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ORIGINAL RESEARCH

A hospital based prospective study to assess association between birth weight and maternal risk factors

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Abstract

Background: Hence this study was conducted to study the morbidity and mortality rates in in born babies weighing less than 1500gm (ELBW and VLBW)admitted in NICU and to define the associated maternal risk factors. Mortality in both VLBW and ELBW group is still high. There is much variation in survival between developed countries and low income countries like India. Maximum numbers of deaths occur in the early neonatal period in this sub group. If they do not receive proper treatment than it negatively affects their families and their countries economically and mentally for the rest of their lives.

Methodology: This Hospital based prospective study was conducted on very low birth weight newborns, born at S.P. Medical College and P.B.M. Associated Group of Hospitals during period of 6 months after analyzing inclusion and exclusion criteria and with the help of consecutive sampling, the questionnaire was administered for the study objects by the researcher.

Results: Among the study population ,72.8% babies had associated maternal risk factors. In our study maternal risk factors had statistically significant association with ELBW babies as compared to VLBW babies. Out of all maternal risk factors, three most commonest maternal risk factors were primiparity ,UTI and PROM. Among all the neonatal morbidities observed in our study ,the most common morbidity was RDS followed by sepsis, jaundice, PDA ,PVL ,NEC ,IVH and pulmonary haemorrhage .

Keywords: very low birth weight newborns, neonatal morbidities, maternal mortality

Introduction

The fourth Millennium Development Goal is to reduce the mortality of children under the age of 5 years by two thirds, before the year 2015. Neonatal mortality accounts for 37% of deaths below the age of 5 years and "improved neonatal and maternal care could save the lives of countless newborns" [1]. In the Perinatal Problem Identification Program (PPIP) a self reporting data base that covers about 40% of births in Asian countries, the early neonatal mortality rate has been static over the past few years at about 9.5 per 1000 live births [2]. However, the majority of neonatal deaths remain unaudited and the national figure is thus probably higher. Very low birth weight (VLBW) infants represent a vulnerable group of newborns with a high mortality rate. There are many reports of factors affecting early

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survival of VLBW infants; these are summarized in [3]. The survival rate of VLBW infants worldwide ranges between 43% in developing countries [4] to more than 90% in developed countries,[5].

Two most important factors to predict the short and long term quality of life of newborns are birth weight and gestational age. The survival rate of VLBW infants has been reported to be constantly increasing but at the same time due to the increase of maternal age from late marriage and development of assisted reproductive technology leads to increase in the births of low birth weight newborns, premature newborns and multiple births .[6]They represent a small percentage of Neonatal Intensive Care Unit admissions and overall births, generally most critically ill and at the highest risk of mortality and morbidity.[7]

Preterm babies mainly when born at <34 weeks of gestation need to remain in newborn intensive care unit (NICU) for sufficient multi-organ maturation resulting in prolonged hospital stay for both mother and babies. The consequences of preterm birth often continue beyond the neonatal period result in significant direct and indirect costs. Therefore, understanding of maternal antenatal factors that lead to preterm birth and need for improvement of perinatal care are important to increase the neonatal survival.[8]

Mortality in both VLBW and ELBW group is still high. There is much variation in survival between developed countries and low income countries like India. Maximum numbers of deaths occur in the early neonatal period in this sub group.[9]

If they do not receive proper treatment than it negatively affects their families and their countries economically and mentally for the rest of their lives.[21]Certain countries like India have recognized the importance of intensive care for infants from early on and are collecting data by organizing a network centered approach on neonatal intensive care units (NICU). They are attempting to achieve quality improvement by sharing network data obtained from such processes. Hence this study was conducted to study the morbidity and mortality rates in in born babies weighing less than 1500gm (ELBW and VLBW)admitted in NICU and to define the associated maternal risk factors.

Methodology

After obtaining permission from Ethical committee and informed verbal consent from the parents of the study population selected through analyzing inclusion and exclusion criteria and with the help of consecutive sampling, the questionnaire was administered for the study objects by the researcher. All relevant information related to the study subjects, sociodemographic details, anthropometry, clinical profile and biochemical parameters were recorded on a proforma.

Very low birth weight newborns, born at S.P. Medical College and P.B.M. Associated Group of Hospitals during period of 6 months were prospectively enrolled in the study. The demographic profile and relevant information of individual patient was collected using structural proforma by interviewing mothers and an informed consent was obtained. Neonatal morbidity,mortality andassociated maternal risk factorswere studied.

