THE MORBIDITY AND MORTALITY PATTERNS OF PRETERM INFANTS AT A TERTIARY CARE HOSPITAL IN PESHAWAR: A MEDICAL RECORD REVIEW

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ABSTRACT

Introduction: The numbers of premature deliveries in developing countries are still a great problem despite of advancement in medical field including advancement in prenatal and neonatal care. The preterm babies are at high risk of mortality and morbidity mainly due to various factors, which varies from region to region and country to countries. Although government have given due emphasis on maternal and child health however little is known about mortality and morbidity of preterm children in tertiary care hospitals especially in Peshawar. This study aims to mortality and morbidity spectrum among preterm neonate presented in Khyber Teaching Hospital, Peshawar, Pakistan during five months in 2014-2015.

Methods: The cross-sectional study is based on retrospective data collection (hospital records) carried out at Khyber Teaching Hospital (KTH) between recruited data of September 2014 to February 2015. Data for all premature infants, admitted to the unit during this period, was included, reviewed and recorded in the check list. Data were analyzed using SPSS version 20 and appropriate statistical measure were applied accordingly

Results: A total of 2103 neonates were admitted to the unit during the period, of which 605 (28.8%) were premature, with a male to female ratio of 1.9:1. Most (41%) of admissions were with prematurity / low birth weight (no specific diagnosis established), followed by neonatal sepsis (28%), neonatal jaundice (11.6%) and Respiratory distress syndrome (9.3%). Only 45% of the admitted babies were those born at KTH rest were brought from home or other hospitals (public or private). The mean stay in the unit was 3.5 days while the mortality rate was 29%, with a higher rate amongst those babies who were born at home compared to health care centers including KTH. The mortality rate among those with birth weight of less than 1000g was high (69.6%) compared to neonate with birth weight of 1000-1499g (40.3%) while it was 24.5% for those between 1500-2499g. Regarding case specific it was high (41%) amongst babies with highest for Respiratory Distress Syndrome, followed by 32.4% for Neonatal sepsis, 31.2% for prematurity/ low birth weight, 18.2% for hypoxic ischemic encephalopathy.

Conclusion: Preterm mortality and morbidity in KTH was alarming, mainly due to Respiratory Distress Syndrome, infections (neonatal sepsis) and complications of prematurity. The study highlights the need for formulation of comprehensive strategy and more research specially focusing on the care of preterm infants with very low birth and extremely low birth weights, respiratory distress syndrome and neonatal sepsis.

Keywords: Preterm infants, Premature, Respiratory Distress syndrome, Mortality, Outcomes, Morbidity, low birth weight, Neonatal sepsis

INTRODUCTION

A preterm baby is one who is born before 37 weeks with less than 2500g body weight.[1] Pre-maturity accounts for the largest number of admission in tertiary care hospital especially neonatal Intensive Care Units. The incidence of pre-maturity is higher in low socioeconomic class and lowest in the higher socioeconomic class[2] Globally over the past two to three decade the incidence of preterm birth in most developed countries is about 5-7% of live birth.

Globalization and advancement in technology progressed in all medical fields and also in neonatology has portrayed a remarkable advancement[3, 4] Consequently a number of preterm babies, born after an abridged pregnancy, develop into normal adults. However, this is not always the case and therefore issues on survival of such babies are given due importance in peri-natal medicine[3, 4]

Secondly, there are a lot of factors (ranging from socio-economic status to health system of country) which influence the morbidity and mortality patterns of preterm infants[3]

Worldwide, preterm deaths constitute 28% of the 4 million annual newborn deaths with 99% of these deaths occurring in the developing countries[5]

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Prematurity accounts for a majority of high risk newborns, as preterm infants have more feeding problems, maintaining blood glucose control, jaundice, temperature instability, apnea, respiratory distress and sepsis either singly or in combination[6, 7]

Providing adequate care for premature infants is one of the most challenging aspects of pediatrics[8, 9]

Factors that determine the success in the management of prematurity include standard of prenatal care, gestational age at birth, sex, availability of resources and well-trained, adequate staff[10, 11] which varies from country to country and areas to areas[12]

The emergence of competitive neonatal intensive care is one of the recent advances that allow for the survival of preterm babies however, this facility is not yet available in most of the developing countries[13, 14]

Neonatal intensive care is expensive due to high cost of sophisticated equipment, need for constant power supply, availability of laboratory facilities and the ratio of trained staff for patients[14-18]

Preterm mortality, morbidity and prolonged hospital stay can cause significant cost to the parents, society and the health sector[19]

The causes of neonatal mortality and morbidity vary because of difference in the level of prenatal care. It is hence imperative to recognize the neonatal disease/ death patterns in relation to these factors[20]

It is important to carry out regular audits of neonatal admissions to neonatal units all over the country as this will help immensely in recognizing the shortcomings in the management of premature births and also provide valuable information to the healthcare workers for better understanding and management of premature babies.

