ORIGINAL ARTICLE

Acute Gastroenteritis In Neonates In Relation To High Risk Infants

by

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Abstract.

Acute gastroenteritis in neonates is more complicated than infantile gastroenteritis and the mortality rate is high especially in diarrhoeal outbreaks due to enteropathogenic escherichia coli (EPEC) infections.
This study evaluated the epidemiological, clinical, bacteriological aspects and the mortality rate in relation to high risk infants.

1. *The incidence of diarrhoeal diseases during a three year period (1975 – 1977) was 4% (337 out of 8594 infants), specified as follows :*
   - *In 1975 : 5.4% (160 out of 2967 infants)*
   - *In 1976 : 3.6% (94 out of 2640 infants)*
   - *In 1977 : 3.1% (83 out of 2640 infants)*
2. *Diarrhoeal diseases most frequently occurred in high risk infants, especially in low birth weights, neonatal asphyxia and pathologic labour.*
3. *The high incidence of pathogenic bacteria was due to EPEC namely 32.2% (92 out of 285 stool cultures).*

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4. *Accompanying diseases or complications such as septicaemia, purulent meningitis, necrotizing enterocolitis and brochopneumonia occured more frequently in high risk infants especially in low birth weights and pathologic labour.*
5. *The mortality rate during the three year period was 14.8% (50 out of 337 infants) consisting of 13.8% (22 out of 160) in 1975; 12.8% (12 out of 94) in 1976 and 19.3% (16 out of 83) in 1977.*

As morbidity, mortality, pathogenic bacteria and accompanying diseases or complications more frequently occured in high risk infants and in pathologic labour, more attention should be focused to the high risk infant care unit.

Introduction.

Acute gastroenteritis in neonates is a more complicated problem than that in older children.

The mortality rate is still very high (Purnomo Sutjantoro et al., 1978; Olarte and Alvores, 1965), especially in diarrhoeal outbreaks due to EPEC.
Some studies stated that the mortality rate of diarrhoea in neonates was about 50% and this was caused by EPEC.

In Indonesia the incidence of acute gastroenteritis is highest in neonates (Purnomo Surjantoro et al., 1978; Aswitha Budiarso et al., 1977). This high incidence is caused by the high prevalence of infections as well as number of high risk infants, especially low birth weights. Beside these factors, overcrowdedness of wards, inadequency of nurses, ignorance of mothers about breast feeding and lack of attention especially in the neonatal care of high risk infants also constitute the important causes.

The purpose of this study is to present figures of diarrhoeal diseases in neonates as well as data about the prevalence of diarrhoea in high risk infants. Thus, we will also have some idea of those high risk infants who need special care in the effort to prevent the occurrence of infections, specially gastroenteritis.

Material and methods.

This investigation was a prospective study during a three year period (1975 – 1977) in the neonatal nursery units at the Department of Child Health, Medical School, University of Sam Ratulangi, Gunung Wenang General Hospital, Manado.
An evaluation was done on every newborn baby, to find out whether the baby belonged to the normal or high risk infant groups. The degree of dehydration was also estimated and routine laboratory examinations and stool cultures were performed. Further observations of accompanying diseases or the complication of the disease in the course of illness were also made.

Results.

During the three year period (1975 (1977) about 8594 infants consisting of 4733 (55.5%) normal and 3821 (44.5%) high risk infants were admitted to the neonatal nursery units. Out of the 4773 normal infants, 103 (2.2%) had diarrhoeal diseases and of the 3821 high risk infants, 234 (6.1%) suffered from diarrhoea with moderate or severe dehydration. (Graph. 1).

