LOW BIRTH WEIGHT: FREQUENCY, DEMOGRAPHIC PROFILE AND ASSOCIATION WITH MATERNAL RISK FACTORS AT A TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Objective: To determine the frequency, demographic profile and association with maternal risk factors of low birth weight babies.

Study Design: Cross-sectional study.

Place and Duration of Study: Neonatal Unit and Obstetrics/Gynaecology department of Combined Military Hospital Kharian, Pakistan, from Mar 2013 to Feb 2014.

Material and Methods: This study was conducted over a period of 12 months. All alive, singleton, low birth weight (LBW) neonates delivered in this hospital over this period were included in study. The sample size was calculated by WHO STEPS sample size calculator Information regarding the neonate and mother was collected in a predesigned proforma. Descriptive statistics were used to analyze and describe data. Frequency and percentage were calculated for categorical (qualitative) variables. Qualitative and quantitative variables were presented in the form of tables. Data was analyzed using SPSS version 17. Chi-square/fisher's exact test was applied for the association of different variables. A *p*-value less than 0.05 considered as a significant value.

Results: Out of total 2810 deliveries, 365 (12.98%) were LBW. Male and female distribution was 45.2% and 55% (*p*-value 0.070). Weight and gestational age relationship parameter showed that 38.6% were Full term LBW (low birth weight) and 53.1% were Preterm AGA (appropriate for gestational age) whilst 8.0% were Preterm SGA (*p*-value 0.001). Distribution of birth weight alone parameter showed <1000 gm babies 3.3%, 1-1.499 kg 11.2%, 1.5-1.999 kg 21.1% and 2.0-2.499 kg 64.4% (*p*-value 0.000).

Among maternal risk factors, maternal age between 20-29 years contributed 58.90% to LBW babies. Only 44.65% were delivered to para1 mothers (*p*-value 0.154). Mothers having anemia were 53.15% (*p*-value 0.003), PIH (pregnancy induced hypertension) 33.42% (*p*-value 0.029) APH (ante partum hemorrhage) 8.21% (*p*-value 0.005) and UTI (urinary tract infection) 11.50% (*p*-value 0.001). It is observed that 52.60% mothers of LBW babies had irregular/no antenatal visits (*p*-value 0.001).

Conclusion: Several risk factors like preterm delivery, maternal age, irregular antenatal check up, anemia, UTI, APH and PIH as significant determinants of LBW, were identified in our study.

Keywords: Incidence, Low birth weight, Maternal risk factors, Pakistan.

INTRODUCTION

LBW is a sensitive detrimental of mortality and morbidity in the neonatal period and beyond. Risk of mortality and morbidity in LBW babies is inversely proportional to birth weight. It is estimated that 25% of infants weighing less than 1500gm die in infancy as compared to 2% weighing between 1500-2499gm and only 0.3% weighing 2500 and above[1]. Singh *et al* reported that low birth weight born babies are forty times more likely to die in the neonatal period than those born with normal weight[2]. Low birth weight contribution to neonatal mortality ranges from 6% in high income countries to 30% in low income countries. Incidence of cerebral palsy, visual and hearing impairment, learning disabilities, autism, low IQ and poor school performance are more common in LBW and VLBW babies than normal weight. Child born as LBW has greater risk of diabetes mellitus, hypertension and cardiovascular diseases in their adult life according to Barker's and thrifty genes/ phenotype hypotheses[3].

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There is significant difference in prevalence of LBW babies in different parts of world especially between developed and developing countries. Its incidence is higher in South Asia and nearly 70% of globally born LBW babies are born in Asia[4]. In Pakistan its reported incidence is 19-30% and a recent study conducted in Karachi has shown incidence of 11.89%[5]. But this may not reflect a true picture of our country as many home delivered and even some hospital born babies are not documented and weighed at birth.

