Original Article

VERY LOW BIRTH WEIGHT BABIES WITH NECROTIZING ENTEROCOLITIS - INCIDENCE AND OUTCOME

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Abstract:

Background: Necrotizingenterocolitis (NEC) is the one of the commonest gastrointestinalemergency and leadingcause of mortality in preterm and very low birth babies (VLBW).

Objective: This study was conducted to determine the incidence and outcome of necrotizing enterocolitis in very low birth weight babies during stay in hospital.

Design: Case series

Methods: This was descriptive case series carried out in neonatal Intensive Care Unit (NICU) of child health department, Pakistan Ordnance Factories (POF) Hospital, Wah Cantt from August 2010 to February 2011. All very low birth babies having weight ≤ 1500 grams admitted under 28 days of age in NICU of POF Hospital were included in the study. Patients were clerked on a pre-designed proforma.

Results: Out of selected fifty six very low birth babies, about fifteen patients developed NEC which is about 26.8% with mortality of 53.33% in patients having NEC as outcome.

Conclusion: The frequency of NEC in this study was 26.8% which is too high in very low birth weight babies. NEC is associated with complications like neurodevelopment delay and death, so timely diagnosis and management of NEC should be done.

KEYWORDS:
Necrotizing enterocolitis, very low birth weight, incidence.

INTRODUCTION:

Necrotizing enterocolitis (NEC) is defined as intestinal inflammation and injury. The incidence and illness burden of NEC has remained unchanged over the past 50 years despite improvements in the survival of extremely preterm infants[1]. Siaebold in 1825 and Genersich in 1891[2] published some of the earliest case reports of NEC. The risk factors in pathogenesis of NEC include preterm birth, small for gestational age (SGA) status, hypoxic-ischemic events, early and rapid advancement of enteral feeds, formula feeds and bacterial overgrowth[1]. With improvement in neonatal intensive care it has become the most common emergency among infants in neonatal intensive care unit (NICU). It is associated with increased mortality and morbidity including growth and neurodevelopment impairment. It is estimated that disease affects up to 15% of premature infants and around 7% of full term neonates admitted to Neonatal Intensive Care Unit (NICU)[3]. Mortality ranges from 25-30%.Of those who survive approx. 25% experience long term sequel related to gastrointestinal tract[4]. Incidence of NEC declines with increasing gestational age and low gestational age is main single risk factor for NEC[5]. Orally administered lactobacillus case subspecies rhamnosus significantly reduces the incidence and the intensity of enteric colonization by Candida species among very low birth weight neonates[6].Feeding with human milk compared with formula milk is probably advantageous for preterm infants

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and it has been recommended that enteral feeding should be introduced as early as possible to reduce risk of systemic infection including NEC, late onset sepsis and meningitis[7].

The rationale of this study was to determine the incidence of NEC and also outcome in form of discharge, transfer out and death in very low birth weight babies as in literature we could not find such study conducted in Pakistan. As NEC is associated with high mortality and morbidity and also prolong hospital stay is expected, the developing country like Pakistan cannot afford to spend too much resources. This study would help in better understanding of pathophysiology of NEC and will help to develop better preventive strategies[8].

MATERIAL AND METHODS:

This is observational study and was conducted in NICU of POF hospital, Wah Cantt from August, 2010 to February, 2011 over six months. After approval from hospital ethical committee of POF hospital, Wah Cantt this observational study was done. After taking consent of parents patients were enrolled in study. Inclusion criteria was to enroll all neonates of either gender in consecutive manner admitted in NICU with gestational age less than 37 weeks and birth weight $\leq$ 1500 grams after taking proper consent from parents.. Exclusion criteria were not to include term babies, babies having syndromic features or who had gut anomalies at birth. A total of fifty six patients meeting the criteria were enrolled in the study using a specially designed proforma which included gestation age, weight, enteral feed, age at presentation. Clinically manifested NEC was noted supported by laboratory findings of blood in stool and thrombocytopenia. Instrumental, normal vaginal delivery and Caesarean section were also taken into account. Babies with gross congenital anomalies and gut anomalies having abdominal distention and emesis were not included in study. Modified Bell stage criteria were used for severity of NEC. Data was analyzed SPSS 20.0. P value was taken significant <0.05.

