

Frequency and Risk Factors of Low Birth Weight in Rawalpindi, Pakistan

Usman Zafar¹, Sadia Zafar², Nadia Tariq³, Farah Rashid⁴, Khalid Hassan⁵

¹ Assistant Professor, Department of Medicine, Islamabad Medical and Dental College, Islamabad.

² Lecturer, Department of Community Medicine, Islamabad Medical and Dental College, Islamabad.

³ Associate Professor, Department of Community Medicine, Islamabad Medical and Dental College, Islamabad.

⁵ Professor and HOD, Department of Community Medicine, Islamabad Medical and Dental College, Islamabad.

⁶ Principal and Professor of Pathology, Islamabad Medical and Dental College, Islamabad.

Author's Contribution

¹ Conception of study

¹ Experimentation/Study conduction

² Analysis/Interpretation/Discussion

^{2,3,4} Manuscript Writing

⁵ Critical Review

^{3,4} Facilitation and Material analysis

Corresponding Author

Dr. Sadia Zafar,

Lecturer,

Department of Community Medicine,

Islamabad Medical and Dental College,

Islamabad

Email: sadia.11@imdcollge.edu.pk

Article Processing

Received: 06/01/2021

Accepted: 25/05/2021

Cite this Article: Zafar, U., Zafar, S., Tariq, N., Rashid, F., Hassan, K. Frequency and Risk Factors of Low Birth Weight in Rawalpindi, Pakistan. *Journal of Rawalpindi Medical College*. 30 Jun. 2021; 25(2): 202-207.

DOI: <https://doi.org/10.37939/jrmmc.v25i2.1467>

Conflict of Interest: Nil

Funding Source: Nil

Access Online:



Abstract

Introduction: Low birth weight is a key determinant of infant survival health and development. There are many maternal and biological risk factors for it. The objective of this study is to determine the frequency and associated risk factors of low birth weight.

Materials and Methods: This cross-sectional study was carried out in the department of obstetrics and gynecology; Al Razi hospital, Rawalpindi from 1st June 2016 till 1st June 2020. The total sample size was 20,681 which was the total number of births during these years in this hospital setting

Results: The overall frequency of LBW was found to be 8.9%. Female babies were more likely to have LBW (9.9%) as compared to male babies (7.9%) with a significant p-value. LBW babies had poor APGAR scoring as compared to normal weight ($p=0.000$). 252 (75%) of the premature babies were LBW. Among primigravida women, 796 (10.8%) gave birth to LBW babies.

Conclusion: It was concluded that gestational age, parity, maternal weight gain during pregnancy, history of miscarriages, and several antenatal visits were significantly associated with low birth weight. LBW was associated with a poor APGAR score.

Keywords: Frequency, Low Birth Weight, Pakistan.

Introduction

WHO defines low birth weight as any neonate weighing 2500 grams or less at birth whether it is pre-term or term. Very low birth weight babies (VLBW) are those weighing less than 1500 gms.¹ The low birth weight (LBW) is taken as a sensitive index of the nation's health and development. Nearly a third of the newly born babies in South East Asia is low birth weight. There are many causes of low birth weight which are greatly influenced by the interaction of both socio-demographic and biological factors. According to UNICEF, unfortunately, Pakistan has the highest incidence of LBW babies in the South Asian region.²

Extremes of maternal age (under 17 and over 35 years) and mothers having deprived socioeconomic settings are at a greater risk of delivering LBW babies. There is ample evidence to show that maternal weight, height, body mass index (BMI), multiple gestations, birth interval, parity, the experience of any physical violence, and the lack of skilled antenatal care, maternal smoking are the risk factors associated with pregnancy outcomes.^{3,4}

The problem is shared unequally between developing and developed countries of the world. The United Nations Children Fund (UNICEF) reported that the low birth weight rate was 15.5% worldwide and the majority (95% of these LBW infants) belonged to the developing world.⁵ Low birth weight is a risk factor for poor health outcomes at a later age. A decline in LBW can have a significant contribution in achieving Sustainable Development Goal for reducing child mortality. In Pakistan, despite the efforts made to achieve Sustainable Development Goals, still, 25% of neonates are born with low birth weight.⁶

A high mortality rate is reported among low birth weight babies as compared to normal weight. Reasons for mortality among LBW are attributed to neonatal sepsis and respiratory distress syndrome. Incidence of complications due to LBW increases with a decrease in birth weight. Primary causes of death in babies weighing 1000-2000 are congenital malformation, birth asphyxia, and Intra-ventricular/ peri-ventricular hemorrhage. Jaundice and hypothermia are also noticeably reported among low birth weight babies.⁷

Pakistan is striving to reduce child mortality to achieve SDGs. Low birth weight is a significant and useful predictor of the health of a child. Until and unless we know the frequency of LBW and its associated factors, we will not be able to implement strategies to reduce its occurrence and ultimately contribute to decreasing child mortality. This research will be helpful to

quantify the problem and its possible risk factors that will help in devising effective ways to reduce the incidence of low birth weight amongst newborn babies.