There are two types of LBW babies, preterm and full term according to gestational age. Further LBW baby may be appropriate for gestational age (AGA), small for gestational age (SGA) or large for gestational age (LGA) depending upon percentile of weight. SGA is defined as weight <10th percentile. SGA is classified into symmetrical and asymmetrical depending upon ponderal index (PI). If PI is less than 2.0 between 29-37 weeks and 2.25 beyond 37 weeks of gestation then it is asymmetrical.

Etiology of LBW babies is multifactorial and represents combination of maternal, placental and fetal plus genetic factors. Maternal causes are related to poor nutrients supply to fetus due to different reasons like malnutrition and chronic diseases. Abnormal placental functional may be due to malformed placental, abruption, infarction and maternal diseases. Several fetal causes like chromosomal abnormalities, toxic exposure and TORCH infections can lead to LBW baby. Thrifty phenotype is also strongly associated with SGA baby. Different local and international studies have documented the association of various maternal factors like maternal age, parity, anemia, APH, PIH, UTI and antenatal visits with LBW neonatal deliveries. We conducted this study to high light the incidence and association with maternal risk factors of LBW neonatal deliveries in our institution.

Table-I: Demographic profile of lbw neonates.

S No.	Parameters		N (%)	
1.	Total Deliveries		2810 (100)	
2.	Low Birth Weight		365 (12.98)	
3.	**Sex**	**Total**	**Percentage (%)**	***p*-value**
	Male Female	165/365 200/365	45.2 55	0.07
4.	**Weight and Gestational Age Association**			
	Preterm AGA (PTAGA) Preterm SGA (PTSGA) Full Term LBW (FT LBW)	194/365 30/365 141/365	53.1 8.2 38.63	<0.001
5.	**Gestational Age Distribution**			
	<28 weeks 28-31 weeks 32-37 weeks >37 weeks		10 (2.73) 80 (21.91) 134 (36.71) 141 (38.63)	
6.	**Weight**			
	2499-2000 1999-1500 1499-1000 <1000		235/365(64.4) 77/365 (21.1) 41/365(11.2) 12/365 (3.3)	

MATERIAL AND METHODS

This cross-sectional study was conducted over a period of one year from Mar 2013 to Feb 2014 in neonatal unit and gynaecology/ obstetrics department of Combined Military hospital (CMH) Kharian. Inclusion criteria were (a) Delivered alive in this hospital, (b) Weight less

than 2500gm and (c) Singleton delivery. Exclusion criteria: (a) Delivered dead, (b) Grossly dysmorphic babies, (c) Weight more than 2500gm and (d) Twin or more deliveries.

This study was irrespective of race, ethnicity, socioeconomic status and geographical distribution. Total Sample of 365 LBW neonates were collected by non probability consecutive sampling technique. Neonatal and maternal information was collected on daily basis by Registrar in a predesigned proforma. Written consent of parents was taken regarding inclusion of their baby in study and then publication. Neonate was examined by same Registrar (FCPS trainee) followed by Neonatologist/paediatrician. Gestational age was assessed from available maternal records/ Ballard Scoring system. Small for gestational age (SGA) was defined as birth weight less than 10th centile for gestational age.

WHO definition was used for LBW Anemia in pregnancy was defined as Hb <10gm/dl and pregnancy induced hypertension (PIH) as systolic blood pressure >140mm Hg and diastolic >90mm Hg. Antenatal check up was considered "regular" if there were at least three visits and one visit in each trimester. Urinary tract infection was considered if proved by laboratory by microscopy/culture. It is our hospital protocol that every newborn delivered as LBW is observed in neonatal unit for initial period. When he/she has tolerated oral feeds and passed meconium/urine, is then discharged from hospital.

Neonatal Variables like neonate gender, gestational age, weight and maternal variables like age, parity, anemia, PIH, APH and UTI were used for analysis. Descriptive statistics were used to analyze and describe data. Frequency and percentage were calculated for categorical (qualitative) variables. Qualitative and quantitative variables were presented in the form of tables. Data was analyzed using SPSS version 17. Chi-square/fisher's exact test was applied for the association of different variables. A *p*-value less than 0.05 considered as a significant value.