This study was done on all inborn babies with birth weights in the range of 500 to 1499gmwho were admitted to the neonatal intensive care unit (NICU) at P.B.M hospital, Bikaner during the course of the study. Thestudy subjectsfurther divided in2 subgroups, ELBW(<1000gm) and VLBW(1000-1499gm)and boththe subgroups comparedin termsof neonatal morbidity, mortality andassociated maternal risk factors. Demographic data included maternal history, maternal age, parity,maternal risk factors(PROM, anemia, UTI, abruptio placentae, eclampsia, preclampsia, polyhydroamnios, oligohydoamnios, gestational diabetes mellitus, any chronic illness, multiple gestation etc.), use of antenatal steroids, gestational age, birth weight, sex, mode of delivery, Apgar score, need for surfactant administration ,resuscitation and mechanical ventilation.

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Gestational age was determined from the date of the mother's last menstrual period and/or from details of earliest available ultrasound scans (at least before 20weeks). Gestational age was assessed by new Ballard score.14

Diagnosis of various morbidities was done on the basis of accessible ,convenientlaboratory investigation and their clinical presentation. Relevant investigation such as complete blood counts, blood glucose, sepsis screen, serumelectrolytes, serum bilirubin, chest x ray, echocardiography, USG cranium and MRI brainwere done as needed.

Respiratory distress syndromewas suspected in babies with gestational ageless than 34 weeks with sign of respiratory distress include tachypnea, retractions, flaring of the nasal alae, cyanosis and grunting.[15] Scoring was done according to Silverman Anderson and Downe's score and classified into mild(<5), moderate (5-7) and severe (>7). Intraventricular haemorrhage (IVH) was diagnosed by clinical examination and USG cranium . Necrotizing enterocolitis (NEC) was suspected clinically and radiologically. Patent ductus arteriosus (PDA) was clinically suspected and confirmedby echocardiography.

Periventricular leukomalaciawas diagnosed byimaging (USG and MRI Brain).

Sepsis was clinically suspected and confirmed by sepsis screen and blood cultures.The length of stay was calculated as the total number days spent in the hospital while the mortality data included all deathsthat occurred before discharge from the hospital.

DATA ANALYSIS: All obtained data were tabulated and important statistical analysis was done with the help of SPSS software (version 23). Microsoft excel and Microsoft word were used to obtain various types of graphs such as bar diagram and pie diagram. Chi-squared test and fischers exact test were used as test of significance for qualitative data. p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Observations

Table 1: Distribution of cases according to baby gender

Gender	No.	%
Male	91	50.6
Female	89	49.4
Total	180	100

In present study, out of 180 neonates,91(50.6%) were male and 89 (49.4%) were female.

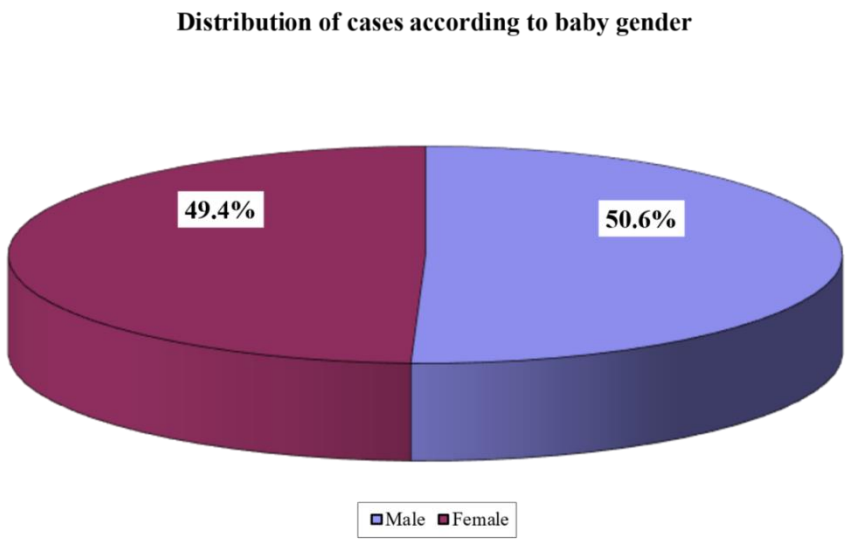

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Table 2: Distribution of cases according to birth weight

Birth weight	No.	%
<1000gm (ELBW)	45	25
1000-1499gm (VLBW)	135	75
Total	180	100

This table shows distribution of cases according to birth weight, Out of 180 neonates, 135 (75%) were VLBW(wt .1000-1499gm)and 45 (25%) were ELBW (wt <1000gm).

