

## Maternal Risk Factors Contributing for Low Birth Weight Babies at tertiary care hospitals of Lahore

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### ABSTRACT

**Background:** WHO defines LBW baby as the one which weighs less than 2500 gm irrespective of the gestational age. Above 20 million infants born all over the world, (representing 15.5% of all births) are low birth weight babies. Prevalence in developed countries is 6%, while in developing countries is 21%; as stated by UNICEF. Asia has the highest prevalence; an estimated 11 million low birth weight babies are reported there. In Pakistan some of the studies show that the prevalence of low birth weight babies is as high as 25%. There are multiple factors significantly contributing to low birth weight babies.

**Aim:** To identify the maternal risk factors and their association with low birth weight babies in tertiary care hospitals of Lahore.

**Method:** An analytical cross sectional study was conducted among 360 full term low birth weight babies, delivered in Fatima Memorial Hospital & Sir Ganga Ram Hospital Lahore. Non probability convenient sampling technique was used. A structured questionnaire was used to collect the data. Data analysis was done by SPSS version 17. Chi square test of significance was applied to find out associations between maternal factors and LBW babies, the p value was fixed at >0.05 as significant.

**Results:** Maternal age, iron supplementation intake, lack of antenatal visits (less than 4 visits) and maternal hypertension are significant risk factors of LBW babies in our study. Maternal age has statistical significance as  $p=0.044$ . The age group of 25-29 years delivered 37.2% LBW babies and this was the highest proportion. Antenatal care of mother also showed significant result as the value of  $p=0.001$  and the frequency of having LBW babies in mothers who did not receive complete antenatal care services came as 9.2%. Iron supplement intake also showed significant result with  $p=0.001$  and frequency of having LBW babies in such pregnant women was found to be 18.9%. Maternal hypertension also showed significant result with  $p=0.029$  and 17.5% of pregnant hypertensive females gave birth to LBW babies. Calcium intake during pregnancy was also found to be significant at  $p=0.009$  and 19.4% of pregnant females who gave birth to LBW babies did not take calcium supplements.

**Key words:** Maternal risk factors, low birth weight babies, tertiary care hospital of Lahore.

### INTRODUCTION

A crucial factor in the survival and development of an infant is birth weight<sup>1</sup>. Low Birth weight (LBW) baby is one which weighs less than 2500 grams irrespective of gestational age<sup>2</sup>. On the basis of birth weight and gestational age, WHO has categorized into three groups i.e. babies which are small for gestational age, appropriate for gestational age, those who are large for gestational age<sup>3</sup>.

Over 20 million infants born all over the world (representing 15.5% of all birth) are low birth weight babies<sup>4</sup>. Prevalence of LBW babies in developed countries is 6%, while that in developing countries is 21%, as stated by UNICEF<sup>5</sup>. Asia has the highest prevalence, an estimated 11 million LBW babies are reported in the subcontinent<sup>6</sup>, Prevalence in India is 33%, Bangladesh 50% and Sri Lanka 25% respectively<sup>7</sup>. In Pakistan some of the recent studies show that the prevalence of LBW babies is as high as 25%. In KPK 34% of infants are reported as having birth weight below average<sup>8</sup>.

It is estimated that neonatal mortality all over the world is 20 times more in LBW babies in comparison to

normal birth weight babies (greater than 2.5 kg)<sup>9</sup>. Birth weight is associated with various maternal and environmental factors<sup>10</sup>, and one of the biggest challenges in public health is the identification of these factors and the strengthening of preventive measures to reduce it<sup>11</sup>.

Factors significantly contributing to LBW babies include twin pregnancies, maternal education, maternal occupation, low socioeconomic status, low body mass index, micronutrient deficiency, maternal diseases (anemia, hypertension, and diabetes), interval between pregnancies, and maternal age<sup>13-14</sup>. Other contributory factors include maternal anthropometry, tobacco and caffeine usage, the gender of the delivered child and parity of the mother<sup>14</sup>.

