

EFFECTS OF ANTENATAL COMPLICATIONS, APGAR SCORE AND BIRTH WEIGHT ON PRETERM MORTALITY

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ABSTRACT

Objective: To compare the mortality of preterm babies based on antenatal complications, APGAR score and gestational weight.

Study Design: Comparative cross sectional study.

Place and Duration of Study: Neonatal Intensive Unit (NICU) of CMH, Quetta, from Oct 2015 to Dec 2016.

Methodology: All preterm babies were included in the study. Antenatal complications, if any, were recorded from the antenatal checkup data file. Gestational age and APGAR score were recorded at the time of birth. Outcome of newborns was measured as discharged or expired. Stratification was done in regard to different variables and post stratification Chi square test was applied. A *p*-value less than 0.05 was considered significant.

Results: Total number of patients in our study was 81. Out of total patients male were 41 (51%) and female were 40 (49%). Mean weight of study population was (Mean \pm SD) 2.02 \pm 0.62. Antenatal complications in the form of pre mature rupture of membrane (PROM) was present in 13 (16%) patients, antepartum hemorrhage (APH) in 4 (5%), oligohydramnios in 12 (15%), polyhydramnios in 1 (1%) and whereas 51 (63%) of the mother had smooth pregnancy. Of the admitted patients 56 (69%) were discharged in satisfactory condition while rest of babies 25 (31%) expired during stay in hospital.

Conclusion: Apgar score, antenatal complications and weight of babies were significantly related to pre term babies' mortality.

Keywords: Apgar score, Gestational weight, Oligohydramnios, Pre-term, Pre-mature rupture of membrane.

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INTRODUCTION

Gestational age is calculated from the first day of last menstrual cycle. Worldwide prevalence of premature babies is about 10% whereas the reported incidence in Asia about 7 to 14%. Preterm births are associated with multiple adverse outcomes. The most common adverse event related to preterm delivery is low birth weight which is defined as birth weight less than 2.5kg. Also it is the most common cause of admission to neonatal intensive care unit, constituting 23% to 48% of the total admission in different parts of Pakistan^{1,2}. The other comorbidities linked with preterm are respiratory distress syndrome, necrotizing enterocolitis and intraventricular hemorrhages; all of which increase mortality and

morbidity of neonates³. There are multiple risks factors, described as non-modifiable and modifiable, for preterm delivery^{4,5}. The most important predictors of neonatal mortality are gestational weight, gestational age, APGAR score and serum albumin level. Neonatal mortality increases with decreasing birth weight and gestational age. Similarly, with low APGAR score the neonatal mortality rises. Some new scoring systems have been developed so as to more precisely predict neonatal mortality like CRIB II (clinical risk index for babies II). By precisely predicting neonatal mortality, it would help the parents and the neonatologist in difficult decision making like whether the newborns to be resuscitated or not and whether these babies to be ventilated or not⁶.

Preterm delivery also affects baby mother relationship. Most of these babies are admitted for one or the other reason. The separation bet-

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ween newborn and the mother increases parental anxiety. Lack of swallowing reflex before 34 weeks may badly affect establishing breast feeding. Discharge criteria may vary and it is very difficult to estimate length of their hospital stay, but most claim that preterm babies are to be discharged when they are able to maintain their core temperature and there is no feeding problem⁷. A lot of efforts have been made to prevent preterm delivery. The different methods used to prevent premature labor include the use of antibiotics, beta 2 agonists which prevent uterine contraction, hormones and cervical pessaries. Some of these interventions are effective and the other not. Also efforts have been made to prevent mortality and morbidity of preterm babies by giving antenatal steroids to mother which help in fetal lung maturation thus decreasing chances of respiratory distress syndrome. Similarly neuro-developmental outcome of preterm neonates is improved by giving Magnesium sulfate to mother antenatally.⁸ Likewise much attention have been paid to prevent mortality and morbidity of preterm babies postnatally. Oxygen is strictly titrated to baby requirements so as to prevent bronchopulmonary dysplasia and retinopathy of prematurity, immunoglobulin are given to reduce mortality from neonatal sepsis in preterm, probiotics have been proved to be effective in reducing the chances of necrotizing enterocolitis in preterm^{9,10,11}.

The rationale of our study was to find out risks factors of mortality in preterm babies in our set up. Also from Pakistan there are few studies on preterm mortality and morbidity. By timely addressing the risks factors of preterm mortality and morbidity we would be able to improve survival of these babies.