Incidence of diarrhoea of the 8594 infants was 4% (337 infants) : 5% in 1975 (60 out of 2967 infants) 3.6% in 1976 (94 out of 2640 infants) and 3.1% in 1977 (83 out of 2646 infants). (Table 1; graph 2)
Of the 337 patients who suffered from diarrhoea : 103 out of 4773 were normal babies (2.2%), 143 out of 1074 low birth weights (13.3%), 11 out of 80 had asphyxia neonatorum (13.8%) and 46 out of 417 with pathologic labours (11%). (Graph. 3).
In 285 out of 337 patients (84.5%) stool culture was done, revealing 32.2% EPEC (92 out of 285 infants), 10.2% mixed EPEC and Shigella infections (29 out of 285 patients), 4.6% Shigella (13 out of 285 patients) and 53% revealed no bacterial growth (151 out of 134 patients). (Table 2; graph 4).
66.4% (89 out of 134 patients) with positive stool culture were high risk infants and the rest, 33.6% (45 infants) were normal. (Graph 5). 15.4% (52 out of 337 patients) suffered from complications or had accompanying diseases : 17 patients (5%) of high risk infants with necrotizing enterocolitis, 15 (4.5%) with bronchopneumonia consisting of 13 high risk and 2 normal infants; 10 patients with septicaemia consisting of 8 high risk and 2 normal infants, 6 (1.7%) with sclerema neonatorum consisting of 3 high risk and 3 normal infants and 4 (1%) from the high risk infants group with purulent meningitis. (Table 3; graph 6).
Of the 52 cases with complications 86.5% were high risks and 13.5% normal infants.
Mortality was 14.8% (50 out of 337 patients) : 13.8% in 1975; 12.8% in 1976 and 19.3% in 1977. From 50 death cases 88% were high risk infants and 12% normal. (Table 4; Graph 7).

Discussion.

From 1975 to 1977 the incidence of diarrhoea decreased from 5.4% in 1975 to 3.6% in 1976 and then to 3.1% in 1977. (Table 1). The decrease of the incidence of diarrhoea might be caused by the decrease in the incidence of high risk infants from 46.5% (1380 out of 2967 infants) in 1975 falling to 42.9% (1133 out of 2640 infants) in 1976 and then 36.5% (967 out of 2646 infants) in 1977. Improvement in nursing care must also be considered.
Beside prematurity, it is evident that the full term babies with pathologic labour and asphyxia neonatorum had a tendency to suffer from infections (Cockington and Drew, 1977).
Wright et al. (1975) stated that newborns with stress were prone to have a decrease in leucocyte bactericidal activity so that they suffered more easily from infection. Other high risk factors such as premature rupture of the membranes, large babies, breech presentation, grande multipara are not important factors in case of diarrhoea (Table 1) .

Purnomo Surjantoro et al. (1978) during a 5 year period found the incidence of gastroenteritis in low birth weight infants

TABLE 1 : *Incidence of Diarrhoea.*

Factors	1975		1976		1977		
	Number of live birth	Diarrhoea	Number of live birth	Diarrhoea	Number of live birth	Diarrhoea	Total of Diarrhoea
Low birth weight	435	14.7%	326	13.2%	313	11.5%	13.3%
Asphyxia	21	12.9%	11	18.2%	48	10.4%	13.8%
Grande multipara	258	2.7%	181	0.6%	78	2.6%	1.9%
Pathologic labour	168	12.5%	163	4.3%	86	16.2%	11%
Large baby	192	2.1%	212	3.3%	260	0.4%	1.8%
Hypertension	151	2%	84	2.4%	113	1.8%	2%
Abortion	65	1.5%	75	1.3%	4	–	1.3%
Premature rupture of membrane	7	–	11	–	10	10%	3.6%
Twins	12	–	13	–	9	–	–
Breech presentation	71	1.4%	50	–	46	2.1%	1.2%
Normal	1587	3.5%	1507	2%	1679	1.2%	2.2%
Prevalent rate	2967	5.4%	2640	3.6%	2646	3.1%	4 %

TABLE ; 2 *Stool culture*

Factors	Diarrhoea	Stool culture 1975 – 1977			Non Culture	Culture Positive
		Epec	Shigella	Shigella + Epec	Negative	
Low birth weight	143	37	8	8	67	23 53
Asphyxia	11	1	2	1	3	4 4
Grande multipara	10	4	–	3	3	– ?
Pathologic labour	46	13	2	4	20	7 19
Large baby	12	2	–	–	9	1 2
Hypertension	7	3	–	1	3	– 4
Abortion	2	–	–	–	1	1 –
Premature rupture of membrane	1	–	–	–	–	1 –
Twins	–	–	–	–	–	– –
Breech presentation	2	–	–	–	1	1 –
Normal	103	32	1	12	44	14 45
Total	337	92	13	29	151	52 89
%		(32.2%)	(4.6%)	(10.2%)	(53%)	(15.4%)