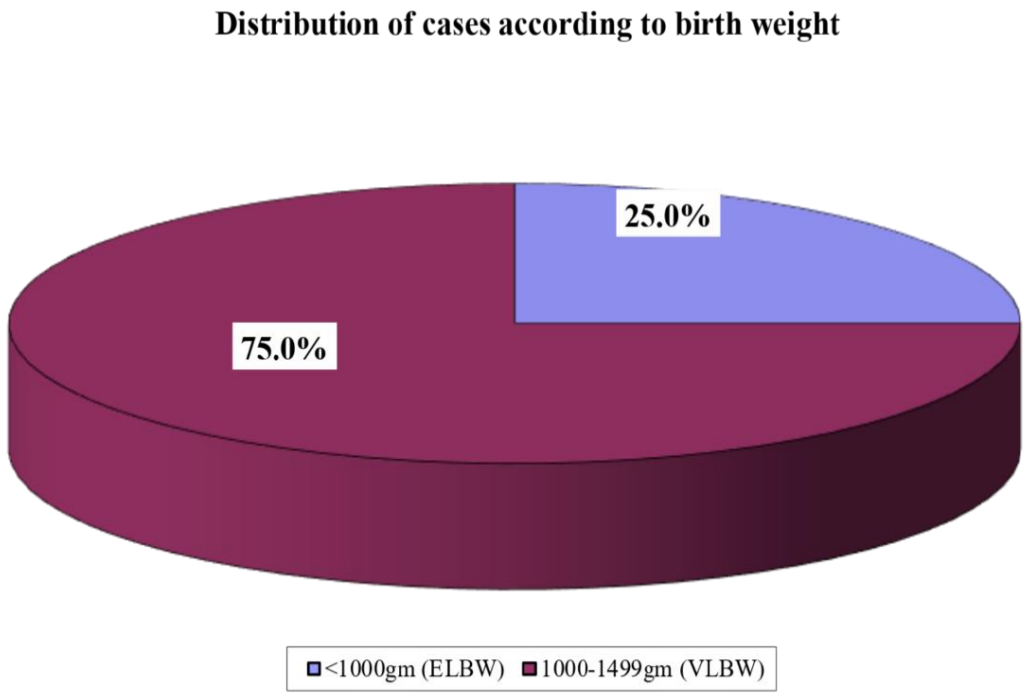

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Table3: Distribution of cases according to gestational age

Gestational age	No.	%
<28 weeks	25	13.9
28-32 weeks	97	53.9
>32 -35 weeks	58	32.2
Total	180	100

This table depicts majority of study population were in thegestational age group between 28-32 weeks.