Table-II: Maternal age and parity association with newborn weight.

S No.	Weight	<1000gm	1000-1499gm	1500-1999gm	2000-2499gm	Total	*p*-value
01	**Age**						NIL
	<20	1	0	1	2	4	
	20-24	2	6	16	47	71	
	25-29	5	23	24	92	144	
	30-34	3	7	28	57	95	
	35-39	1	5	7	36	49	
	40 and Above	0	0	1	1	2	
	Total	12	41	77	235	365	
02	**Parity**						0.154
	Para-1	8	21	38	95	162	
	Para-2	2	10	17	43	72	
	Para-3	1	3	07	50	61	
	Para-4 and Above	1	7	15	47	71	
	Total	12	41	77	235	365	

RESULTS

Among total 2810 deliveries, 365 (12.98%) were LBW neonates over our study period. Gender analysis of LBW babies revealed 45.2% male and 55% female. Weight and gestational age relationship distribution, 53.1% were preterm AGA and 38.6% full term LBW whilst 8% were preterm SGA. According to gestational age alone parameter 2.73% were less than 28 weeks and 38.73% were more than 37 weeks. Weight

parameter results showed that more than half of sample (64.4% neonates) was between 2000-2499gms (table-I).

Maternal age parameter revealed that about 58.90% of LBW babies were born to mothers of 20-29 years age and 44.65% babies were delivered to Para 1 mothers (table-II).

Analysis of maternal risk factors showed that anemia was present in 53.15%, UTI 11.5%, APH 8.21%, PIH 33.42% mothers of LBW babies. More than half of the mothers (52.60%) did not have regular antenatal visits (table-III).

DISCUSSION

Our incidence of LBW is in comparison with some reported incidence from Pakistan and neighboring countries. Incidence from Pakistan has been reported as 18.8%[6] and 11.89%[5] whilst its reported frequency is 40% and 18.1% from India[7,8], 10.31% Nigeria[9], 11.9% Nepal[10], 11% Bangladesh[11]. 9.14% Turkey[12] and 9% from Oman[13]. Incidence from developed countries like England and Italy is reported as 7.8 and 11.8% respectively[14,15]. This variation in incidence may be due to differences in size and nature of sample, place of study, methodology used to collect data, racial and socioeconomic factors. Our reported incidence is less when compared with our national figure of 25%. A plausible explanation for it may be that maximum number of mothers of our sample belonged to armed forces families and some civilians from upper and middle socio-economic class. Nutritional status and available health care facilities of our sample were comparatively better when compared to general population. Study reported by Shahnaz[5] represents only private sector and by Badshah *et al*[16] public sector hospitals cliental deliveries.

Female preponderance noted in our study, although statistically insignificant, is in comparison with results reported by other authors[5,8] but in contrast to Altuncu *et al*[12] and Kayastha *et al*[10] who have reported male dominance. Again this contrast may be due to ethnic, racial or geographical factors. Preterm deliveries contribution to LBW babies in our study is similar to results reported by other authors[7-9,12] but Shahnaz[5] has documented major contribution by full term deliveries. It may be due to variation in nature and size of sample.

Regarding weight parameter, our results are supported by published data of study of Yasmin *et al* 17 (71%) and Khatun *et al* 11 (52.5%) from Bangladesh.

Majority (70%) of LBW babies were born to mothers who were in 20-29 years age group. It is parallel to results reported by Shahnaz[5], Rakesh *et al*[18] and Aras[19]. Hosain *et al* has reported that the risk of LBW rise steeply with maternal age from 20-29 years[20].

Table-III: Maternal risk factors and weight association (n=365).