TABLE 4 : *Mortality Rate*

Factors	1975		1976		1977		Total	
	Diarrhoea	Mortality	Diarrhoea	Mortality	Diarrhoea	Mortality	Diarrhoea	Morality
Low birth weight	64	17	43	8	36	8	143	33
Asphyxia	4	–	2	–	5	2	11	2
Grande multipara	7	–	1	–	2	–	10	–
Pathologic labour	21	2	11	2	14	4	46	8
Large baby	4	–	7	–	1	–	12	–
Hypertension	3	–	2	–	2	1	7	1
Abortion	1	–	1	–	–	–	2	–
Premature rupture of membrane	–	–	–	–	1	–	1	–
Twins	–	–	–	–	–	–	–	–
Breech presentation	1	–	–	–	1	–	2	–
Normal	55	3	27	2	21	1	103	6
Total	106	22	94	12	83	16	337	50
%		(13.8%)		(12.5%)		(19.3%)		(14.8%)

TABLE 3 : *Complications or accompanying diseases.*

Factors	Diarrhoea	Complication/Accompanying diseases 1975 – 1977				
		Septicaemia	Sclerema	NEC	Purulent meningitis	Broncho-pneumonia
Low birth weight	143	7	2	15	2	9
Asphyxia	11	–	–	–	–	–
Grande multipara	10	–	–	–	–	1
Pathologic labour	46	1	1	2	2	2
Large baby	12	–	–	–	–	1
Hypertension	7	–	–	–	–	–
Abortion	2	–	–	–	–	–
Premature rupture of membrane	1	–	–	–	–	–
Twins	–	–	–	–	–	–
Breech presentation	2	–	–	–	–	–
Normal	103	2	3	–	–	2
Total	337	10	6	17	4	15
%		(3%)	(1.7%)	(5%)	(1%)	(4.5%)

GRAPH 1: THE RELATIONSHIP BETWEEN TOTAL NUMBER OF INFANTS AND DIARRHOEAL INFANTS DURING 3 YEARS.