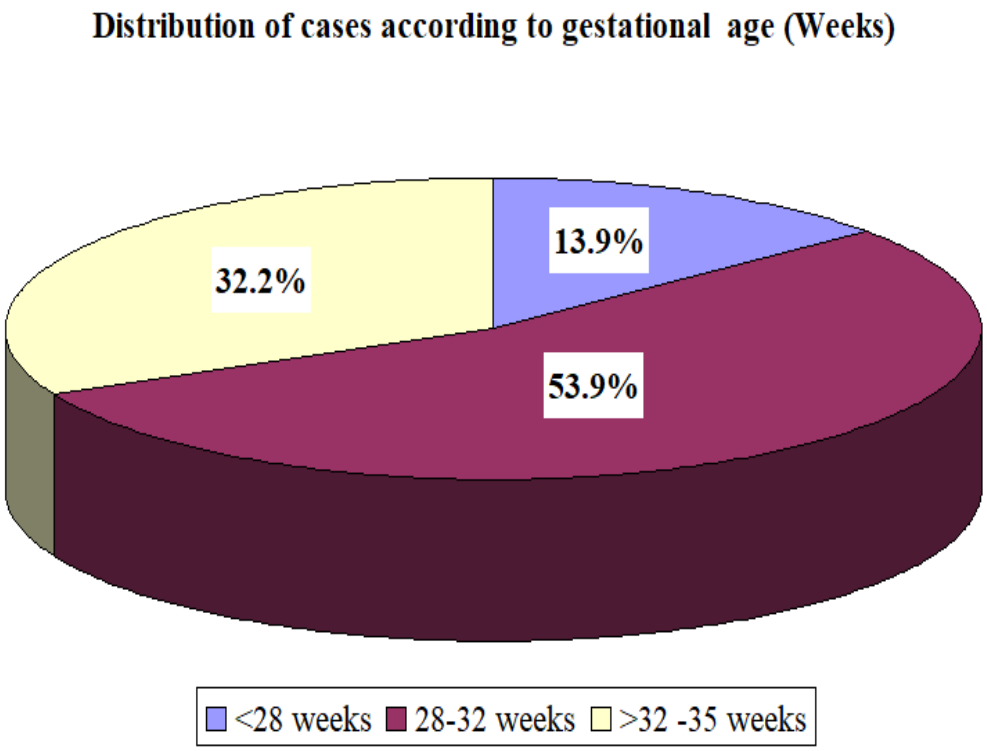

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Table 4: Type of delivery

Type of delivery	Total	%
LSCS	15	8.3
NVD	165	91.7
Total	180	100

Out of 180 neonates,165(91.7%) were born by NVD and 15 (8.3%) were born by LSCS.

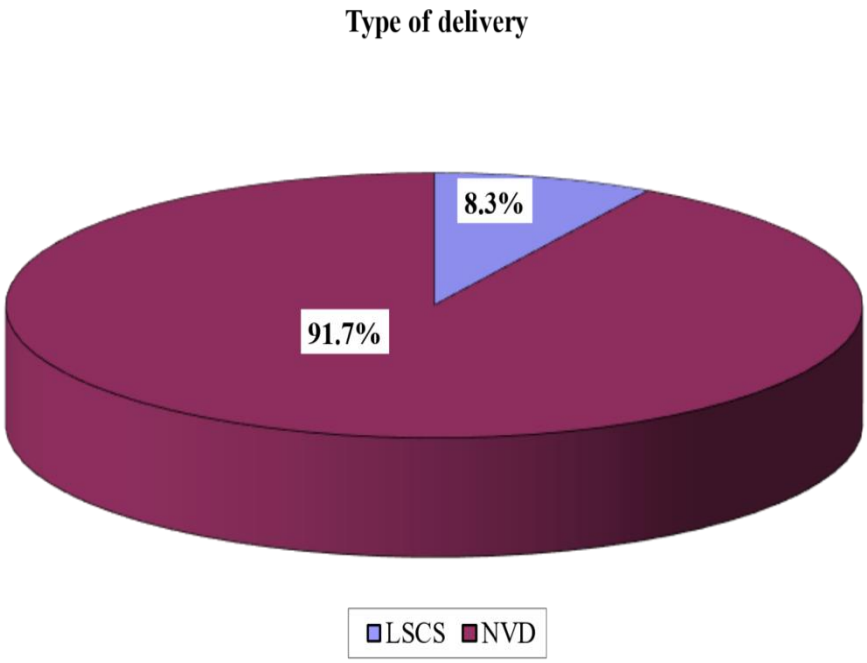

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Table 5: Association Between Birth Weight and maternal risk factors

maternal risk factors: Any	Birth Weight			Chi-Squared Test	
	<1000gm	1000-1499gm	Total	$\chi 2$	P Value
Present	41 (91.1%)	90 (66.7%)	131 (72.8%)	8.983	0.003
Absent	4 (8.9%)	45 (33.3%)	49 (27.2%)		
Total	45 (100.0%)	135 (100.0%)	180 (100.0%)		

This table shows, out of total180,41 (91.1%)neonates in ELBW group and 90(66.7%)neonates in VLBW group had maternal risk factors .This difference was statistically significant.(p=0.003)