METHODOLOGY

The cross sectional study was carried out in NICU of CMH, Quetta, from October 2015 to December 2016. Sample size was calculated by World Health Organization sample size calculator. Sampling technique used was non probability consecutive sampling. All preterm babies of

either gender were included in the study. Pre term was defined as baby born with less than 37 completed weeks from first day of last menstrual cycle. They were further classified as babies with <37 to 32 weeks, <32 to 28 weeks and less than 28 weeks (minimum gestational age of baby in our study was 27 weeks). Weight of the babies in grams was classified as weight more than and equal to 2500, 1500 to 2499, 1000 to 1499 and less than 1000 grams. Apgar score at 5 minutes was considered and was grouped as score more than 7, 5 to 7 and less than⁷. Record from Gynae department of the institution was reviewed; maternal complications were observed as pregnancy induced hypertension, gestational diabetes, anemia and asthma whereas antenatal complications were labelled as premature rupture of membrane, antepartum hemorrhages, oligohydramnios and polyhydramnios. Antenatal checkup was marked as regular if the mother had more than 4 antenatal visits as none, irregular if 1 to 4 antenatal visits and no if no visits done in antenatal period. Morbidity was defined by the type of problem the neonates suffered during stay in hospital. Respiratory distress syndrome was diagnosed clinically and with the help of chest x-ray. Neonatal sepsis was diagnosed with clinical symptoms, blood complete picture and C reactive protein. Neonatal jaundice diagnosed clinically and with the help of laboratory tests. Similarly other diagnoses were made with clinical symptoms, examinations and laboratory reports. Outcome was measured as discharged if patient sent home in satisfactory condition and expired if the patient died during stay in NICU. Pregnancy outcome was marked as single if single alive baby delivered and twin if two babies delivered.

Data Collection and Analysis

Data was collected on a specially designed proforma. After approval from the hospital's ethics and research committee, informed consent was obtained from the parents of all patients after explaining the purpose and benefits of study, from those fulfilling the inclusion and exclusion criteria. All indoor patients meeting the inclusion criteria were included in the study.

All patients were subjected to detailed history including antenatal history and examination. Exclusion criteria was strictly followed for controlling confounders and avoiding bias in the study. Due respect was given to the patients and all cultural, traditional and social values were kept in mind. Confidentiality was given due importance (by keeping the parents' names and address information 'secret').

Data collected was entered in SPSS-23. Continuous variable like age and weight were measured by mean and standard deviation. Qualitative variables like gender, maternal illness, antenatal complications, Apgar, gestational age and antenatal checkup were measured as frequency and percentages. Effect modifiers like gestational age, gender, maternal illness, antenatal complication, Apgar score and weight was analyzed. Post stratification chi-square test was applied, p -value ≤ 0.05 was significant.

RESULTS

Total number of patients in our study was 81. Out of total patients male were 41 (51%) and female were 40 (49%). Mean weight (kg) of study population was (Mean \pm SD) 2.02 ± 0.62 . Maternal illnesses during antenatal period were pregnancy induced hypertension 19 (23%), diabetes mellitus 4 (5%), anemia 3 (4%), asthma 1 (1%) and rest of the mothers 54 (67%) remained in good health during pregnancy. Antenatal complications in the form of pre mature rupture of membrane (PROM) was present in 13 (16%) patients, antepartum hemorrhage (APH) in 4(5%), oligohydramnios in 12 (15%), polyhydramnios in 1 (1%) and whereas 51 (63%) of the mother had smooth pregnancy. Apgar score was more than 7 in 47 (58%), between 5 and 7 in 24 (30%) and less than 5 in 10 (12%) patients. Of the admitted patients 56 (69%) were discharged in satisfactory condition while rest of babies 25 (31%) expired during stay in hospital as given in table 1 along with other descriptive statistics. Post stratification chi square test was applied and mortality of pre term babies was significantly related to Apgar score, ante-

natal complications and birth weight (p -value < 0.005) as given in table-II.

Table-I: Descriptive statistics of study population (n=81).

	No. of Patients	Percentage
Gender		
Male	41	51
Female	40	49
Outcome		
Discharged	56	69
Expired	25	31
Gestational Age (weeks)		
32 to 36/6	59	72.8
28 to 31/6	19	23.5
<28	3	3.7
Co-morbidities		
RDS	23	28.4
NN Sepsis	21	25.9
NNJ	7	8.6
NEC	1	1.2
IVH	1	1.2
Pregnancy		
Single	74	91.4
Twin	7	8.6
Antenatal Complications		
PROM	13	16
APH	4	4.9
Oligohydramnios	12	14.8
Polyhydramnios	1	1.2
None	51	63
Apgar Score		
>7	47	58
5 to 7	24	29.6
<5	10	12.3
Weight (Grams)		
2500 or more	16	19.8
1500 to 2499	48	59.3
1000 to 1499	13	16
<1000	4	4.9
Antenatal Checkup		
Regular	72	88.9
Irregular	5	6.2
None	4	4.9

DISCUSSION

In the modern era the advancement in medical sciences has improved the survival of preterm babies though preventive measures for

preventing preterm birth are still not that much successful. These babies suffer from multiple problems during the immediate post-natal period which has long term consequences in the form of learning disabilities, cognitive dysfunction and behavior problems¹². In Pakistan, to our knowledge, there is little literature available regarding preterm babies' mortality and morbidity as most of the studies are about term babies and their problems^{2,3,13}. Regarding reducing mortality of preterm in Pakistan, kangaroo skin care and emollient skin care have been tried on small scale^{14,15}.