This study aim to determine the morbidity and mortality patterns of preterm infants presented in KTH during the year 2014.

MATERIALS AND METHODS:

This was cross-sectional study based on review of records retrospectively from KTH Peshawar (a tertiary care hospital). This was one year record starting from September 2014 to February 2015. All patients' (preterm infants) records were considered regardless of gender and doweling while incomplete files were excluded. A baby born before 37 weeks gestation was considered as preterm infants. A total 506 files were found eligible according to the criteria. The data was collected on structure check list which

comprised of three parts; the demographic, mortality and morbidity parameters. Morbidity parameters were based on the final diagnoses while mortality parameters were confirmed from file and death book. The consequences of mortality parameters were also considered which included hospital stay, mode of delivery, indication for admissions and finally over all outcome. Data were then entered and analyzed using SPSS version 20. Appropriate statistical measures were applied according to the nature of data i.e. mean and SD was estimated for continuous data and categorical data were presented in terms of frequencies and percentages.

RESULTS

Out of a total of 2103 neonates admitted to the unit during the study period, 605 cases (64.8% being male & 35.2% being female) were preterm which account 28.8% of total neonatal cases in the selected hospital. Among the admitted cases 269 (44.5%) were delivered in KTH, 138 (22.8%) in Private hospitals / clinics, 108 (17.9%) in

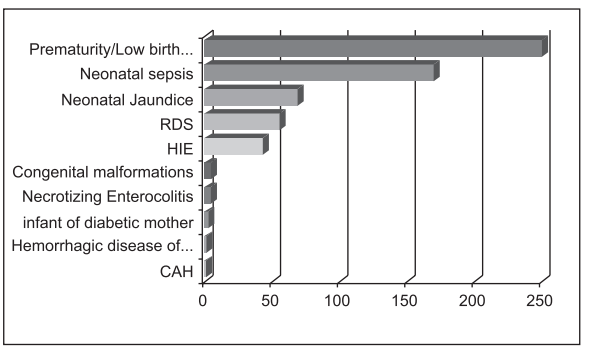

Figure 1: Distribution of cases by diagnosis (indications for admission)

* RDS= Respiratory Distress Syndrome, HIE= Hypoxic Ischemic Encephalopathy and CAH= Congenital Adrenal Hyperplasia

Table 1: Outcome and mortality rate in hospitalized patients with respect to place of birth

Place of birth	Outcome				Total
	D. Healthy*	DOW	LAMA	Expired	
Khyber Teaching Hospital	172 (63.9%)	11 (4.1%)	16 (5.9%)	70 (26.0%)	269
Other government hospital	74 (68.5%)	02 (1.9%)	02 (1.9%)	30 (27.8%)	108
Private hospital/ clinic	82 (59.4%)	07 (5.1%)	07 (5.1%)	42 (30.4%)	138
Home	49 (54.4%)	05 (5.6%)	02 (2.2%)	34 (37.8%)	90
Total	377 (62.3%)	25 (4.1%)	27 (4.5%)	176 (29.10%)	605

(D. Healthy* = discharged healthy, DOW =discharged on well, LAMA=leave without medical advice)

Table 2: Morbidity in term of low birth weight and outcome

Birth weight	Outcome				Total
	D. Healthy*	DOW	LAMA	Expired	
Low birth weight 1500-2499g	303 (66.9%)	19 (4.2%)	20 (4.4%)	111 (24.5%)	453
Very low birth weight 1000-1499g	61 (51.3%)	6 (5.0%)	4 (3.4%)	48 (40.3%)	119
Extremely low birth weight <1000g	06 (26.1%)	0 (0.0%)	1(4.3%)	16 (69.6%)	23
Normal >2500g	07 (70.0%)	0 (0.0%)	2 (20.0%)	1(10.00%)	10
Total	377 (62.3%)	25(4.1%)	27(4.5%)	176(29.1%)	605

(D. Healthy* = discharged healthy, DOW =discharged on well, LAMA=leave without medical advice)

Table 3: Mode of Delivery VS Outcome

Mode of delivery	Outcome				Total
	D. Healthy*	DOW	LAMA	Expired	
Normal Vaginal delivery	329 (61.3%)	22 (4.1%)	25 (4.7%)	161 (30.0%)	537
Caesarean section	48 (70.6%)	3 (4.4%)	2 (2.9%)	15 (22.1%)	68