Materials and Methods

Objectives:

- To determine the frequency of low birth weight among babies born at Al-Razi hospital in Rawalpindi Islamabad.
- To identify the various associated risk factors of low birth weight.

A cross-sectional survey was conducted between 1st June 2016 to 1st June 2020 to determine the frequency of low birth weight born to expecting females reporting to the Department of Obstetrics and Gynecology, at Al-Razi Hospital, Rawalpindi during a study period of 4 years.

All unbooked cases reported in Obstetrics and Gynae Emergency were excluded. A total of 20,681 babies were born (booked cases) at Al-Razi hospital during the study period.

A structured pre-tested questionnaire was used. Cronbach's alpha for the tool was calculated to be 0.89. The information collected included the birth weight of newborn babies, gender, APGAR scoring, maternal age, weight, maternal hemoglobin level, parity, history of miscarriages, and several antenatal visits. Birth weight was recorded by using a digital scale within 24 hours of delivery and WHO definition was used to categorize birth weight. Babies weighing more than 2500 grams were categorized as normal birth weight, 2500 grams or less as low birth weight, and greater than 4000 grams as macrosomic.

Data was analyzed using SPSS v 26. Percentages were calculated for categorical variables while continuous variables analyzed using mean and standard deviation. Inferential statistics calculated by using Chi-square test (taking p-value less than 0.05 as significant).

Ethical Considerations:

The study was undertaken after getting approval from the ethical committee of Al-Razi Hospital. Informed consent was taken from all the participant mothers, explaining in detail the research topic and objectives. Confidentiality and privacy were ensured. Soft data was password protected ensuring data security. All procedures performed during this study and involvements of subjects were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments.

Results

The mean weight of the sample was 2.996 ± 0.662 . The mean weight among low birth weight babies was 2.112 ± 0.346 while among normal and macrosomic babies, the mean weight was 3.124 ± 0.511 .

Out of total 20,681 live births (10,061)48.6% were female, (10,620) 51.3% were male. (255) 1.2% were twin/multiple births. The overall prevalence of LBW was found to be (1730) 8.4%, 112 (0.5%) were VLBW, and (18,839) 91.1% had normal birth weight (NBW). 229 (1.1%) babies were small for gestational age among the sample. Gender-wise (996) 9.9% of female babies were LBW, 9065 (90.1%) NBW; while 846 (7.9%) male babies were found to be LBW and 9774 (91.8%) NBW. On application of chi-square it was inferred that female babies are more likely to have LBW as compared to male babies and this finding was statistically highly significant (p-value=0.000)

Distribution of birth weight

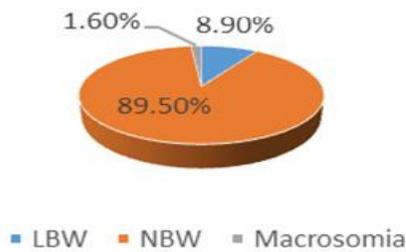


Figure I: Distribution of birth weight

APGAR scoring was done just after the birth of all the babies and classified as concerning, (score 0=3), moderately abnormal (4-6), and reassuring (7-10) and turned out to be 219 (1%), 7252 (35%) and 13,210 (63.8%) respectively. Among LBW babies, 87 (4.7%) had concerning APGAR score, 658 (35.7%) had moderately abnormal scores and 1097 (59.6%) had reassuring APGAR score. While among NBW babies, only 132 (0.7%) babies had concerning APGAR scores, 6594 (35%) had moderately abnormal scores, and 12,113 (64.3%) had reassuring scores. This shows that LBW babies have poor APGAR scoring and LBW is one of the significant factors (p=0.000) which affect the outcome of APGAR scores.

The frequency and percentages of maternal risk factors are shown in Table 1.

