



LOW BIRTH WEIGHT BABIES AND MATERNAL VARIABLES AND DISORDERS AFFECTING THEM A RETROSPECTIVE STUDY

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ABSTRACT **Research question:** to estimate the frequency of low birth weight and prematurity in a service hospital, and compare with Indian and international figures, and find the reasons.

Objective: to study the association of maternal variables and maternal disorders with the outcome of birth weight.

Study design: retrospective study of mothers booked in department of obstetrics in service hospitals in central India.

Participants: Antenatal mothers coming for regular check up in department of obstetrics in service hospitals in central India.

Sample size: 4665 new borns were delivered by all pregnant mothers booked and unbooked during the study period between March 2011 and May 2016.

Results: The prevalence of low birth weight as well as prematurity was much lower than the figures quoted in various Indian studies, WHO and UNICEF figures. The figures are comparable to and outperform most developed nations and reasons could be due to focused antenatal, intranatal and postnatal care of mother, foetus and infant.

KEYWORDS : low birth weight(LBW), preterm, intrauterine growth retardation(IUGR), Small for gestational age(SGA), large for gestational age(LGA), appropriate for gestational age(AGA)

Introduction

Intrauterine growth and development is one of the most vulnerable processes in human lifecycle and its aberrations can result in lasting influence in individual's life. Growth of the fetus is influenced by genetic, maternal environmental factors. Different studies have revealed that risk factors for the birth weight of a new born vary according to the geographical location and the study population. Low birth weight is one of the most sensitive indices of child health. It is an indication of the quality of health care made available to the expecting mother and the newborn. Low birth weight is one of the most important causes of perinatal mortality in India.

Low birth weight has been defined as birth weight less than 2500 gms (1). More than 96 percent of low birth weights occur in developing world. South Asia accounts for 31 percent of all babies with low birth weight.(2,3). The prevalence in India is approximately 33 percent .i.e.7.5 million babies are born with low birth weight (4,5,6).This accounts for 42% of the global burden, the largest for any country. These babies have 40 fold higher risk of mortality as compared to normal weight neonates.About 60% of the LBW infants are born at term, but subjected to intrauterine growth restriction, while the remaining 40% are born preterm(7,8),.

Low birth weight increases the odds of underweight, stunting, and wasting in the first 5 years of life.Preterm/LBW infants are at a high risk of major neuro-developmental disabilities and around 10% of LBW infants have major developmental disabilities at 3 years of corrected age.The mean IQ of LBW infants at six years of age, though within normal limits, is significantly lower than that of NBW infants. [17] LBW infants are also predisposed to a variety of adult onset diseases in later life because of the anomalous programming of affected fetuses. (9,10,11)

The aim of this study was to conduct an analysis of low birth weight in service hospitals in central India and compare them to Indian as well as global standards. The study also examines the association of various maternal variables and medical disorders with birth weight. The study was carried out under controlled conditions where 95 % of the patients were booked during antenatal period and followed through the pregnancy, delivery, neonatal, and infancy periods. The study was conducted between March 2011 and May 2016.A total of 4665 newborns delivered during this period were included in the study.

MATERIALS AND METHODS

This study was conducted by the Department of Pediatrics and

Department of Obstetrics & Gynecology, in various service hospitals in central India which have modern technology and equipment with trained & dedicated staff. Patients are homogenous and comprise of people from all parts of the country. More than 95 percent of pregnant women of services personnel were booked cases for antenatal examination right from conception and followed through to delivery & further follow up of mother and child was done up to one year. There were 4665 new borns during the period of study. The medical facilities in a service hospital is available to authorized clientele free of cost. All basic and advanced equipment and assistance is available.

The patient pool had an average female literacy rate of over 80%. The antenatal coverage was hundred percent for booked patients and all deliveries were institutional deliveries. The study included all livebirths. Various maternal variables and maternal disorders which could affect the pregnancy and birth weight were analyzed.