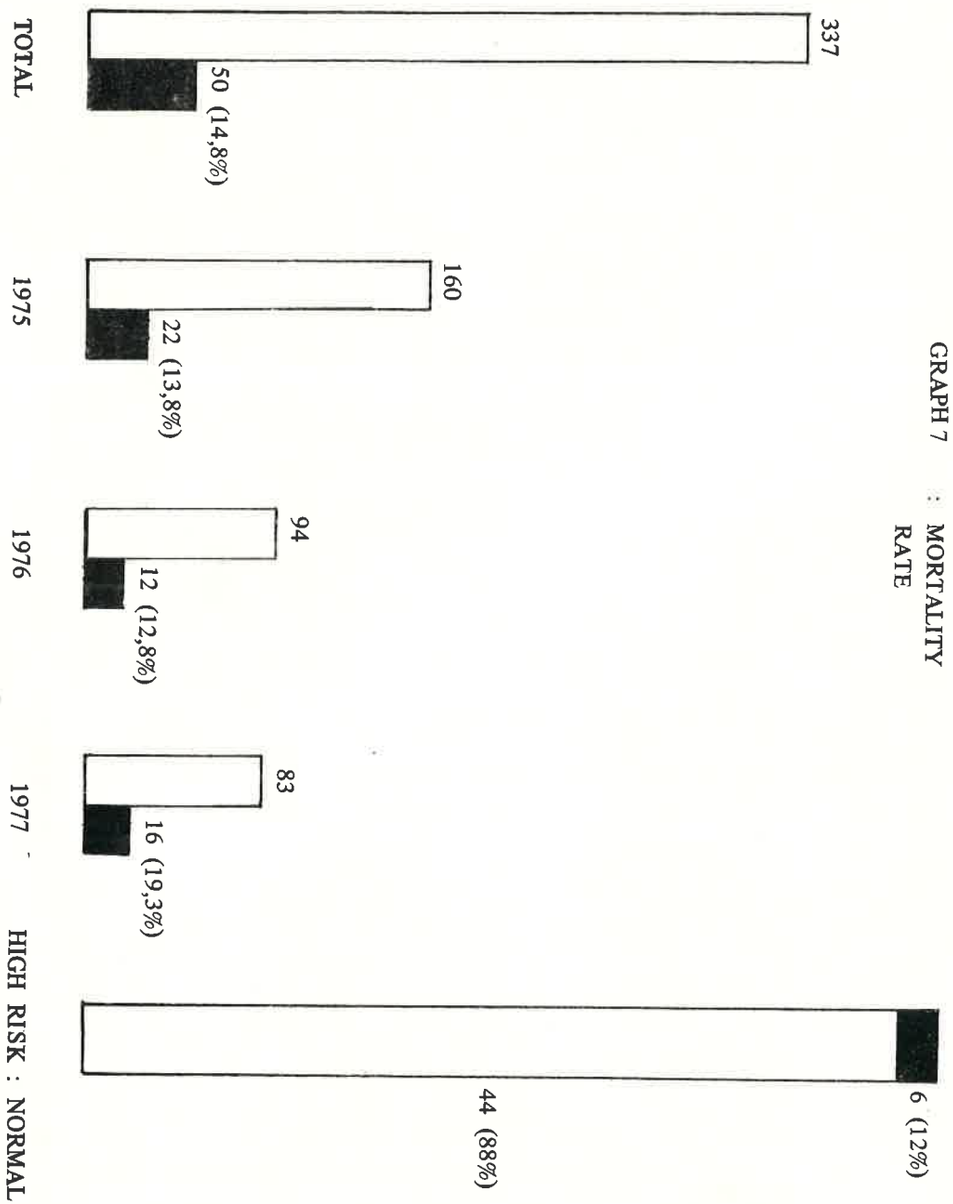
GRAPH 2 : INCIDENCE OF DIARRHEA

GRAPH 3 : PERCENTAGE OF DIARRHEAL ILLNENS IN HIGH RISK AND NORMAL INFANTS

GRAPH 4 : STOOL CULTURE

GRAPH 5 : THE RELATIONSHIP BETWEEN POSITIVE STOOL CULTURE IN HIGH RISK AND NORMAL INFANTS

GRAPH 6 : ACCOPANYING DISEASES OR COMPLICATIONS



GRAPH 7 : MORTALITY RATE

be 21 – 30%. A study of Olarte et al. (1965) revealed that 18 out of 21 small for dates suffered from diarrhoea.

The high incidence of diarrhoeal diseases in small for dates was caused by infections of bacteria and virus (Sunoto, 1975; Haroen Noerasid, 1975; Bueno et al., 1977) ; carbohydrate and fat malabsorption (Aswitha Budiarso et al., 1977; Pitono Suparto et al., 1977; Achmad Surjono et al., 1973); milk allergy (Davidson et al., 1976; Ebenthal, 1975); and also milk hyperosmolarity (Munir and Mustadjab , 1979).

In our cases most of the infants were given bottle feeding. Our experiment revealed that for high risk infants, especially low birth weights, asphyxia neonatorum and pathologic labour, much more attention should be given in nursing to guard against diarrhoeal infection.

The largest part of cases of bacterial infection revealed to be caused by EPEC. In 285 patients (84.5%) stool cultures were done revealing 32.2% to be EPEC; 10.2% a mixture of EPEC and Shigella; 4.6% Shigella and in the remaining no bacterial growth was found (Table 2).

Sixty six percent of patients with a positive stool culture were high risk infants and the rest (33.6%) were normal infants. Fifty two (15.4%) patients suffered from complication or had accompanying diseases : 17 (5%) high risk infants with necrotizing enterocolitis; 15 (4.5%) with bronchopneumonia consisting of 8 high risks and 7 normal infants; 6 (1.7%) with sclerema neonatorum consisting of 3 high risks and 3 normal infants; and 4 of the high risk group of infants (1%) had purulent meningitis. (Table 3).

The complications or accompanying diseases such as septicaemia, necrotizing enterocolitis, purulent meningitis and bronchopneumonia occurred more commonly in the low birth weights and pathologic labour of the high risk infants.

86.2% (45 out of 52 infants) with complications were high risk infants and the remaining 13.8% (7 out of 52 infants) were normal babies.

Total mortality was 14.8% (50 out of 337 patients) consisting of 13.8% in 1975, 12.8% in 1976 and 19.3% in 1977 (Table 4). The 50 patients who died consisted of 88% high risks and 12% normal infants.

Finally we could conclude that the morrality rate of diarrhoeal diseases in high risk was greater than that among normal infants.

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