Table 1: Frequency and percentages of maternal risk factors for low birth weight

Maternal Risk Factors	Frequency (n)	Percentage (%)
Age		
<20	680	3.3
20-25	7668	37
26-30	8498	41.1
31-35	2997	14.5
36 and above	838	4.1
Hemoglobin		
Normal	11638	56.3
Anemia	9043	43.7
Parity		
Primigravida	7348	35.5
1-2	9955	48.1
3 and above	3378	16.3
Antenatal Visits		
<4	5269	25.5
4 or more	15412	74.5
Maternal Weight		
<70kg	9465	45.8
70kg or more	11216	54.2
History of miscarriages		
0	15852	76.7
1	3337	16.1
2	1007	4.9
3 and above	485	2.3
Gestational Age		
<37 weeks	20345	98.4
37 weeks or above	336	1.6

Table 2: Association of maternal risk factors with low birth weight (N = 20681)

Maternal risk factors	Birth Weight		P-value
	LBW n (%)	Normal n (%)	
Age			
<20	68 (10%)	612 (90%)	0.309
20-25	707 (9.2%)	6961 (90.8%)	
26-30	717 (8.4%)	7781 (91.6%)	
31-35	271 (9%)	2726 (90.9%)	
36 and above	79 (9.6%)	759 (90.4%)	
Hb (gm/dl)			
Normal	1068 (9.2%)	10570 (90.8%)	0.233
Anemia	774 (8.5%)	8269 (91.4%)	
Parity			

Primigravida	796 (10.8%)	6552 (89.2%)	
1-2	766 (7.7%)	9189 (92.3%)	0.000*
3 and above	280 (8.3%)	3098 (91.7%)	
Antenatal visits			
<4	610 (11.6%)	4659 (88.4%)	
4 or more	1232 (8%)	14180 (92%)	0.000*
Maternal weight			
<70kg	1103 (11.6%)	8362 (88.3%)	
70kg or more	739 (6.6%)	10477 (93.4%)	0.000*
History of Miscarriages			
0	1432 (9%)	14420 (91%)	
1	270 (8.1%)	3067 (91.9%)	
2	81(8.1%)	926 (91.9%)	0.004*
3 and above	59(12.2 %)	426 (87.8%)	
Prematurity (Gestational age<37 weeks)			
No	1590 (7.8%)	18755 (92.2%)	0.000*
Yes	252 (75%)	84 (25%)	

The most important factor for LBW was gestational age. 252 (75%) of the premature babies were LBW. While among term babies, only 7.8% were LBW (P-value=0.000)

The frequency of LBW was higher among mothers who were <20years of age and >30years, however, the P-value is not significant. The mothers who had less than 4 (recommended by WHO) antenatal visits were more likely to have LBW babies (p-value=0.00). LBW babies were reported more among primigravida women with 796 (10.8%) of the primigravida women giving birth to LBW babies (P-value= 0.000). With increasing, maternal weight frequency of LBW was reduced. 1103 (11.6%) of the mothers weighing <70kg gave birth to LBW babies, while among mothers weighing greater than 70kg the frequency of LBW babies was only 739 (6.6%) with a significant P-value. The history of miscarriages was also found to be an important factor for LBW. Among women reporting a history of 3 or more miscarriages, 59 (12.2%) gave birth to LBW babies. (P-value=0.04)

Discussion

The present study shows a frequency of low birth weight at 8.9% with female babies more likely to have LBW. APGAR scoring done at the time of birth revealed that 40.4% of babies with low birth weight had moderately abnormal or concerning APGAR scoring when compared to APGAR score of normal-weight babies. A study conducted in Muzaffarabad, Azad Jammu Kashmir on a sample of 1863 births reveals comparable findings with the frequency of LBW at 10.04% with more number of female babies having LBW but the difference between male and females to be statistically insignificant in their study⁸ as in another study done in Layari General hospital, Karachi which shows the frequency of LBW at 10.6%.⁹ Prevalence of LBW was 10.2% according to a study conducted on data from the national survey of Indonesia Demographic and Health Survey (IDHS).¹⁰ Demographic and Health survey from least developed countries as defined by the World bank including Cambodia, Colombia, Indonesia, Jordan, Nepal, Pakistan, Tanzania, Uganda, and Zimbabwe reveals the overall prevalence of 15.9% of LBW babies¹¹ while 13.8% were LBW according to a study conducted in rural Maharashtra, India.¹² Proportion of LBW in Nigeria Demographic and Health survey is found to be 7.3% which is lower than the studies done in other parts of the world. This might be because most of the deliveries that were taken into consideration in that study were non-institutional and babies are less likely to be weighed at birth in such a setting and data relied on self-reporting.¹³

Maternal age is a useful predictor for LBW as shown by a study carried out by Gulnaz et al where the incidence of LBW is found to be decreasing with increasing maternal age supported by Nigeria Demographic and Health survey while this study shows that LBW was most frequent in less than 20 and more than 36 years of maternal age. The Indian study reveals that odds of LBW were twice as high in maternal age less than 22 years which can be compared to our study. Mothers with advanced age (35 to 49 years) had a significantly greater risk of delivering LBW babies than younger mothers according to a Health survey from developing countries which is similar to our study. According to a study carried out in California, women aged 40 to 54 years were twice as likely to have an LBW infant as women in the 20 to 24 age group which is not in accordance with the above findings.¹⁴ This difference may be because in developed countries like the USA,

women tend to have children at late ages and fewer women are likely to give birth in less than 20 years of age.