(D. Healthy* = discharged healthy, DOW =discharged on well, LAMA=leave without medical advice)

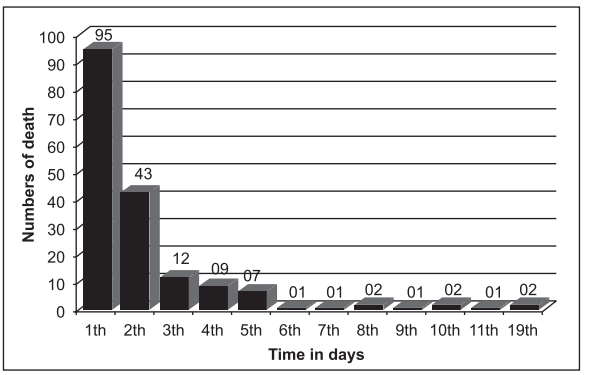

Figure 2: Mortality spectrum of preterm infants during hospitalization

other Government hospitals and 90 (14.9%) at home. Out of referred cases, (46%) were brought to hospital within 24 hrs of delivery while 29% were brought at the age ranged from 8-28 days or more.

Regarding Indication for admissions, most of the admissions to the premature unit were without a specific diagnosis and admitted for prematurity / low birth weight (41%), followed by neonatal sepsis (28%) and neonatal jaundice (11.6%). These were followed by Respiratory Distress Syndrome (9.3%) and Hypoxic Ischemic Encephalopathy (7.3%).

The comparative aspects of birth place, out come and mortality indicates that 269 infant born in KTH out of which 172 (63.9%) were discharged healthy and 70 (26.0%) were expired. Similarly 108 born in other government hospitals, out of which 74 (68.5%) were improved while 30 (27.8%) died. Those who were delivered in private clinics (n=138) and at home (n=90), who were referred to KTH, only 82 (59.4%) and 49 (54.4%) improved while 42 (30.4%) and 34 (37.8%) expired respectively. Over all outcome and mortality rate indicates that 377 (62.3%) were discharged normal from hospital, 25 (4.1%) were discharged on parents request whereas 27 (4.5%) left without medical advice. A total 176 (29.10%) had died as shown in table 1.

Morbidity in term of low birth weight and outcome

The cross tabulation of different categories of the birth weight was plotted against hospital discharge status and mortality rate. Results indicated that the mortality rate of patients admitted with a weight of less than 1000g was high (69.6%) as compared to 10% for those who weighed more than 2500g, 24.5% for those between 1500-2499g and 40.3% of those between 1000-1499g.

The spectrum of mortality during hospital stay revealed that from a total of 176 babies, that expired in the premature unit of SCBU during the study period, 95 (54%) died during the first 24 hours of admission followed by 43 (24.4%) on the second day.

Comparison of outcome with respect to the Mode of delivery

The mortality rate amongst preterm babies born via normal vaginal delivery was high 30%, compared to those born through Caesarean sections 22.1%. However this was not significant. Significance was low with a p value of 0.47. The outcome in term of discharge status was that 329 (61.3%) of the preterm babies (born via normal vaginal delivery) improved and were discharged

healthy while out of those born with Caesarean section 48 (70.6%) had improved health status and were discharged through routine procedure.

Prognosis of different diagnoses

The correlation of the diagnosis at admission and the outcome, like that of weight, was interesting. The prognosis for necrotizing enterocolitis was best at 0% mortality although it should be noted that only 4 cases were diagnosed who were discharged healthy. Amongst diseases with more than 20 cases reported in the study, preterm infants with Respiratory Distress Syndrome (RDS) had the worst prognosis with 41.1% mortality,

Table 4: Prognosis for various diagnoses

Mortality indicators among preterm Neonate	Outcome				Total
	D. Healthy*	DOW	LAMA	Expired	
RDS	28(50.0%)	01(1.8%)	04 (7.1%)	23 (41.1%)	56 (9.25%)
Neonatal sepsis	102 (60.0%)	05 (2.9%)	08 (4.7%)	55 (32.4%)	170 (28.1%)
HIE	32(72.7%)	02 (4.5%)	02 (4.5%)	08 (18.2%)	44 (07.2%)
Prematurity/ Low birth weight	151 (60.4%)	14 (5.6%)	07 (2.8%)	78 (31.2%)	250 (41.3%)
Neonatal Jaundice	57 (81.4%)	01 (1.4%)	06 (8.6%)	06 (8.6%)	70 (11.5%)
Necrotizing Enterocolitis	04 (100.0%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	04(0.66%)
Congenital malformations	01 (20.0%)	01 (20.0%)	0 (0.00%)	03 (60.0%)	05 (0.82%)
Hemorrhagic disease of newborn	00 (0.00%)	0 (0.00%)	0 (0.00%)	02 (100%)	02(0.33%)
Infant of diabetic mother	01 (33.3%)	01 (33.3%)	0 (0.00%)	01 (33.3%)	03 (0.49%)