Many health complications, which include hypothermia, hypoglycemia, respiratory problems, anemia, infections, impaired nutrition, neurological problems, ophthalmologic complications, hearing defects, coronary heart diseases and immune system problems are observed in LBW babies<sup>15</sup> and they also seem to be having a low IQ level struggle in school and then in professional life as well<sup>16</sup>. The rationale of this study was to determine the maternal risk factors contributing for LBW babies in tertiary care Hospitals of Lahore.

Received on 13-03-2019

Accepted on 19-07-2019

The objective of this study is to identify the maternal risk factors contributing for LBW babies and to see their frequency in Lahore.

**MATERIAL AND METHODOLOGY**

An analytical cross sectional study was conducted at two tertiary care hospitals of Lahore, One from the private sector, Fatima Memorial Hospital Lahore (FMH),and the other was Government owned ,Sir Ganga Ram hospital Lahore (SGRH).Non probability convenient sampling technique was used to collect the sample .Underweight full term babies (below 2.5 kg /2500gms),both male and female in between 38-40 weeks or 266-280 days were included in the study. .Post term and Pre term babies of normal weight at full term were excluded from this study As the prevalence in Pakistan is 12-25%,the sample size calculated was 290.To reduce the margin of error,10 % increase was assumed which brought the sample size to 360.Data from 62 cases was collected from FMH and 288 cases were taken from SGRH.A structured questionnaire was developed which included multiple risk factors associated with LBW babies depending upon literature search. Data was analysed by SPSS version 17. Descriptive statistics were given in the form of frequencies and percentages, For categorical variables ,Pie chart and bar charts were used for graphical presentations and the analytical statistics were calculated by application of chi-square test and p-value >0.05 level of significance .Approval for conduction of research was taken from IRB of FMH ,and an informed consent from participants was taken before data collection. Data was collected and confidentiality of participants was maintained by the principle investigator.

**RESULTS**

Table 1 suggests that in the study of 360 cases of full term low birth weight babies born in tertiary care hospitals, 190(52.8%) mothers had anemia, 40(11.1%) had the history of miscarriages, 86(23.9%) had abortion history,7(1.9%) had history of still births, 268(74.4%)

mothers had the history of previous multiple pregnancies and only 14(3.9%) had history of addiction. 292(81.1%) mothers took iron supplements, 289(80.3%) took calcium supplements and 277 (76.9%) had folic acid supplements during pregnancy. Vitamins were taken by 273 (75.8%) female. Table 5 and Table 6 depict that gestational hypertension [p-value=0.02(<0.05)] and age of mother [p-value=0.04(<0.05)] are significant.

A large number of mothers had history of gestational hypertension i.e.162 (45%) and only 53 (14.7%) had gestational diabetes. Chronic medical illness was present in a small percentage of study population i.e.7 mothers (1.9%) had hepatitis,5 (1.4%)tuberculosis,5 (1.4%) cardiovascular diseases,63(17.5%) hypertension previously and 43(11.9%)had diabetes and only 4 respondents (1.1%) had genitourinary disorders. Majority of the respondents 134(37.2%) belonged to the 25-29yrs age group.

Table 1. Description of factors associated with low birth weight

Factors	Frequency		Percentage	
	Yes	No	Yes	No
Miscarriage	40	320	11.1	88.9
Abortion	86	274	23.9	76.1
Still birth	7	353	1.9	98.1
Anemia	190	170	52.8	47.2
Previous pregnancies	268	92	74.4	25.6
Contraceptives used	36	324	10	90
Addiction	14	346	3.8	96.2
Iron	292	68	81.1	18.9
Calcium	289	71	80.3	19.7
Folic acid	277	83	76.9	23.1
Vitamins	273	87	75.8	25.2

Table 2. Weight of mother before pregnancy

Weight before pregnancy(kg)	Frequency	%age
40-49	69	19.2
50-59	109	30.3
60-69	120	33.3
70-80	53	14.7
80 above	9	2.5

Most of the respondents 120(33.3%) had 60-69kg body weight before pregnancy.