RESULTS:

A total number of fifty six patients were included in the study that were preterm having gestational age less than 37 weeks and were very low birth weight having weight $\leq$ 1500 grams. Duration of study was six months. The mean gestational age of the patients was 30.48 weeks (SD $\pm$2.703 weeks) with gestational age range of 26 to 35 weeks. The mean weight of patients included in this study was 1.2088 kg (SD $\pm$0.21964 kg) with weight range of 0.70 to 1.49 kg.

The frequency of NEC in this study was 26.8% in total patients shown in table 1 and frequency was 8.93% in female and 17.87% in males. Outcome was assessed during hospital stay in patients having NEC as 40% of patients discharged and about 53.33% patients expired and 6.67% patients were referred to other centers of total patients who were diagnosed to have NEC as shown in table 2. Out of 56 patients mother feed was given in 21 (37.5%) patients while no feed was given in 32 (57.1%) patients (Graph 1). Patients who were given mother feed, out of 21 patients, NEC was absent in 11 patients (table 3). Relation between NEC and enteral feed was significant as P value calculated was 0.016 (< 0.05). Out of total 20 female patients NEC was absent in 15 (75%) patients and of 36 male patients NEC was absent in 26 (72.2%) patients. Relation between gender and NEC was not significant as P value was 0.474. NEC frequency and distribution is shown in graph 2 and 3.

DISCUSSION:

In this study the frequency of NEC is 26.8% as out of total 56 patients, 15patients developed NEC. Out of 15 patients 1 patients got NEC with stage I corresponding to 6.67%, 13 patients were stage II corresponding to 86.6% and there was only one patient having stage III NEC corresponding to 6.67%. Mancila et al[9] found in their study 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. In one study done by Martin and Walker[10] showed prevalence of NEC in 7-14 % of preterm neonates with birth weight in between 500 and 1500 grams. In one of selected series by Lin and co-workers[11] found the incidence of NEC ranging from 1-5% of all NICU admission. The incidence of NEC is about 9% in VLBW babies as reported by Fisher JG[12] et al, which is too less as compare to our study. NEC prevalence is about 7% among infants with a birth weight between 500 and 1500 grams as also data from large, multicenter, neonatal network data bases from the United States and Canada report show mean NEC prevalence of 7% in infants weighing <1500 grams[13]. Johnson TJ et al[14] found incidence of NEC in about 10% of VLBW babies. The incidence of NEC (5%–6% of VLBW neonates) has not changed significantly despite advances in neonatal intensive care as studied by Lin and co-workers[11]. Fanaroff AA et al[15] in their study found necrotizing enterocolitis incidence about 5%. Studies done by National Institute of Child Health and Human Developmental Neonatal Network centers done during the decade of 1990 showed incidence of NEC at about 7% in infants with birth weight between 500 and 1500 grams[16] where as in this study the incidence of NEC in this weight range was about 7.65%. The Vermont Oxford Network reported an incidence of NEC 6 to 7.1% during the decade of 1990[17]. Frank S et al[18] found NEC mortality around 19.2% patients while in our study it was 53.33%.

In this study out of total fifty six patients 15 patients who got NEC out of these 15 patients 8 patients expired which account for 53.33% mortality which is too high as compared to study conducted by Fitzgibbons SC et al[19] which showed estimated rate of death associated with necrotizing enterocolitis ranges between 20 and 30%. One patient with NEC was referred to other center accounting for 6.67%. In one retrospective study done by Elfvin A et al[20] showed overall mortality of NEC 32% which is also high but in comparison to our study it is less. Our mortality is as comparable to one study by Henry et al[21]as in their study found the mortality rate approaching 20-50% in very low birth weight infants having NEC. Berman and Moss[22] found an estimated mortality of 15%–30% in their study.

The mean gestational age of the patients in this study was 30.48 weeks with SD of $\pm$2.703 weeks. The patient with minimum gestational age was of 26 weeks and maximum gestational age was 35 weeks. The mean weight of patients in this study was 1.2088 kg with standard deviation of $\pm$0.21964.The minimum weight of patient included in study was 0.70 kg and a patient having maximum weight was 1.49 kg.

There were 20 females patients accounting for 35.7% and 36 patients were male which accounted 64.3% of total patients. NEC developed in 5 female patients corresponding to 33.33% of total patients with NEC. One female patient was having stage-I NEC and 4 patients were having stage-II NEC. NEC was present in 10 male patients corresponding to 66.67% of total patients with NEC as 9 patients having stage-II NEC and only one patient got stage-III NEC.

