

# CLINICAL PATTERN OF NEONATAL INFECTIONS

(July 1991-June 1993)

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## Summary

Neonatal infection is an important cause of morbidity and mortality among infants. Clinical pattern of neonatal infection in the neonatal unit of Institute of Post Graduate Medicine & Research (IPGM&R), Dhaka has been reported. Out of total 2160 Neonatal admission from July 1991 to June 1993. 320 (14.8%) cases of neonatal infections were found. Septicaemia was the commonest type found in 118 (5.5%) cases. Other infections included umbilical sepsis (4.7%) Skin infections (1.6%), Meningitis (1.2%). Tetanus neonatorum were not included. Out of 320 cases, 20 patient died (6.2%). Preterm, Low birth weight and birth asphyxia were the common risk factors.

## Introduction

Infections are a frequent and important cause of morbidity and mortality in the neonatal period. As many as 2% of foetuses are infected in utero and upto 10% infants are infected during delivery or the first month of life<sup>1</sup>. Infection can be of two types. Early onset infection with perinatal pathogenesis whose usual onset is within 72 hours, whereas late neonatal infection is applied to infections those occur after one week. Neonatal infections vary from the trivial (Minor) which does not endanger life to profoundly damaging (Major)<sup>2,3</sup>. They may be sub-clinical or may kill the newborn. Among the major infections, septicaemia, pneumonia, diarrhoea, urinary tract infection (UTI), meningitis are common. Whereas minor infections, eg omphalitis, conjunctivitis are common problems. Neonatal septicaemia is a clinical syndrome characterized by signs of infection and documented by a positive blood culture in the first four weeks of life. The incidence of neonatal septicaemia has been estimated to range from 1 to 10 per 1000 live births.<sup>4,5</sup> Early onset sepsis is more fulminant, commonly diagnosed within the first 48 hours and almost always during the first week of life. Late onset sepsis is more insidious. Despite the development of broad spectrum antimicrobial agents and improved obstetric and paediatric care, septicaemia still contributes greatly to neonatal morbidity and mortality particularly in developing

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countries.<sup>6</sup> In Bangladesh, there is no definite study on the incidence, etiology, risk factors and prognosis of neonatal septicaemia but it is likely to be high in Bangladesh like other developing countries.<sup>7</sup> Risk factors for development of neonatal sepsis are low birth weight, Apgar score less than 7 at 5 minutes, male sex, complication of labour e.g. prolonged labour, early rupture of membrane, malpresentation, complication of delivery like septic delivery, instrumental delivery and primary caesarian section and poor socio-economical conditions.<sup>8-14</sup> Group B strepto-coccus & Escherichia Coli are the leading causes of sepsis. Other pathogens like Staphylococcus aureus, Klebsiella, Enterobacter, Group D streptococci and Pseudomonas aeroginosa, Strep pneumoniae, Nesseria meningitidis and Haemophilus influenzae are rarely encountered. Pneumonia is also common.<sup>15</sup> Meningitis is one of the important variant of infections. It may be viral and bacterial. It is often associated with sepsis and is a cause of significant morbidity and mortality.<sup>16,17,18</sup> UTI in newborn is difficult to establish because, as many as 40% of the infections are asymptomatic.<sup>19</sup> Diarrhoea is one of the important component of major infections and is a leading cause of illness and death among children of the developing countries.<sup>20</sup> Among the minor infections omphalitis is the most common.<sup>21,22</sup> The present study was carried out to know the clinical Pattern, etiological agents, risk factors and outcome of neonatal infections.

## **Materials and Methods**

This study was done in the neonatal unit of the Department of Paediatric, Institute of Post Graduate Medicine and Research (IPGM&R), Dhaka over a period of 2 years from July 1991 to June 1993. Three hundred twenty neonates with different types of infection were studied. TORCH infections, HIV, Hepatitis B and neonatal tetanus were excluded from this study because these cases were admitted in a separate infectious disease hospital. A detailed prenatal, natal and post natal history with special emphasis on any predisposing factors for infection was taken and thorough clinical examination was done in all the cases and were recorded. Patient's particulars like, redness around the umbilicus, umbilical discharge, fever, hypothermia, diarrhoea, respiratory distress and feeding history were noted. Haemoglobin, total and differential count of WBC, Platelet counts were done in all patients, Swabs from the Umbilicus & septic spots were sent for gram staining and C/S. Cultures of urine, stool & blood were carried out in all cases, Radiographs of the chest and CSF examination were carried out whenever indicated clinically.

