,16,21-23]. Similar to many other studies, ANC registration and ≥ 4 ANC and IFA consumption was found to be significantly protective against LBW[6,12,13,16,21-23]. Maternal anaemia & severe maternal complications significantly and adversely influenced the birth weight. Association of LBW with maternal anaemia and severe maternal complications is also reported by many studies[22-23,30-32]. Mean difference in birth weight among normal & low birth weight newborns was found to be 695 grams and the difference was statistically significant (table-3). While study done by Biswas et al[6] reported no significant birth weight difference among normal & low birth weight babies,Ehsanpour S et al[33] reported a difference of 775.45 grams.

Results of the study cannot be generalized as the study has been conducted in a referral unit which is bound to get more complicated cases.

V. Conclusion

This study conclude that maternal age <20 years and ≥ 30 years, BPL status, poor maternal education, rural residence, prematurity, too many pregnancy, maternal anemia and severe maternal complications are significantly favoring the occurrence of low birth weight while ANC registration, ≥4 ANC visits and IFA consumption are significantly protective against low birth weight. As we can see most of the factors responsible for LBW are modifiable, a robust primary health care coupled with socio-economic development may decrease the burden of LBW.

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