RESULTS

Total no of births	4665 (M-2568, F-2097)
Term babies	4217(90.3%)
Term AGA	3887(83.3% of Term)
Term LGA	250 (5.3%)
Preterm (>2500g)	228 (50.8% of Preterm)
Preterm (<2500g)	220(49.2%)
Total preterm	448(9.6%)
Low birth weight	Total-321(6.8%)
TermSGA-	101(31.4% of LBW)
Preterm-	220(68.5%)
< 2500 gms to 1500 gms-	201(91.3% of Preterm)
< 1500 gms to 1000 gms	17(7.7%)
<1000 gms	3 (1.3%)
Stillbirth	24 (0.45%)
Neonatal deaths	17(0.64%)

There were a total of 4665 newborns, of which males were 2568 & females 2097. The number of term babies were 4217 and that of preterm babies was 448. Out of term babies 3887 were AGA, 250 LGA & 101 SGA. There were a total of 301 low birth weight babies out of which 101 were term SGA & 220 were preterm. Amongst low birth weights in the range of less than 2500gms to 1500gms there were 201 babies, and in the range of less than 1500 gms to 1000 gms there were 17 newborns & in the range of <1000 gms the total no of new borns were 03.

Relation of Maternal variables, medical and obstetric causes with birth weight (n=4665)

Age of mother <18 yrs, 18 to35 yrs, 36 to 40 yrs, >40 yrs	No of mothers 163(3.5%) 3723 (79.8%) 802 (17.2%) 257(5.5%)	No of LBW newborns 21 (6.5%) 166 (51.7%) 99 (30.8%) 35 (16.9%)
Antenatal care Booked Unbooked	95% 05%	
Institutional deliveries	100%	
Height <155 cm, 155to165cm 165 to 170 cm, >170cm	no- 467 (10%) 2799(60%) 1166(25%) 233 (5%)	, 44(13.7%) 149(46.4%) 96(29.9%) 32(9.9%)
Parity Primigravida, Multipara>1, Grand multipara>2	no- 1866(40%) 2565(55%) 234(5%)	139(43.3%) 93(28.9%) 89(27.7%)
Education <matriculate, Matriculate Graduate	no 1167 (25%) 2472(53%) 1026(22%)	124(38.6%) 149(46.4%) 48 (14.9%)
Mother' weight(first visit) <50 kg 50--55kg >55kg	1119 (24%) 2752 (59%) 561	66 225 30
Maternal hemoglobin <7gm% 7-10 gm% >11 gm%	93 (2%) 886 (19%) 3685 (79%)	29 219 102
Smoking	303 (6.5%)	93
Alcohol	233(5%)	67

Hypertension in pregnancy	933(20)%	No of LBW newborns-207
Hypothyroid	280(6%)	28
Heart diseases	23(0.5%)	12
GDM	140(3%)	52
Oligohydramnios	256 (5.5%)	130
Polyhydramnios	56(1.2%)	26
Anemia	93 (2%)	39
Bad Obstetric History	233(5%)	67
Twins	233(5%)	139

While analyzing the maternal variables out of the total 4665 new borns 163 mothers were less than 18 yrs and gave birth to 21 low birth weight babies, 3723 mothers were in age group 18 to 35 yrs and had 166 low birth weight babies whereas 1059 mothers in more than 35 yrs old group had 134 low birth weight babies. Mothers with a height less than 155 cms had more no of low birth weight babies. The no of low birth weight babies was higher in grand multi parous women. The number of LBW was more in mothers weighing under 50 kgs at first antenatal visit. Mothers with a bad obstetric history, anemia Hb less than 7 gm%, heart diseases, hypertension, GDM, oligohydramnios & polyhydramnios, had more number of LBW as compared to normal mothers. Mothers who consumed alcohol and smoked had more number of low birth weight babies.

The figures in our study of low birth weight as well as preterm is much less than the figures quoted by various Indian studies, WHO and UNICEF figures. The figures are comparable to most of the developed nations and even better.

Discussion

Intrauterine growth and development is one of the most vulnerable processes in human lifecycle and its aberrations can result in lasting influence in individual's life. Growth of the fetus is influenced by genetic, maternal and environmental factors. Different studies have revealed that risk factors for the birth weight of a new born vary according to the geographical location and the study population. Low birth weight is one of the most sensitive indices of child health. It is an indication of the quality of health care made available to the expecting mother and the newborn. Low birth weight is one of the most important causes of perinatal mortality in India.