Parity has an impact on the birth weight of the baby as demonstrated by this study in which LBW were mostly born to Primigravida women who are in contrast to the study conducted in Nigeria where among LBW babies, there was a greater proportion of multiparous women. Our results are similar to a study conducted in Maharashtra, India which shows that the odds of both pre-term delivery and LBW were reduced in multigravida compared with primigravida women, regardless of age.

The association of maternal anemia with LBW is found to be statistically insignificant in this study. Anemia was not significantly related to birth outcomes in a study conducted in California as well as India. On the contrary, is a study by Gulnaz et al where regression analysis revealed that with an increase in hemoglobin level, there was a decrease in the incidence of LBW babies and a study conducted in Layari where maternal anemia is significantly associated with LBW. Mothers¹⁵ having less than 4 antenatal visits during pregnancy delivered more LBW babies as compared to those who had 4 or more antenatal visits. This is similar to a study conducted in South Africa where Women who attended fewer than five ANC visits were predisposed to have low birth weight babies. According to a study in China, mothers who did not receive five ANC visits had a higher risk of LBW babies than those who had received it.¹⁶ Proportion of LBW babies was more (15.9%) in mothers who had not availed of full antenatal care also in an Indian study.¹⁷ These consistent results show that several antenatal visits greatly impact the birth weight of the baby.

History of Abortions is significantly associated with term low birth weight according to an Ethiopian study¹⁸ similar to our study that reveals a statistical association between having 3 or more abortions and having LBW babies. Consistent results are shown by a study by Bora M. showing mothers who had a previous history of abortions and stillbirth having a high percentage of LBW babies (28%).¹⁹

Maternal weight was also significantly associated with the birth weight of a newborn in this study with more LBW babies born to mothers having weight less than 70 kg. Low maternal weight was a significant risk factor for LBW babies in a study conducted in Gujrat, India.²⁰ Weight gain has a significant effect on infant birth weight, a 1 kg increase in the pregnancy weight was associated with 94 g increase in BW according to a study conducted in Mikelle city, Northern Ethiopia.²¹

Conclusion

The overall frequency of low birth weight was 8.9% which was significantly associated with maternal factors. The most important factor associated with birth weight was gestational age. Low birth weight increased with extremes of maternal age. Primigravida was more likely to have LBW babies. As maternal weight increased, the frequency of low birth weight decreased. Less than four antenatal visits increased the incidence of LBW. Women who had a history of more than 3 abortions significantly impacted birth weight.

LBW was associated with baby gender with female babies more likely to have LBW. Babies with LBW had poor APGAR scores as compared to normal weight babies

Practical Implications: Our study strongly suggests antenatal visits and advice as a predictor of healthy newborn weight. Our findings will be disseminated to various stakeholders and policymakers to help them strengthen the antenatal coverage and services to improve newborn health and contribute to the steps taken towards achieving Sustainable development goals.

References

1. Tchamo ME, Prista A, Leandro CG. Low birth weight, very low birth weight and extremely low birth weight in African children aged between 0 and 5 years old: a systematic review. *Journal of developmental origins of health and disease*. 2016 Aug 1;7(4):408-15.
2. Naqvi J, Siyal AA, Taqi T. Frequency and Outcome of Low Birth Weight Babies Admitted in Tertiary Care Hospital. *National Editorial Advisory Board*. 2018 Nov;29(11):32.
3. Jamshed S, Farah-Khan AB, Ali BB, Akram Z, Ariff M. Frequency of Low Birth Weight and its Relationship With Maternal Nutritional and Dietary Factors: A Cross-Sectional Study. *Cureus*. 2020 Jun;12(6).doi: 10.7759/cureus.8731
4. Rashid F, Makhdoom S. Maternal Health in Pakistan: Where do we stand?. *Journal of Islamabad Medical & Dental College*. 2019 Sep 29;8(3):99-100.
5. Chanie H, Dilie A. Prevalence of low birth weight and associated factors among women delivered in debre markos referral hospital, East Gojam, Ethiopia, 2017. *Prevalence*. 2018;53.
6. Saeed A, Saeed AM. Maternal predictors of Low Birth Weight among women attending private hospitals of Lahore, Pakistan. *Progress in Nutrition*. 2017 Sep 1;19(3):257-63. Doi:10.23751/pn.v19i3.5036
7. Shaikh F, Laghari GS, Syal AR, Hameed A, Nizamani MA. Complications of low birth weight babies during first 72 hours of life. *Med channel*. 2016 Jan 1;22(1):18-24.
8. Iltaf G, Shahid B, Khan M I. Incidence and associated risk factors of low birth weight babies born in Shaikh Khalifa Bin Zayad Al-Nayan Hospital Muzaffarabad, Azad Jammu and Kashmir. *Pak J Med Sci*. 2017;33(3):626-630. <https://doi.org/10.12669/pjms.333.12413>