Fig.1: Illness before and during pregnancy

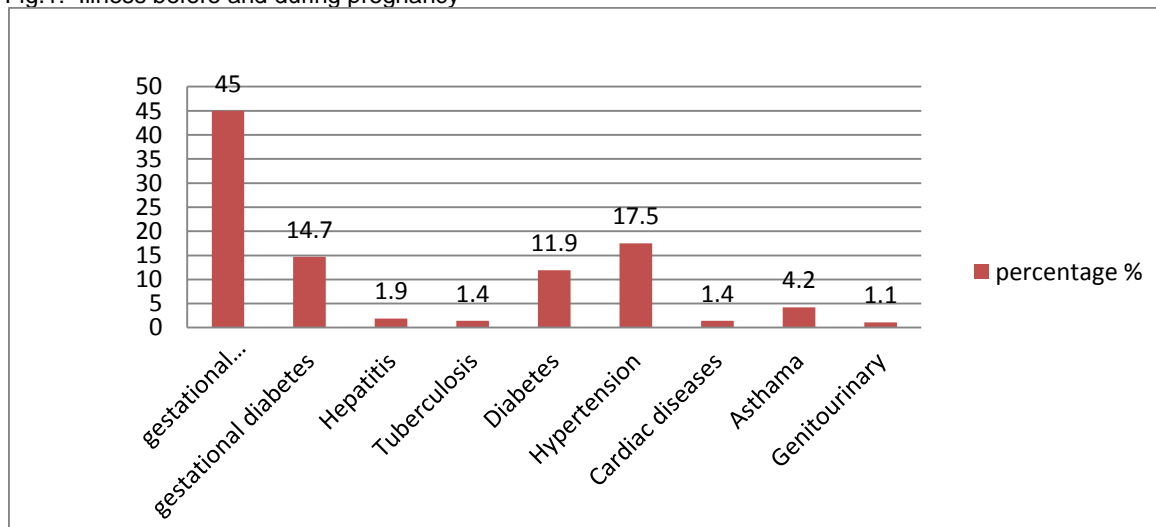


Fig.2: Age of the mother

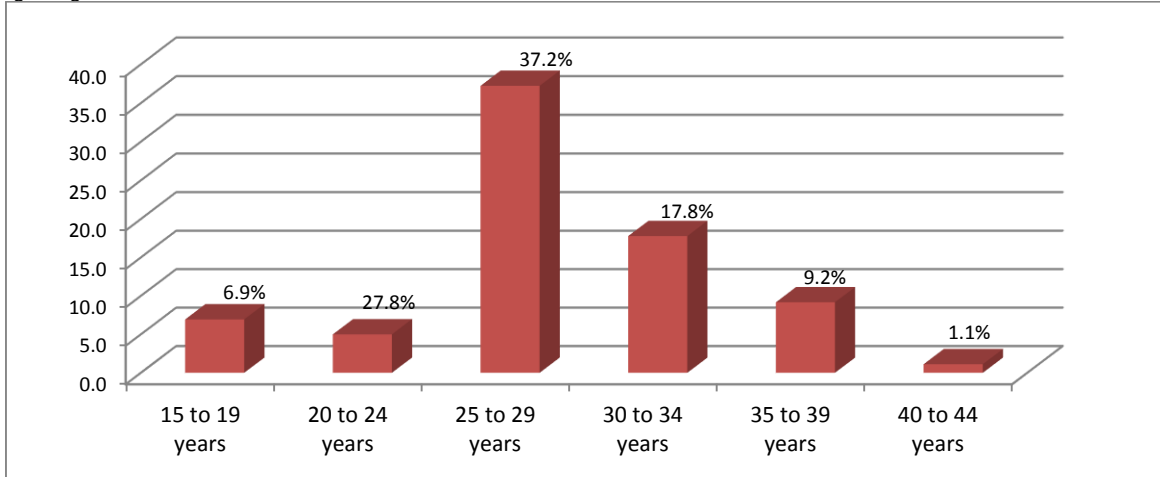


Table 3. Antenatal care visits\*Weight of baby

Antenatal visits		Weight of the baby				Total
		below 1 kg	1 to 1.49 kg	1.5 to 1.99 kg	2 to 2.49 kg	
Care 0	Count	5	10	5	13	33
Care 1-4	Count	8	40	39	187	274
Care >4	Count	0	8	8	37	53

Since p-value is 0.01 i.e. <0.05 it is significant.