Low birth weight has been defined as birth weight less than 2500 gms (1). More than 96 percent of low birth weights occur in developing world. South Asia accounts for 31 percent of all babies with low birth weight.(2,3). The prevalence in India is approximately 33 percent , i.e.7.5 million babies are born with low birth weight (4,5,6).This accounts for 42% of the global burden, the largest for any country. These babies have 40 fold higher risk of mortality as compared to normal weight neonates. About 60% of the LBW infants are born at term, but subjected to intrauterine growth restriction, while the remaining 40% are born preterm(7,8)., More than 80% of all neonatal deaths occur among LBW/preterm neonates. They also have a higher risk of neonatal mortality and morbidities, childhood growth retardation & developmental problems. A neonate may be low birth weight either due to born prematurely(1/3rd of cases) or having IUGR. (1,2,,3,4,5).

Low birth weight increases the odds of underweight, stunting, and wasting in the first 5 years of life.Approximately 28% of underweight, stunting and 22% of wasting, at 6 months of age can be attributed to Low birth weight. About 16-21% cases of wasting, 8-16% cases of stunting, and 16-19% cases of underweight between 1 year and 5 years of age are attributed to low birth weight. [16] Preterm/LBW infants are at a high risk of major neuro-developmental disabilities and around 10% of LBW infants have major developmental disabilities at 3 years of corrected age.The mean IQ of LBW infants at six years of age, though within normal limits, is significantly lower than that of NBW infants. [17] LBW infants are also predisposed to a variety of adult onset diseases in later life because of the anomalous programming of affected fetuses. (9,10,11)

Causes of neonatal deaths

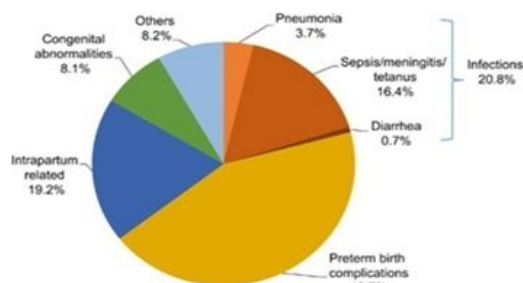


Fig. 1-Source: Liu 2012 [8],SOIN-14.