9. Khan A, Nasrullah F D, Jaleel R. Frequency and risk factors of low birth weight in term pregnancy. *Pak J Med Sci*. 2016;32(1):138-142.
<http://dx.doi.org/10.12669/pjms.321.8120>
10. Siramaneerat I, Agushyana F, Meebunmak Y. Maternal Risk Factors Associated with Low Birth Weight in Indonesia. *The Open Public Health Journal*. 2018;11: 377
11. Mahumud RA, Sultana M, Sarker AR. Distribution and Determinants of Low Birth Weight in Developing Countries. *J Prev Med Public Health* 2017;50:18-28
<https://doi.org/10.3961/jpmph.16.087>
12. Ahankari A, Bapat S, Myles P, Fogarty A, Tata L. Factors associated with preterm delivery and low birth weight: a study from rural Maharashtra, India. *F1000Research*. 2017;6.
13. Dahlui M, Azahar N, Oche OM, Aziz NA. Risk factors for low birth weight in Nigeria: evidence from the 2013 Nigeria Demographic and Health Survey. *Global health action*. 2016 Dec 1;9(1):28822.
14. Ratnasiri AW, Parry SS, Arief VN, DeLacy IH, Halliday LA, DiLibero RJ, et al. Recent trends, risk factors, and disparities in low birth weight in California, 2005–2014: a retrospective study. *Maternal health, neonatology and perinatology*. 2018 Dec 1;4(1):15. <https://doi.org/10.1186/s40748-018-0084-2>
15. Tshotetsi L, Dziki L, Hajison P, Feresu S. Maternal factors contributing to low birth weight deliveries in Tshwane District, South Africa. *PloS one*. 2019 Mar 1;14(3).
<https://doi.org/10.1371/journal.pone.0213058>
16. Zhou H, Wang A, Huang X, Guo S, Yang Y, Martin K, et al. Quality antenatal care protects against low birth weight in 42 poor counties of Western China. *PloS one*. 2019 Jan 16;14(1).<https://doi.org/10.1371/journal.pone.0210393>
17. Uppadhaya SK, Agrawal N, Bhansali S, Garg K, Singh M. Utilization of antenatal health care services and its impact on birth weight of newborn in rural area of Western Rajasthan, India. *International Journal Of Community Medicine And Public Health*. 2017 Mar;4(3):680.
<http://dx.doi.org/10.18203/2394-6040.ijcmph20170739>
18. Gebregzabihherher Y, Haftu A, Weldemariam S, Gebrehiwet H. The prevalence and risk factors for low birth weight among term newborns in Adwa General Hospital, Northern Ethiopia. *Obstetrics and gynecology international*. 2017 Jul 4;2017. <https://doi.org/10.1155/2017/2149156>
19. Borah M, Agarwalla R. Maternal and socio-demographic determinants of low birth weight (LBW): A community-based study in a rural block of Assam. *Journal of postgraduate medicine*. 2016 Jul;62(3):178-181.
DOI:10.4103/0022-3859.184275
20. Parikh T, Parikh A. Maternal risk factors and outcome of low birth weight babies admitted to a Gujarat Adani Institute of Medical Science, Bhuj, Kutch, Gujarat, India-A cross-sectional study. *International Journal of Medical Pediatrics and Oncology*, April-June, 2017;3(2):54-56. DOI:10.18231/2455-6793.2017.0015
21. Tela FG, Bezabih AM, Adhanu AK. Effect of pregnancy weight gain on infant birth weight among mothers attending antenatal care from private clinics in Mekelle City, Northern Ethiopia: A facility based follow-up study. *PloS one*. 2019 Mar 11;14(3).<https://doi.org/10.1371/journal.pone.0212424>