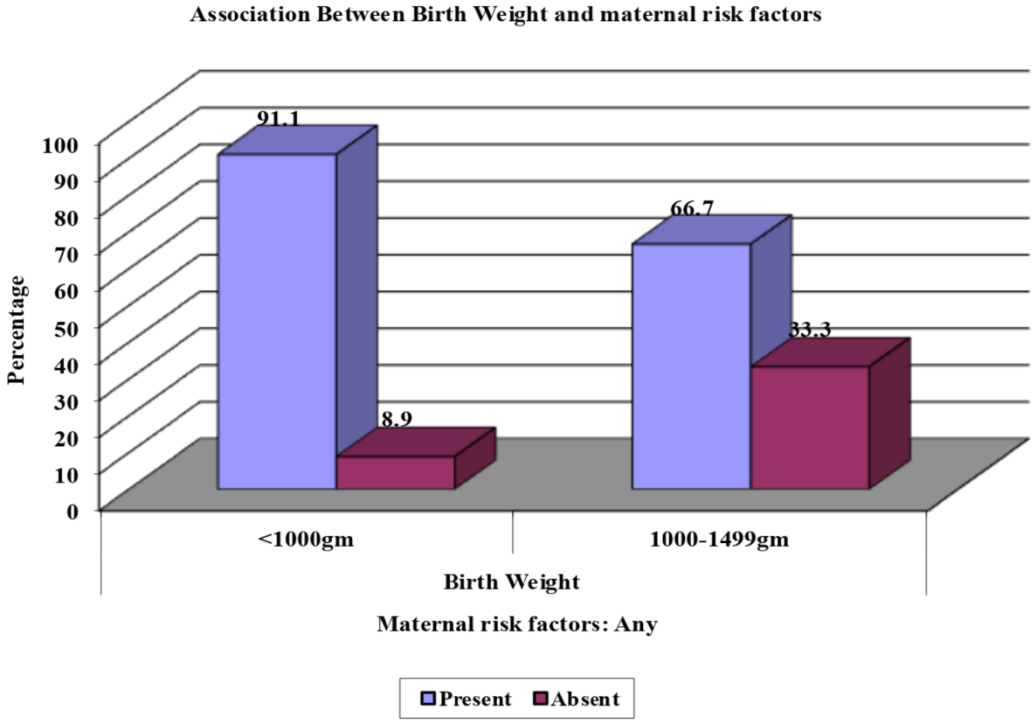

Table 6: Maternal risk factors (N=180)

Maternal risk factors	No.	%
Primi parity	63	35
UTI	60	33.3
PROM	46	25.5
Chronic medical illness	23	12.7
Multiple gestation	21	11.6
Eclampsia	16	8.8
Preclampsia	12	6.6
Polyhydroamnios	10	5.5
Oligohydroamnios	9	5
Anemia	9	5
Hypothyroidism	8	4.4
Abruptio placentae	5	2.7
Hyperthyroidism	1	0.5
Hepatitis	1	0.5
Norisk	49	27.2

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This table shows that the commonest maternal risk factors were primipartity (35%),UTI (33.3%) and PROM(25.5%) followed by chronic medical illness (12.7%), multiple gestation(11.6%),eclampsia(8.8%),preclampsia(6.6%),polyhydroamnios(5.5%),oligohydroamnios(5%), anemia (5%), hypothyroidism (4.4%), abruptio placentae(2.7%),hyperthyroidism (0.05%),and hepatitis(0.05%).However, no risk factors was seen in49 (27.2%)babie