More than 20 million LBW are born each year in the developing world

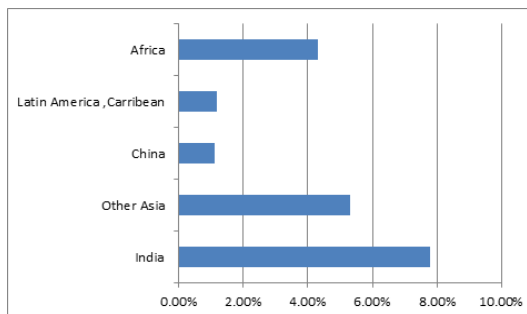


Fig. 2-Source-UNICEF/WHO 2014

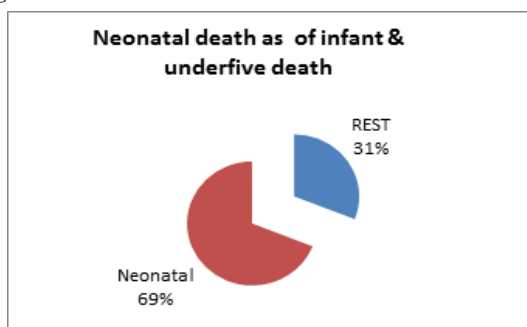


Fig. 3-Source-SOIN-2014

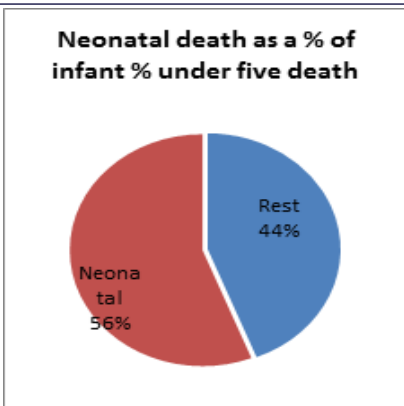


Fig. 4-Source-SOIN-2014

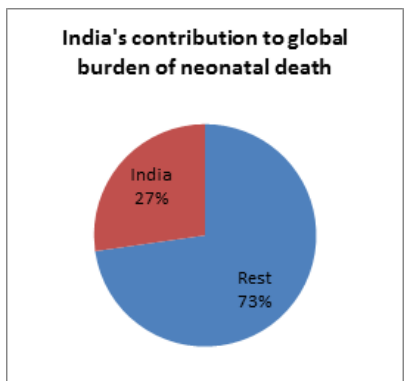


Fig. 5-Source-SOIN-2014

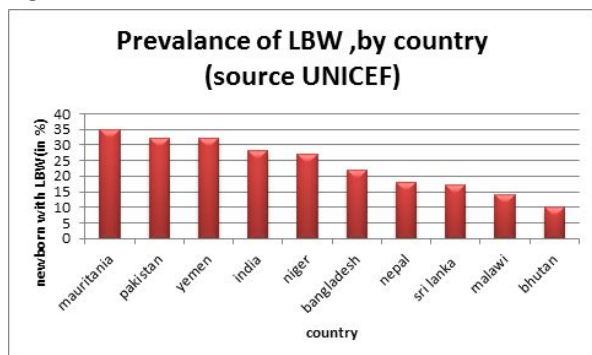


Fig. 6-Source-UNICEF/WHO 2014

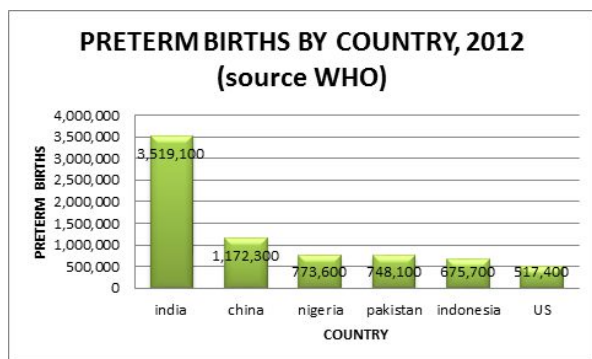


Fig. 7-Source-UNICEF/WHO 2014

These infants are also at a higher risk of asphyxia, sepsis, hypothermia, and feeding problems. Out of the important cause of low birth weight the most important cause is the genetic background of the mother & baby, age of mother, her nutritional level, access to prenatal care. These primary determining factors are the focus of much attention both

nationally & internationally. Each one by itself can cause low birth weight, but they always happen together in predictable ways. Mother's access to prenatal care is one of the most predominant causes of low birth weight, as prenatal care provides nutritional counseling, monitoring of weight gain, screening for genetic or behavioral risk factors & emotional support for pregnant woman. Focused prenatal programmes lower the incidence of LBW among woman of all ages (4,11,12). Unfortunately woman in low socioeconomic status who need prenatal care the most are the least likely to get it (12). Prenatal smoking also accounts for low birth weight & also increases prematurity, RDS, SIDS, & IUGR. (1) An adequate supply of nutrients is extremely important during conception and throughout the pregnancy. Adequate nutrition can make a difference in Weight from 100 to 250 gms. Age of mother is also a factor in birth weight. The incidence of low birth weight is higher in mother less than 18 yrs and those over 40 yrs. (12)

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The figures in our study of low birth weight as well as preterm is much less when compared to the figures quoted by various Indian studies, WHO and UNICEF figures. The figures are comparable to most of the developed nations and even better.

Conclusion

The aim of the study was to determine the incidence of low birth weight & ascertain the causes and their relation and compare the available trends to national and international data. The study included all live births. Various maternal variables which could affect the pregnancy and birth weight were analyzed. The figures in our study of low birth weight as well as preterm is much less when compared to the figures quoted by various Indian studies, WHO and UNICEF figures.

Considering that the population of patients in service hospitals is homogenized and brought from all parts of the country the results have shown the concerted approach followed in service hospitals where all the patients are closely monitored all through out the antenatal, intranatal and postnatal period and provided all requisite facilities through this period without any commercial angle and free of cost can achieve results comparable to best in the world. Therefore if this model is followed even in central and state facilities, it can produce results comparable to best in the world and bring down the maternal, neonatal and infant morbidity and mortality.

NRHM strategy should look into the quality of medical services provided to masses through the existing infrastructure along with timely augmentation of equipment, manpower and training with complete accountability. Strong and sustained political support and public ownership needs to be developed which is guaranteed by the state to provide care for all the mothers & newborn. By focusing on priority actions and core principles, countries are already achieving progress, bending the curve on child mortality and moving towards a world where no mother or child dies from a preventable cause. Maintaining this momentum towards a sustainable goal must be our top priority.

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