ORIGINAL ARTICLE

FREQUENCY AND OUTCOME OF NECROTIZING ENTEROCOLITIS IN PRETERM NEONATES

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Background: Necrotizing enterocolitis (NEC) is the commonest gastrointestinal emergency in neonates. It is associated with high mortality and morbidity. Present study was conducted to determine the frequency of necrotizing enterocolitis in preterm neonates along with their outcome during stay in hospital. **Methods:** This was descriptive case series carried out in Neonatal Intensive Care Unit (NICU) of Paediatrics department, POF Hospital Wah Cantt from August 2010 to February 2011. All the preterm neonates admitted in NICU POF Hospital were included in the study. Patients were clerked on a pre-designed *pro forma*. **Results:** A total of 196 neonates were enrolled and 28 (14%) were diagnosed with NEC. Outcome analysis of these 28 patients with NEC revealed that 16 patients (57.14%) were discharged while 11 (39.28%) expired and one (3.5%) was referred. **Conclusion:** There is a high incidence in preterm-low birth weight babies presenting in our set-up, with high mortality rates.

Keywords: Necrotizing enterocolitis, outcome, preterm, enteral feeding

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INTRODUCTION

Necrotizing enterocolitis (NEC) is defined as intestinal inflammation and injury probably secondary to bowel ischemia, immaturity and infection.[1] NEC has been described in medical literature since 1960s.[2] With improvement in neonatal intensive care it has become the most common emergency encountered at neonatal intensive care unit (NICU). It is associated with increased mortality and morbidity including growth and neurodevelopment impairment. The pathophysiology of NEC is thought to involve immaturity of the immune, circulatory and digestive systems, hypoxic-ischemic injury, enteral feeding and pathological bacterial colonization.[3] It is estimated that the disease affects up to 15% of premature infants and around 7% of full term neonates admitted to NICU.[4] Mortality ranges from 25–30%. Of those who survive, approximately 25% experience long term squeal related to gastrointestinal tract.[5] Incidence of NEC declines with increasing gestational age and low gestational age is single most important risk factor for NEC.[6] Twin analysis show that Intra-ventricular haemorrhage (IVH), NEC and bi-parietal diameter (BPD) are familial in origin.[7] Patent ductus arteriosis, prolonged antibiotic therapy, H receptor blocker therapy and formula feeding increase the risk of developing NEC.[8,9] On the other hand orally administered probiotics and early introduction of breast milk feeding protects against the development of NEC.[10]

The objective of this study is to determine magnitude of NEC as well as its outcome in the form of discharge, transfer out and death in study population. As NEC is one of most serious complication in preterm neonates associated with death and neurodevelopment delay as well as interventions like surgery; it is important to study magnitude and implications of this problem in our population.

MATERIAL AND METHODS

This descriptive case series was done from August 2010 to February 2011 in NICU of POF hospital, Wah Cantt. All neonates admitted in NICU with gestational age less than 37 weeks and birth weight less than 2500 grams were enrolled in the study after taking proper consent from parents. Babies with gross congenital anomalies and gut anomalies having abdominal distension and emesis at the time of presentation were excluded. A total of 196 patients meeting the criteria were enrolled in the study. Baseline characteristics of study population were recorded using a specially designed *pro forma*, which included gestation age, weight, enteral feed, age at presentation and mode of delivery. Any neonate included in the study was considered a case of NEC based upon Bell's Criteria[5] for diagnosis of NEC supported by laboratory findings including thrombocytopenia and blood in stool. All the babies diagnosed as cases of NEC were further followed during the course of illness at NICU. Final outcome in terms of recovery and discharge or referral to other centres for treatment or death were recorded. Data were analysed using SPSS-10.

RESULTS

A total number of 196 patients fulfilling the inclusion criteria were enrolled in the study. Duration of study was six months. The frequency of NEC in this study was 14.28% (n=28) in total patients shown in table-1

and frequency was 4.59% in females and 9.69% in males. (Table-2)

Outcome was assessed during hospital stay as 57.14% of patients discharged and about 40% patients expired and 2.86% patients were referred to other centres of total patients who were diagnosed to have NEC as shown in table-3

The mean gestational age of the patients was 33.61 weeks (SD±2.78 weeks) with gestational age range of 26 to 36 weeks. The mean weight of patients included in this study was 1.8780 kg (SD±0.4930 kg) with weight range of 0.70–2.45 kg.

