

Determinants of Low Birth Weight

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Objective: To determine the incidence of LBW in study population, with particular reference to cause and mode of prevention thereof, in order to improve the existing practices. **Study design:** Prospective study. **Place and duration of study:** Department of Obs & Gynae Unit III, Sir Ganga Ram Hospital, Lahore from January 2002 to December, 2002. **patients and methods:** All those mothers who gave birth to babies weighing less than 2.5 kg during this duration were included in the study population. On admission, detailed history was taken from the patients. Detailed general physical examination, thorough systemic examination and an abdominal examination was performed in accordance with a preset format. Fetal growth was monitored by maternal weight gain and serial measurements of symphysio-fundal height. Ultrasonography was performed to rule out fetal anomalies and serial scan to monitor fetal growth. Other investigations like Blood group and Rh-factor, Blood C/E, Blood sugar level, Liver function tests, Renal function tests, Ultrasonography and Cardiotocography, were carried out to determine any contributing factor. If patient presented with preterm labor, attempts were made to tocolyse. If labor could not be stopped, the babies were delivered and handed over to paediatrician. Elective induction of labor was performed in case of the babies with congenital anomalies incompatible with life. Labor was either induced or spontaneous, route of delivery was either vaginal or by cesarean section and was elective or emergent. Babies were examined for signs of prematurity, growth restriction or congenital anomalies. Their APGAR score and weight were recorded. The babies were handed over to paediatrician and were subsequently followed up in the nursery. **Results:** Out of 3315 deliveries, 135 babies were LBW (4.08%). Major determinants of LBW were found to be Pre-term labor, PROM and IUGR. No cause for LBW was found in 8.88% of cases, however, 91% of LBW babies had verifiable causes. Other causes of LBW babies were either constitutional or intra-uterine death or congenital abnormalities. **Conclusion:** While yielding some interesting findings in regard to the nexus between poverty and LBW, the study clearly demonstrate the importance of high quality obstetric and paediatric input at all stages of fetal development.

Key words: Low Birth Weight

The weight of an infant at birth below 2.5 kg is classified as low birth weight¹. The reported incidence of low birth weight is about 7% in England and Wales. In Sweden, which has a low perinatal mortality, only 4% of babies are born weighing less than 2.5 kg². Japan is a country where the proportion of babies of low birth weight has fallen in the last 20 years; consequently a sharp decrease has occurred in perinatal mortality. Incidence of low birth weight here in after referred to as LBW, is 29% in some rural areas of India³. At this point in time, research on LBW in Pakistan does not appear to be as exhaustive/ data base and extensive as in other countries. This study is a modest beginning in that direction, but more importantly, however it will hopefully, help in the prevention of LBW and in the establishment of improved practices in the country on an institutional basis.

Aims and objectives

To determine the incidence of LBW in study population, with particular reference to cause and mode of prevention thereof, in order to improve the existing practices.

Patients and methods

This study was carried out in unit III of the Department of Obstetrics & Gynaecology, Sir Ganga Ram Hospital, Lahore over a period of one year, from January 2002 to December 2002. All those mothers who gave birth to babies weighing less than 2.5 kg in this duration were

included in the study population. It was done as a prospective study.

Mothers were admitted either through OPD or Casualty Department. Patients who had at least three antenatal check-ups were considered as booked, while others were considered as un-booked. On admission, detailed history was taken from the patients regarding their age, parity, duration of gestation, labor pains and leaking or bleeding P/V. Past history of any medical illness, e.g., hypertension or diabetes; socioeconomic status, husband's occupation, income and any history of addiction was taken. Detailed general physical examination including height, weight, blood pressure and anemia was performed. A thorough systemic examination was conducted in accordance with a preset format. On abdominal examination, fundal height, amount of liquor and an approximate weight of baby was assessed.

Booked cases of suspected LBW babies were managed by taking a detailed history and by thorough examination during antenatal check-up to look for reason thereof. Fetal growth was monitored by maternal weight gain and serial measurements of symphysio-fundal height. Ultrasonography was performed to rule out fetal anomalies and serial scan to monitor fetal growth. Other investigations like Blood group and Rh-factor, Blood C/E, Blood sugar level, Liver function tests, Renal function tests, Ultrasonography and Cardiotocography, were carried out to determine any contributing factor. Patients with

medical problems were admitted for treatment thereof. In un-booked patients, detailed history, examination and relevant investigations were carried out at the time of admission. If the history was suggestive of cervical incompetence, cervical cerclage was considered. If patient presented with preterm labor, attempts were made to tocolyse. If labor could not be stopped, the babies were delivered and handed over to paediatrician. Elective induction of labor was performed in case of the babies with congenital anomalies incompatible with life. The timing and mode of delivery was decided after considering the condition of the mother and the baby. Labor was either induced or spontaneous, route of delivery was either vaginal or by cesarean section and was elective or emergent. Babies were examined for signs of prematurity, growth restriction or congenital anomalies. Their APGAR score and weight were recorded. The babies were handed over to paediatrician and were subsequently followed up in the nursery. All the patients were advised regular antenatal check-up and hospital delivery in the next pregnancy. They were also advised about vaccination and contraception.