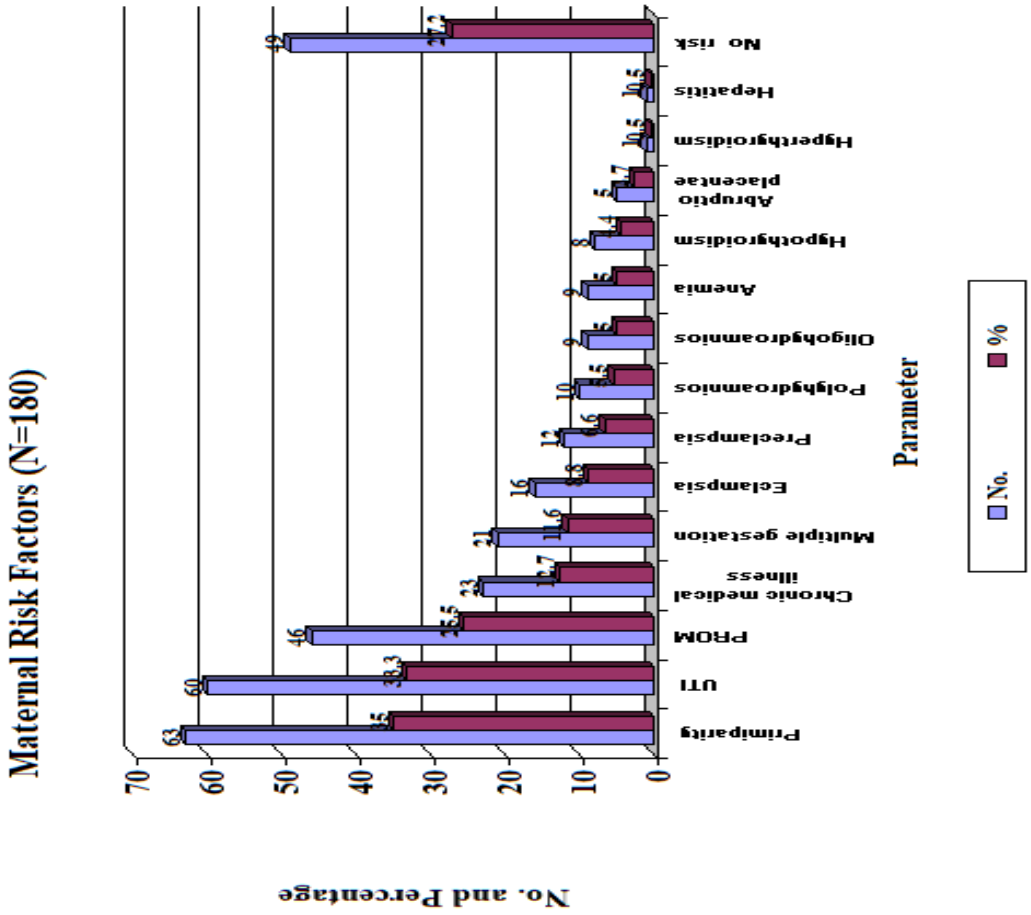

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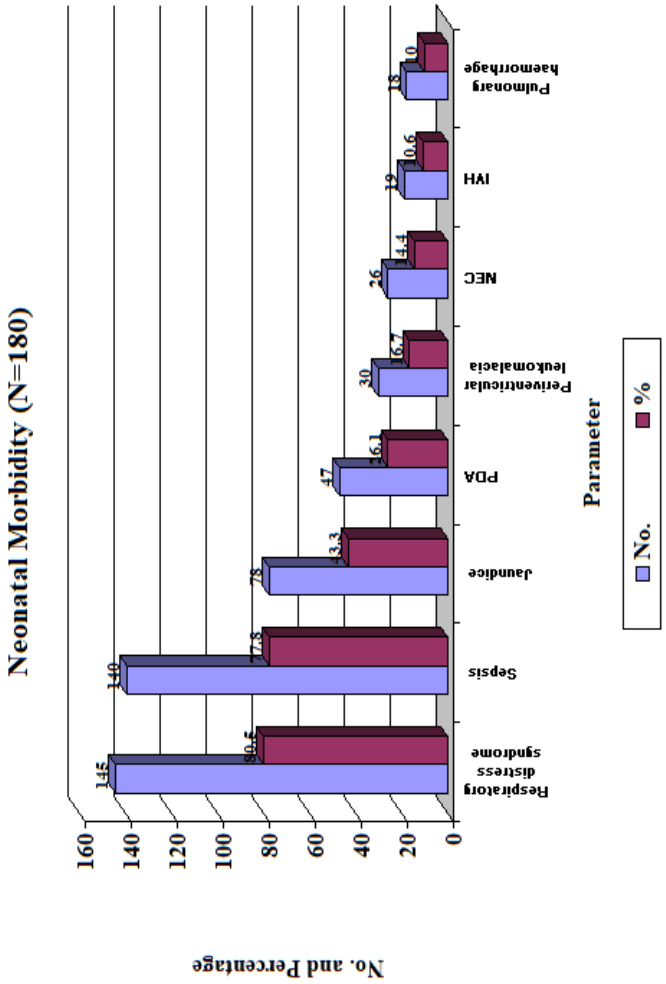
Table 7: Neonatal Morbidity (N=180)

Parameter	No.	%
Respiratory distress syndrome	145	80.5
Sepsis	140	77.8
Jaundice	78	43.3
PDA	47	26.1
Periventricular leukomalacia	30	16.7
NEC	26	14.4
IVH	19	10.6
Pulmonary haemorrhage	18	10

This table shows that most common cause of neonatal morbidity among study population was RDS (80.5%) followed by sepsis (77.8%), jaundice (43.3%), PDA (26.1%), PVL (16.7%), NEC (14.4%), IVH (10.6%) and pulmonary haemorrhage (10%).