The frequency of patients with different stages of NEC with type of enteral feedings like mother feed, formula feed and both mother feed and formula feed is tabulated in table-5

Table-1: Frequency of necrotizing enterocolitis in study population

Necrotizing enterocolitis Present	**Bell staging**	**Frequency**	**Percent**
	Stage 1 NEC	6	3.1
	Stage 2 NEC	21	10.7
	Stage 3 NEC	1	0.5
NEC Absent		168	85.7
Total		196	100.0

Table-2: Necrotizing enterocolitis and gender

Gender	**Necrotizing enterocolitis present**			**NEC Absent**	**Total**
	Stage 1 NEC	**Stage 2 NEC**	**Stage 3 NEC**		
Female	2	7	0	58	67
Male	4	14	1	110	129
Total	**6**	**21**	**1**	**168**	**196**

Table-3: Outcome in patients having necrotizing enterocolitis

		Outcome			
		Discharge	**Expire**	**Referred**	**Total**
Necrotizing enterocolitis	**Stage 1 NEC**	5	1	0	6
	Stage 2 NEC	11	9	1	21
	Stage 3 NEC	0	1	0	1
Total		16	11	1	28

Table-4: Statistics of gestational age (weeks) & weight (kg) in all patients

	N	**Minimum**	**Maximum**	**Mean**	**SD**
gestational age (weeks)	196	26	36	33.61	±2.78
weight (kg)	196	.70	2.45	1.8780	±0.4930

Table-5: Enteral feed and necrotizing enterocolitis

Enteral feed	**Necrotizing enterocolitis**			**NEC Absent**	**Total**
	Stage 1 NEC	**Stage 2 NEC**	**Stage 3 NEC**		
Nil	1	2	1	47	51
Mother feed	4	17	0	100	121
Formula feed	0	2	0	6	8
Both feeds	1	-	-	15	16
Total	**6**	**21**	**1**	**168**	**196**

DISCUSSION

In this study the frequency of NEC is 14.28% as out of total 196 patients 28 patients developed NEC. Out of 28 patients 6 patients (21.43%) got stage I NEC; 21 patients (75%) had stage II NEC and there was only one patient having stage III NEC (3.57%). These results are in contrast to those presented by Mancila *et al*[11] in their study. They reported that 7.2% of newborn admitted to hospital developed NEC as 52% corresponded to stage I, 37% to stage II and 11% to stage III. However Martin and Walker[12] got prevalence of NEC in 7–14 % of preterm neonates with birth weight in between 500 and 1500 grams which is closer to the frequency found in present study. In one of the selected series Lin and co-workers[13] found the incidence of NEC ranging from 1–5% of all NICU admission but this study showed quite high frequency of 14.28% with comparison to Lin and co-worker. The Vermont Oxford Network reported an incidence of NEC 6–7.1% during the decade of 1990.[14]

In study conducted by Mancila *et al*[11] the global mortality was found to be 29.5% and in this study the mortality is 39.28%. Henry *et al*[15] in their study found the mortality rate approaching 20–50% in very low birth weight infants having NEC. The above mentioned studies were conducted in the developed world while present study has been conducted in resource limited NICU of a developing country and this may be the cause of different mortality rates reported.

The mean gestational age of the patients in this study is 33.61 weeks (±2.78 weeks).The patient with minimum gestational age is of 26 weeks and maximum gestational age is 36 weeks. The most of the patients included in the study are late preterm neonates. This is probably due to poor survival of extremely premature infants in our country. The mean weight of patients in this study is 1.8780 kg (±0.4930 kg), the range was 0.70–2.45 kg.

NEC was found predominantly in male preterm neonates (9.69%) in our study though in past there is no relation of sex and rates of NEC but recent studies shows that there is increased risk of developing NEC in males as there is also slight greater incidence and higher mortality among male infants.[16] The mortality was also higher in male patients of our study that is 47.37% of total male patients and it was 22.22% for total of females.

Relationship of enteral feeding with development of NEC has been described in literature. Out of 196 patients in this study enteral feed was started in 145 patients (73.98%). One hundred-twenty one patients were given only mother feed (61.7%), 8 patients only got formula feed (4.1%) and 16 patients were given both feeds (8.2%). Among the infants receiving only breast milk 21 babies developed NEC these babies were 17.36% of the total babies receiving breast milk only compared to this 6 patients receiving only formula feed developed NEC

representing 75% of the babies receiving only formula feed. This finding reaffirmed the protective role of breast feeding demonstrated in one of study by Montgomery D *et al.*[17] Only one Patient getting combination of both mother and formula feed developed NEC corresponding to 3.57% of total patients who got NEC. In the present study majority of patients who developed NEC were receiving enteral feeds (85.71%) and only 14.2% babies in no enteral feed group developed NEC. This fact pointed towards the recognized relationship between enteral feeds and development of NEC in preterm neonates as study showed done by Henderson G *et al*.[18]

CONCLUSION

Necrotizing enterocilitis is one of the major challenges in neonatology and there is a high incidence in preterm-low birth weight babies presenting in our set-up, with high mortality rates. Studies on this topic are few in our part of world. Keeping in view the magnitude of the problem in developing countries, multi-centre studies are required with a larger sample size to recognize the differences and similarities between features of NEC in Pakistani neonates and features seen in NICUs of developed world and to identify means to decrease the morbidity and mortality associated with NEC

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