Results

Out of 3315 deliveries, 135 babies were LBW (4.08%). Major determinants of LBW were found to be Pre-term labor, PROM and IUGR. No cause for LBW was found in 8.88% of cases, however, 91% of LBW babies had verifiable causes. 54.4% of the babies were delivered before term, either due to pre-term labor or premature rupture of membranes. 24.44% of the babies were growth retarded. Other causes of LBW babies were either constitutional or intra-uterine death or congenital abnormalities.

Birth weight of 55.5% infants was between 02 and 02.4 kg, 28.8% babies weighed between 1.5 and 1.9 kg and 5.5% were less than 1.5 kg. 56.24% of the babies did not develop any complication, while 37% of the LBW infants developed complications like RDS, ANN and Sepsis. 2.96% of the babies were delivered dead. 20% of the babies died in nursery due to RDS.

After 06 weeks, 72.11% babies were alive and healthy. 15.16% infants died either due to prematurity or infections. 12.5% of the babies were not brought for follow up. Results are shown in following tables:

Table I: Incidence of lbw babies

Total no f deliveries	No of LBW babies	%age
From January 2002		
To December 2002		
3315	135	4.08

Table II: Mode of admission

Mode of admission	No of LBW babies	%age
Booked	46	34.07
Unbooked	89	65.92

Table III: Socioeconomic status of patients

Class	No of LBW babies	%age
Upper middle class	32	23.70
Lower middle class	40	29.62
Poor	63	46.66

Table IV: Gravidity of patients

Gravidity	No of LBW babies	%age
Primigravida	50	37
Para (1-2)	38	28.14
Para (3-5)	42	31.11
Para (6-10)	05	03.70

Table V: Presenting complaints

Presenting complaints	No of LBW babies	%age
Labor pains	55	40.74
Leaking P/V	36	26.66
Bleeding P/V	19	14.07
Multiple pregnancy	07	05.18
Loss of fetal movements	06	4.44
Sluggish fetal movements	02	1.48
Imminent eclampsia	04	2.96
Eclampsia	05	3.70

Table VI: Relevant features of past obstetric history

Relevant features	No of LBW babies	%age
H/O mid trimester miscarriage	07	5.18
Preterm deliveries	13	9.62
IUD	12	8.8
LBW babies	10	7.40
Twin pregnancy	02	1.48
Previous neonatal death	04	2.96
H/O hypertension	06	4.44

Table VII: Height and weight of patients part-1 height

Height in feet	No of LBW babies	%age
> 5.5	12	8.88
5 - 5.5	95	70.37
< 5	28	20.74

Part-2 weight

Weight in kg	No of LBW babies	%age
> 60	18	13.33
50-60	90	66.66
<50	27	20

Table VIII: Various methods of delivery

Method of delivery	No of LBW babies	%age
NVD	63	46.66
Induced labor	12	08.08
Outlet forceps	08	5.92
Assisted breech	02	1.48
Decapitation	01	0.74
Cesarean section	49	36.29

Note: Indications for caesarean section were mainly fetal distress, severe IUGR, PIH with poor Bishop score and previous cesarean sections.

Table IX: Apgar score of LBW babies

Apgar score	No of LBW babies	%age
8-10	55	40.74
6-7	36	26.66
<5	28	20.74
Zero	16	11.85

Note:

- 28 babies with APGAR score < 05 developed complications like Respiratory distress syndrome, Asphyxia Neonatorum and sepsis. 15 babies died in Nursery. 05 babies were discharged in healthy condition and 08 were discharged on request.
- 04 babies were old cases of IUD. 08 had congenital anomalies not compatible with life. 04 were of extremely LBW.