Chi square test=22.905<sup>a</sup>, p-value=0.001

Table 4. Iron intake\*Weight of baby

Iron intake		Weight of the baby				Total
		below 1 kg	1 to 1.49 kg	1.5 to 1.99 kg	2 to 2.49 kg	
No intake	Count	1	7	15	45	68
1 <sup>st</sup> trimester	Count	1	4	8	21	34
2 <sup>nd</sup> trimester	Count	3	5	12	36	56
3 <sup>rd</sup> trimester	Count	8	33	8	79	128
throughout pregnancy	Count	0	9	9	56	74

Since p-value is 0.01 i.e. <0.05 it is significant.

Chi square test=32.590<sup>a</sup>, p-value=0.001

Table 5. Gestational hypertension\*weight of baby

Hypertension		Weight of the baby				Total
		below 1 kg	1 to 1.49 kg	1.5 to 1.99 kg	2 to 2.49 kg	
Yes	Count	0	4	10	49	63
No	Count	13	54	42	188	297

Since p-value is 0.029 i.e. <0.05 it is significant.

Chi square test=9.037<sup>a</sup>, p-value=0.029

Table 6. Age of mother\*weight of baby

Age of mothers		Weight of the baby				Total
		below 1 kg	1 to 1.49 kg	1.5 to 1.99 kg	2 to 2.49 kg	
15 to 19 years	Count	2	8	2	13	25
20 to 24 years	Count	6	22	15	57	100
25 to 29 years	Count	2	13	22	97	134
30 to 34 years	Count	1	10	8	45	64
35 to 39 years	Count	1	5	4	23	33
40 to 44 years	Count	1	0	1	2	4

Since p-value is 0.044 i.e. <0.05 it is significant.

Chi square test=25.491<sup>a</sup>, p-value=0.044

## DISCUSSION

Maternal age, iron supplementation intake, lack of antenatal visits (less than 4 visits) and maternal hypertension are significant predictors of LBW in this study. Maternal age does have statistical significance in our study as p=0.044. The age group of 25-29 years showed 37.2% of LBW babies and this was the highest proportion. The age group of 20-24 years showed 27.8% of LBW

babies. The age group of 40-44 years showed only 1.1% of LBW babies and these results are similar to earlier studies done by Parlinton and Tabcharoen, where maternal age <20 years has higher incidence of LBW<sup>17</sup>. Ante-natal care of the mother also showed significant result as the value of p=0.001 and the frequency of having LBW babies in mothers who did not receive ante-natal care services came out to be 9.2%. Antenatal care for pregnant mothers is an established factor to improve pregnancy outcome.

Appropriate nutritional education and food supplements must be given to the mothers with poor weight gain. In our study, the risk of LBW was higher among mothers who did not attend antenatal care for current pregnancy as compared to those mothers who attended ANC. This is consistent with a study done in Nepal which showed that birth weight was significantly associated with ANC service utilization<sup>17</sup>. Regarding ante-natal visits, it is recommended that the pregnant women must have at least four visits to the doctor during her pregnancy period<sup>16</sup>.

Iron supplements intake also showed significant result with prevalence of LBW babies as the value of  $p=0.001$  and frequency of having LBW babies in such pregnant women was found to be 18.9%. In this study, intake of iron supplements during pregnancy was found to have a beneficial effect with respect to LBW which is consistent with Rizvi et al<sup>18</sup>. Women can develop iron deficiency anemia from the loss of excessive blood during menstruation and from repeated pregnancies or it can also be caused by iron deficiency in the diet. During pregnancy, the iron and folic acid requirement is increased to meet the growing demand of the fetus. In the present study, it was observed that around 52.8% of women were anemic.

Maternal hypertension also showed significant result with prevalence of LBW babies as  $p= 0.029$  and 17.5% of all pregnant women who gave birth to LBW babies, were hypertensive. These results are consistent with the results obtained from another study conducted in Isfahan.<sup>24</sup> Hypertensive disorders in pregnancy are also important contributors to LBW. Hypertension leads to insufficient blood flow to the placenta and limits fetal development and thus increasing the incidence of LBW.