S No.	Risk Factors	Weight <1000g	1000-1499g	1500-1999g	2000-2499g	Total	*p*-value
1.	**Anaemia**						
	Absent	03	26	45	97	171/365 (46.84%)	0.003
	Present	09	15	32	138	194/365 (53.15%)	
2.	**PIH**						
	Absent	06	21	48	168	243/365 (66.57%)	0.029
	Present	06	20	29	67	122/365 (33.42%)	
3.	**APH**						
	Absent	10	37	64	224	335/365 (91.78%)	0.005
	Present	02	04	13	11	30/365 (8.21%)	
4.	**UTI**						
	Absent	10	28	60	225	323/365 (88.49%)	<0.001
	Present	02	13	17	10	42/365 (11.50%)	

Nearly half of sample size was born to para1 mothers and statistically is a significant association. In literature there is inconsistency in relationship between parity and low birth weight. Boo *et al*[21] have concluded nulliparity as risk factor for low birth weight but Yadav *et al* have suggested multiparity as a risk factor for LBW[22]. Severe anemia (Hb<8gm/dl) in pregnancy may decrease birth weight up to 200 to 400 gm. Badshah *et al*[16] and Lone *et al*[23] have reported increased incidence of low birth weight babies among the anemic mothers as compared to non anaemic mothers. The results of our study are also consistent with these studies.

Our results indicate that hypertensive disorders during pregnancy might play a role in etiology of LBW. Our this observation is supported by other studies also[21,24]. Our reported (33.42%) proportion of LBW babies whose mothers were having PIH, is in comparison with result reported by Najmi *et al*[6] but higher from results of study by Shahnaz[5] and Ezugw*u et al*[9]. We also report APH as a significant risk factor for LBW. Our observation is supported by results of other authors also[25]. Our reported incidence of UTI in mothers with LBW newborn is in accordance with Shahnaz[5] and Kayastha *et al*[10]. Dimetry *et al*[26] have reported that percentage of low birth weight neonates was higher among the group who suffered UTIs during pregnancy with highly significant difference (p<0.01). Onyiriuka[27] has reported that leading maternal factor associated with delivery of low birth weight infant was absent or inadequate antenatal care. Similar results have been reported from Bangladesh and it is suggested that three antenatal care visits are quite effective in reducing the proportion of low birth weight infants. Our study result is comparable with reported findings of other authors[15,7,28] (table-IV).

CONCLUSION

Prevalence of LBW was quite high in our study. It is comparable with national and international studies. LBW is result of multiplicity of many factors and cannot be curtailed just with pharmaceutical agents. We have identified few significant maternal risk factors associated with LBW. Early and proper identification of these factors needs to be highlighted and efforts made to minimize the incidence of these risk factors. This information could be used to formulate local/ national policies. This effort in return will reduce LBW deliveries and neonatal morbidity/ mortality thus saving the hospital, community and national health resources.

Table-IV: Comparision of our results with different studies.

S No.	Parameters	Study Name							
		Shahnaz	Najmi et al	Badsha et al	Agarwal et al	Our study	Altuncu et al	Ezugwuec et al	Kayastha et al
1.	Incidence	11.89%	18.82	10	40	12.98	9.17	10.31	11.9
2.	Sex								
	Male	47.5%	-	-	-	45.4	53.6	-	52
	Female	52.5%	-	-	-	55	46.4	-	48
3	PT AGA	09%	70	41.6	76.5	53.10	62.8	69.5	-
	PT SGA	30%	14	17.8	-	0.07	-	-	-
	FTSGA/IUGR	61%	16	40.6	31.4	38.30	32.2	-	-
4	ANEMIA	44.44%	-	-	60.5	53.15	-	13.37	-
5	PIH	22.22%	16.52	-	-	33.42	-	22.46	07
6	APH	16.6%	25.69	-	-	8.21	-	5.35	5.8
7	UTI	11.11%	-	-	-	11.50	-	-	11.6
8	Visits								
	Regullar	55.55%	-	-	29.6	47.39	-	-	-
	Irregular	44.44%	-	-	70.5	52.60	-	-	-

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LIMITATION OF STUDY

Limitations of our study are (1) it is hospital based study and does not represent all sections of community. It's not a case control study. (2) We have not included many additional maternal risk factors in this study. (3) We have not documented perinatal mortality so our study does not count LBW babies lost during parturition.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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