Table X: Weight of LBW babies

Weight of babies in kg	No of LBW babies	%age
2 - 2.4	75	55.55
1.5 - 1.9	39	28.88
<1.5	21	15.55

Table XI: Determinants of low birth weight

Determinants	No of LBW babies	%age
Pre-term labor	47	34.81
PROM	21	15.55
IUGR	33	24.44
Undetermined	12	8.8
Constitutional	10	7.40
Congenital anomaly	08	5.92
IUD	04	2.96

Note: Hydrocephaly and Anencephaly.

Table XII: Outcome of neonates

Complications	No of LBW babies	%age
None	76	56.24
Sepsis	02	01.46
ANN	09	6.66
Pre-term delivery	15	11.11
Anemia	02	01.46
RDS	27	20.00
IUD	04	02.90

Table XIII: Follow-up of babies after 06 weeks

Status	No of LBW babies	%age
Alive	75	72.11
Dead	16	15.38
Lost to follow-up	13	12.50

Note: Out of 135 babies, 16 had zero APGAR score. 15 died in Nursery. 104 babies were sent home after 06 weeks. 75 were alive. 16 died at home at various times. 13 babies were not brought for follow-up.

Discussion

This study was conducted at Gynae unit III of Sir Ganga Ram Hospital, Lahore for one year, with a view to establishing the incidence and determinants of low birth weight. Out of 3315 babies delivered, 135 (4.08%) were of low birth weight. This compares well with the results obtained in England/Wales (7%)¹ and Sweden (4%)².

However, the incidence of LBW reported to be 29% in some rural areas of India³, is significantly higher than the results obtained in this study.

In this study 65.92% of babies were delivered by mothers who never had the benefit of antenatal check-up. Women so predisposed, register significant increase in delivery of LBW babies⁴⁻⁷. This shows importance of regular antenatal check up for detection of problems and their management.

Most of LBW babies were delivered by young primigravida (37%). Multipara delivered only 3.7% LBW babies. Gortzak et al⁸ and others⁹⁻¹² have shown that young age and primigravida are risk factors for LBW. In Canada, the ratio of primipara to multipara was 6.7% and 4.9%, respectively¹³. This may not, however, be a valid comparison as birth rates in Pakistan and Canada differ substantially.

In this study, it was noted that majority of women (46.6%) who gave birth to LBW babies were from poor socio-economic class. Bennet NG¹⁴ noted that LBW rate was 1.4 times higher among women of lower income group as compared to those from the higher income group. Others¹⁵⁻¹⁸ also noted the correlation between poverty and LBW.

Previous intra-uterine death, LBW and mid trimester abortion were found to be important relevant features of past obstetric history. Khan et al¹⁹ and others²⁰⁻²³ have found similar results.

Conley et al²⁴ states that both father's and mother's weight status have an important impact on birth weight of infant. Similarly Goldenberg et al²⁵ found that maternal thinness is a strong predictor of LBW. However, in this study it was noted that majority of the women were of average height and weight. Albeit, 20% of the LBW babies were delivered by mothers whose weight was less than 50kg and whose height was less than 05 feet.

In this study 36.29% of LBW babies were delivered by caesarean section, either electively or emergently. This indicates a high ratio of deliveries by caesarean section for LBW babies as compared to babies of normal weight. The normal rate of caesarean section is 33% and 10% in U.S.A and Europe, respectively^{26,27}. The common indications for caesarean section were fetal distress, severe fetal growth retardation, uncontrolled hypertension and pre-term baby with previous caesarean section.

Babies with normal birth weight invariably have good APGAR score, unless there is fetal or maternal disease. Interestingly in this study only 40.70% of infants had good APGAR score.

LBW is one of the major causes of perinatal mortality. Other causes are congenital abnormality and hypoxia. In this study it was noted that 56.24% of the babies did not develop any complication, while 37% of the LBW infants developed complications like RDS, ANN and Sepsis. 2.96% of the babies were delivered dead. 20% of the babies died in nursery due to RDS.

Concluding the study findings, it was noted that incidence of LBW in Pakistan compares well with developed countries i.e., England/Wales. Major determinants of LBW were pre-term labor, IUGR, and PROM. Congenital abnormality constituted a minute proportion of LBW babies in this study population. While no cause/contributing factor was found in small proportion of cases.

Conclusion

While yielding some interesting findings in regard to the nexus between poverty and LBW, the study clearly demonstrate the importance of high quality obstetric and paediatric input at all stages of fetal development. It further highlights the importance of well-equipped hospitals, duly staffed by trained professionals to minimize risks to LBW infants. Most importantly, it furnishes incontrovertible proof of the importance of the education for mothers in particular and women, in general.

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