followed by Neonatal Sepsis with 32.4% mortality, prematurity with low birth weight with 31.2%, Hypoxic Ischemic Encephalopathy with 18.2% and Neonatal Jaundice with 8.6% mortality. Amongst the diseases with low prevalence, Hemorrhagic disease of newborns had the worst prognosis with 100% mortality, although only two cases were reported. This was followed by congenital malformations with 60% mortality (3 out of 5 babies did not survive).

DISCUSSION

Pakistan has one of the highest preterm birth rate in the world. According to WHO, Pakistan has ranked eighth in terms of number of preterm birth in the world and fourth among countries with the highest numbers of preterm births (21). Using the retrospective approach of data collection, five months data was retrieved from archives of KTH, in order to know the spectrum of mortality and morbidity among preterm neonates admitted in pediatric unit.

In the present study, the number of preterm admissions was 605 out of a total of 2103 which account for 28.8% neonates admitted during the study period. This was higher than 24% reported at a tertiary care hospital

in Karachi (22), and that in India (23). There was a gender disparity, as the percentage of male preterm babies was 65%, which is higher than the 57% reported in a study conducted in Karachi Pakistan by Khan MR (24).

Regarding the morbidity, prematurity (no specific diagnosis) accounted 41%, followed by neonatal sepsis (28%) and neonatal jaundice (11.6%). this pattern differs from the study conducted in Karachi which show that low birth weight account for 24.6% and 20% of all neonates develop sepsis (20). Although the percentage is low as compared to present study, however the morbidity of babies with RDS was 9.3% compared to 12.8% and 18.9% in similar studies from Karachi (20, 25, 26). The worse outcome in terms of mortality for prematurity is low birth weight and RDS which is also reported by other studies (23, 27, 28). These reported figures were also similar to those from the United States in 1950s and 60s (29).

The mean period of stay in the preterm unit in our

study was 3.5 days, compared to 11.5 days from a study in Karachi (24). This could reflect the high turnover of patients maintained at KTH to deal with a heavy patient load of not just our own hospital, but of referrals from other rural and urban health centers (both private and public) as well. The mortality rate of preterm babies admitted at KTH was 29%, which is higher than the 14% observed at Agha Khan University's NICU (24). This marked difference can be attributed to a number of factors such as high patient load, lack of latest equipment like ventilators and inadequately trained health care staff.

According to the present study the outcome in term of mortality was 37.8% for babies born at home as compared to 26% amongst those born at KTH. This could be due to delay in seeking neonatal care, especially in those from remote areas.

The mortality among very low birth weight (<1000g) was 69.6% compared to 40.3% of those between 1000-1499g, 24.5% for those between 1500-2499g, and 10% for those who weighed more than 2500g. This necessitates the need for better handling of extremely low birth weight and very low birth weight babies.

The case specific mortality for other diseases with a high prevalence in the admitted babies was 55 (32.4%) for Neonatal sepsis, 78 (31.2%) for prematurity / low birth weight, 08 (18.2%) for hypoxic ischemic encephalopathy and 06 (8.6%) for neonatal jaundice. However, study in India shows a high percentage as compare to our study (23). The case specific mortality at KTH is alarming which demand for better facilities to deal with respiratory problems of preterm neonates (especially ventilators) and a more comprehensive strategy to deal with neonatal sepsis, as these two factors had the highest mortality rates.

Another factor noted in our study (although not reported in result part), was the significant number of multiple births (twins and triplets) admitted to the unit. This could be related to the frquent use of assisted reproductive techniques in our country resulting in increasing multiple births, most of them preterm as reported by Baig SA et al (30). However, this could not be correlated as the drug histories of mothers were not available and no statistics reported on this subject.

CONCLUSIONS:

A large proportion of the preterm admissions to KTH were due to low birth weight, followed closely by neonatal sepsis. The case specific mortality was high for RDS and neonatal sepsis as well as a high mortality rate amongst babies with extremely low birth weight. There is extreme need to do more research in order to find out the real causes of premature births and formulate comprehensive strategy for its prevention and cure. A special attention is needed for the care of preterm infants with very low birth weight and extremely low birth weight, respiratory distress syndrome, and neonatal sepsis. The study also shows the need for better awareness among parents and health care providers about the threats of preterm birth.

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