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[23] as in this study the frequency of NEC was more among males i.e. 66.67% as compare to females i.e. 33.33%. The mortality was also higher in males than females.

The use of probiotics in preterm babies is related to low incidence of NEC specially NEC-II and more which have got even high mortality and morbidity[24].

CONCLUSION:

There was high incidence of NEC in this study with total of 26.8% patients having NEC and also there was high mortality as 53.33% patients expired. Prevention and treatment of NEC has become an area of priority for research due to the significant mortality and morbidity including long-term neurodevelopment impairment related to the illness.

Table 1: Frequency of Necrotizing enterocolitis

	NEC stages	Frequency	Percent
Necrotizing enterocolitis Present	Stage 1 NEC	1	1.8
	Stage 2 NEC	13	23.2
	Stage 3 NEC	1	1.8
NEC Absent		41	73.2
Total		56	100.0

Table 2: Necrotizing enterocolitis and Outcome

		Outcome			Total
		Discharge	Expire	Referred	
Necrotizing enterocolitis Present	Stage 1 NEC	1	0	0	1
	Stage 2 NEC	5	7	1	13
	Stage 3 NEC	0	1	0	1
NEC Absent		7	34	0	41
Total		13	42	1	56

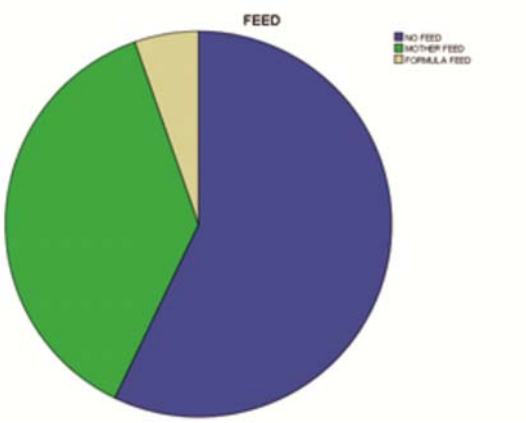
Table 3: Enteral feed and Necrotizing enterocolitis

Enteral feed	Necrotizing enterocolitis Present			NEC Absent	Total
	Stage 1 NEC	Stage 2 NEC	Stage 3 NEC		
No feed	0	2	1	29	32
Mother feed	1	9	0	11	21
Formula feed	0	2	0	1	3
Total	1	13	1	41	56

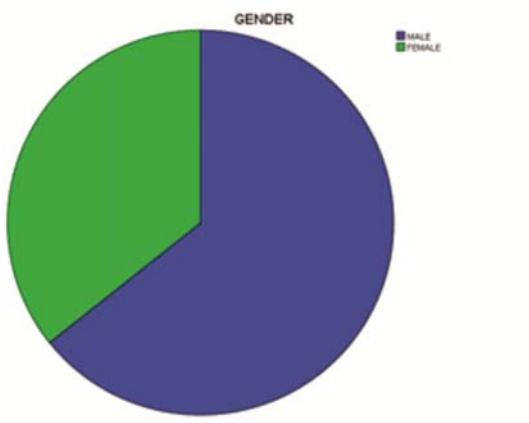
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.536[a]	6	.016
Likelihood Ratio	16.521	6	.011
N of Valid Cases	56		

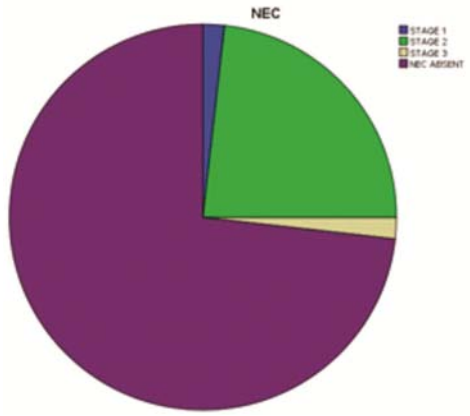
a. 9 cells (75.0%) have expected count less than 5. The minimum expected count is .05.



Graph 1: Enteral feed



Graph 2: Necrotizing enterocolitis frequency distribution



Graph 3: Necrotizing Enterocolitis and Gender distribution

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