Calcium intake during pregnancy was also found to be a significant indicator having LBW babies as  $p=0.009$  and 19.4% of pregnant females who gave birth to LBW babies, did not take any calcium supplements.

Mothers with birth spacing of 2 years and below were more likely to deliver LBW baby than those mothers who delivered with birth interval of 2 or more years. These findings were also consistent with similar study done in south western Ethiopia, Tanzania and Iran<sup>21,22,23</sup>. However, another study in the Islamic Republic of Iran in 5 maternity hospitals of Yazd showed that a birth interval of <12 months is a major risk factor for LBW.<sup>24</sup> This could be due to the fact that short inter-pregnancy interval might result in inadequate replenishment of maternal nutrient stores depleted in the previous pregnancy and thus lead to reduced fetal growth.

Various modes of delivery showed varied degrees of incidence of having LBW babies and in our study,  $p =0.01$ . 54.7% of women having LBW babies delivered through C-section, 42.5% of women having LBW babies delivered through normal vaginal delivery, while remaining 2.8% of women having LBW babies delivered through the instrumental mode of delivery. Similar findings have been reported by Levy A. et al. in Israel and Ahmed Mo et al. in Pakistan, where women with anemia during pregnancy delivered LBW babies<sup>19</sup>.

The incidence of LBW babies among diabetic mothers was significant,  $p=0.05$ . Among all the LBW babies, 11.9% were born to diabetic mothers. Uncontrolled diabetes

mellitus may result in LBW due to early induction of labor or premature rupture of membranes<sup>20</sup>.

The comparatively less significant factors were hepatitis positive mothers, history of previous miscarriages, abortions, stillbirths, weight of the mothers before becoming pregnant, and illness during or before pregnancy.

## CONCLUSION

Low birth weight is a major public health problem contributing substantially both to infant mortality and to childhood handicap in Pakistan. The findings of the study conducted in tertiary care hospitals of Lahore showed antenatal care visits, gestational hypertension, mode of delivery and iron supplements intake to be the principle determinants of low birth weight, having  $p$  values of .001, .029, .032 and .001 respectively. Maternal age, multiple pregnancies, birth spacing, use of contraceptive methods, tetanus vaccination and anemia were among maternal factors identified as positively associated with low birth weight. It is suggested to conduct more comprehensive studies to assess different factors associated with low birth weight. Public health programs should focus on raising awareness on avoiding early marriage and pregnancies of females. Provision of more intensive antenatal care services to mothers with any previous abnormal birth record or any significantly associated disease can be another strategy to prevent low birth weight. Family members should be advised to fulfill the nutritional requirements of the pregnant females.

## RECOMMENDATIONS

- According to our study, early maternal age is a risk factor for LBW. So health education to females should be provided for delaying early marriages as well as child bearing in adolescents.
- All pregnant women must get their blood pressure checked regularly, so that those with Gestational hypertension can be identified earlier and treated.
- Females who are pregnant or planning to be pregnant should be given access to antenatal Care.
- Iron and calcium intake shows a beneficial effect for LBW babies, so females who intend to be pregnant should be educated to have diet rich in calcium and iron. Nutritional advice and food supplementation should be provided to mothers.
- Blood tests to screen for anemia should be part of routine care during pregnancy. So that anemia can be detected and treated earlier.
- Maternal socio-economic status is identified as important determinant of LBW. So targeted public health interventions are needed to improve the conditions.
- Tetanus toxoid must be administered to females according to the recommended schedule.
- Gestational diabetes is also a risk factor for LBW. So All pregnant females should be screened for gestational diabetes between 24th and 28th weeks of pregnancy. If female has certain risk factor of developing gestational diabetes or if there is family

history of gestational diabetes, screening should be done earlier.

- Non modifiable risk factors like previous history of LBW baby, abortion or miscarriage may be considered as high risk pregnancy. A high risk approach should be taken and these women need to be monitored frequently and treated to prevent low birth weight

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