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Discussion

This study was undertaken to evaluate the morbidity and mortality rates in inborn babies weighing <1500gmadmitted in NICU and to define associated maternal risk factors. This was a hospital based prospective observational studyconductedin Departmentof Pediatrics, S.P. Medical Collegeand P.B.M Associated group of Hospitals, Bikaner ,Rajasthan. Total 180 babies meeting the criteria were includedand divided in 2 subgroups VLBW and ELBW and compared above parameters in both groups.

Out of 180 neonates, 91(50.6%) were males and 89 (49.4%) were females. This was also shown in study done by A lakshmanaswamy et al[10] where out of 382 neonates, 183(48%) were females and 199(52%) were males. In our study almost 3/4th (135) of the total study population was VLBW babies and only 1/4th (45) of the babies were ELBW [Table 2]. Similar results were seen in the study conducted by K.K Roy et al[12] where2/3rd (70) of babies wereVLBWand1/3rd (36) of babies were ELBW.

All the cases in the present study were divided into 3 groups according to gestation i.e. <28 weeks,28 to 32 weeks and > 32-35 weeks. 53.7% of babies were ingestation age group of 28-32 weeks, 32.2% were in the gestation age group of >32-35 weeks and the rest 13.9% of the babies were in the gestation age group of<28 weeks. These results were similar to study done by A lakshmanaswamy et al[10] where 59% VLBW babies were in the gestational age group 28-32 weeksand24%werein 32-34 weeks gestational age group. In our study therewas statisticallysignificantdifferencebetween gestational age and mortality (p value =0.006). In our study, 165 (91.7%)neonates were born out ofNVD and 15 (8.3%) were born by cesarean section[Table 4].In A lakshmanaswamy et al[10] study, 187(49%) were born outby caesarean section and 195(51%) were born out of NVD.

Majority (72.8%) of the babies inthe present study had one or more maternal risk factors. Wedivided our study subjects into 2 subgroups i.e. VLBW (1000-1499gm) and ELBW (<1000gm) to look for any difference association of maternal risk factors in the given 2 subgroups. We found that, 91.1% neonates inELBWgroup had high maternal risk factors ascompared to 66.7% in VLBW group and this was statisticallysignificant (p=0.003) [Table 5]. However ,in the study done by Atalay et al[13] there was no significant difference between the 2 subgroups with respect to maternal risk factors. This could be explained by their small sample size. In our study population, the commonest maternal risk factors were primiparity seen in 35%, UTI in 33.3%, PROMin25.5% followed by chronic medical illness in 12.7%, multiple gestation in 11.6%,eclampsia in 8.8%,preclampsia in 6.6%, polyhydroamnios in 5.5%,oligohydroamnios in 5%, anemia in 5%, hypothyroidism in 4.4%, abruptio placentae in 2.7%,hyperthyroidism in 0.05%,and hepatitis in 0.05%.However, nomaternal risk factors were seen in27.2 %babies. These results were very similar to study done by Naskar N. et al[11] in which maternal risk factors associated with VLBW babies were primiparity (58.06%), poor socio economic status (40.86%), multiple gestations (36.83%), PROM (26.34%), hypertension (13.44%) and under nutrition (12.36%).

Conclusion

In our study the most common morbidity observed was respiratory distress syndrome which was present in 80.5% of the study subjects, followed by sepsis present in three fourth (77.8%) of the babies. The other complications noted were jaundice (43.3%),patent ductus arteriosus (26.6%), periventricular leukomalacia (16.7%), necrotizing enterocolitis (14.4%), intraventricular haemorrhage (10.6%) and pulmonaryhaemorrhage(10%).In our present study we found that 72.8%preterm delivery is associated with various maternal risk factors. So it is important to prevent preterm delivery and related complications by improving antenatal and

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perinatal care and emphasis to be given on antenatal checkup, antenatal steroids and institutional deliveries

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