Table-II: The effect of different variable on preterm mortality (n=81).

Birth Weight (Grams)	Discharge	Expired	p-value
>2500	15 (18.52)	1 (1.23)	<0.001
1500 to 2499	37 (45.68)	11 (13.58)	
1000 to 1499	4 (4.76)	9 (11.11)	
<1000	-	4 (4.76)	
Apgar Score			
>7	40 (49.38)	7 (8.64)	<0.001
5 to 7	15 (18.52)	9 (11.11)	
<5	1 (1.23)	9 (11.11)	
Antenatal Complications			
PROM	6 (7.41)	7 (8.64)	0.021
APH	1 (1.23)	3 (3.70)	
Oligohydramnios	10 (12.34)	2 (2.47)	
Polyhydramnios	-	1 (1.23)	
No	39 (48.15)	12 (14.81)	

So we carried out this study to study mortality and morbidity in preterm babies in a tertiary care set up with focus on the effects of antenatal complication, gestational age, birth weight and Apgar score on preterm mortality.

The most valuable indicators for preterm mortality are birth weight and gestational age. With increasing gestational age and birth weight the mortality decreases¹⁶. Same trend was observed in our study too which showed statistically significant relation with birth weight and gestational age (p -value <0.001). A study from China revealed that most preterm babies are male as compared to female. The males in their study were about 60% but in contrast the male and

female ratio in our study was almost equal. The reason may be the small number of our sample size as compared to their study¹⁶. Another study from Karachi revealed male to be 57% and female 43%¹⁷. Similar to our study they also divided birth weights into 4 categories. The mean birth weight in their study was 1.88 ± 0.5 kg whereas in our study it was 2.02 ± 0.62 kg. about 16% of the admitted neonates were with weight more than 2.5kg, about 52% were in weight group 2.5 to 1.5kg, 26% in weight group 1 to 1.5kg and the remaining 6% were with weight less than 1kg¹⁷. In our study neonates with weight more than 2500 grams were 20%, neonates with age 1500 to 2500 grams were 59%, with weight 1000 to 1500 grams were 16% and with weight less than 1000 grams were 5%. Metabolic disorders (72%), respiratory distress syndrome (35%), neonatal sepsis (43%) and intraventricular hemorrhage (4%) were the most frequent complications observed in the admitted patients. Whereas in our study the complications observed in our study were RDS (28%), neonatal sepsis (26%), metabolic disorder (hyperbilirubinemia=9%), necrotizing enterocolitis (1.2%) and intraventricular hemorrhage (1.2%). The preterm mortality in their study was 14% and in our study it was about 30%. We also studied the effects of maternal illness, antenatal complications, birth weight, Apgar score and gestational weight on preterm mortality, whereas they did not.

Another study by Manuck, like our study, also revealed gestational age to be related to preterm mortality. Similarly the morbidity observed in their study were hyperbilirubinemia, respiratory distress, intraventricular hemorrhage and necrotizing enterocolitis¹⁸, which were also observed in our study. Another Indian study enrolled 80 preterm neonates. In their study most of the admitted preterm babies were female (60%), whereas in our study male and female were almost equal (51% vs 49%). Similar to our study all preterm neonates with weight less than 1000 gm died. Again similar to our study the commonest comorbidities found in pre term babies were respiratory distress syndrome, neo-

natal sepsis and hyperbilirubinemia¹⁹. Among the antenatal risk factors, in a study by Ashtekar, observed were PROM (50%), anemia (35%), twin pregnancy (18%), oligohydramnios (13%) and pregnancy induced hypertension (12%)²⁰. Whereas in our study the observed antenatal problems were PROM (16%), anemia (4%), twin pregnancy (8%), oligohydramnios (15%) and pregnancy induced hypertension (23%).

CONCLUSION

Survival of preterm babies is good if the baby is healthy and has good Apgar score. Mortality of preterm newborns is also increased if mother has antenatal complications in the form of PROM, APH and oligohydramnios. To further study factors affecting pre term mortality, large Multicenter trials need to be carried out.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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