## **Results**

Of the total 2160 neonatal admissions, 320 (14.8) had different types of infections. There were 212 (66.2%) male and 108 (33.8%) female babies. Age distribution is shown in Table-I. Mean age was 9.5 days. Table-II shows the various spectrum of infections. Septicaemia 118 (36.87%), pneumonis 70 (21.87%) and Meningitis 20 (6.25%) were the major infections while Omphalitis 101 (31.56%) and pemphigus 28 (8.75%) were the minor infections in the

studied Population. Table-III shows the age of onset of infections. Most patients with major or minor infections presented after 48 hr. Table-IV shows the risk factors of infection. Preterm low birth weight 228 (71%) prolonged rupture of membrane 108 (33.7%) birth asphyxia 46 (14.3%) home delivery by untrained persons 52 (16.2%) and use of unsterile blade to cut the cord 36 (8%) cases were the risk factors in the study group. Fever 160 (50%), respiratory distress 115 (35.92%), Reluctant to feeds 112 (35%), abdominal distension 102 (31.8%), vomiting 98 (30.6%), apnoic spells 28 (8.7%), jaundice 36 (11.2%), foul smelling umbilical discharge 80 (25%), hypothermia 11 (3.4%), Pemphigus 28 (8.7%) and convulsions were the clinical presentation. Of course they had overlapping of clinical presentations (Table-V)

Table-VI shows the organisms isolated from samples of blood, urine, stool and umbilical swabs. Blood culture done in 184 patients showed positive culture in 41 cases of which 35 showed E. coli and 6 patients showed staph aureus. Urine culture done in 184 cases yielded the growth of E. coli in 15 patients, stool culture showed E. coli in 6 cases. Umbilical swab culture showed the growth of staph aureus in 75 cases and E. coli in 8 cases.

Table-VII shows total WBC count from 20,000-30,000/cm<sup>3</sup> in 120 (37.5%) and from 10,000 to 20,000/cm<sup>3</sup> in 140 (43.7%) cases. Table-VIII shows that 16 patients had hazy CSF with plenty of neutrophils. Gram staining showed the presence of 6 and 8 cases of Gram positive and Gram negative bacteria respectively. However culture did not show growth of any bacteria. Mean value of protein & Sugar in CSF were 152 & 22mg/dl respectively.

Table-IX Shows the X-ray findings of the studied population. 30 (42.8%) cases showed bilateral patchy opacities in the lung fields. 40 cases had opacities in both the lung fields. Out of 320 cases of neonatal infection 20 (6.2%) patients died in the hospital.

## Discussion

Infections of the neonates are common causes of admission into the neonatal special care baby units. This study showed the pattern and predisposing factors of neonatal infections in a tertiary centre with one of the largest neonatal units in Bangladesh. Out of 320 neonates, 184 had major infections and the remaining had minor infections, mostly Omphalitis. Septicaemia alone or in association with pneumonia, meningitis diarrhoea and UTI were the major infection. In this series septicaemia were found in 36.87%, pneumonia in (21.87%), meningitis in (6.25%), diarrhoea in (2.19%) UTI (1.27%) cases (Table II). Majority of these patients were referred from different clinics, home and other hospitals. Various factors such as poor personal hygiene, delay in recognition of infection, inappropriate or no treatment etc. could be the contributory factors for the higher incidence of infection. There was a preponderance of boys over girls in all types of infections. The male to female ratio was 2:1. The preponderance of male sex is postulated to be linked to the X-linked factor<sup>23</sup>. It might be due to greater care given to the male child in our social set up<sup>24</sup>. In this study, most patients were low birth weight (43.75%). Numerous studies have found LBW to be

predisposing factor for neonatal infection. Low birth weight and preterm babies have low Ig.G as well as impaired cellular immunity. The risk for nosocomial infection is greatest in hospital. It is established that Umbilical stump is good media for luxuriant growth of variety of organisms<sup>25</sup>. But in this study it was observed that most of these patients had their umbilical cord cut aseptically.

Resuscitation was needed in 14.37% cases. In the major group of infections most of the neonates presented with Pyrexia other features being respiratory distress, reluctant to feed, abdominal distension, vomiting, Apnoic spells, Jaundice etc.

Pyrexia is one of the important features of septicaemia<sup>26</sup>, pneumonia, UTI<sup>27</sup> and meningitis<sup>28</sup>. Fever (temperature above 38°C) had been recorded in 50% of neonates with infection in this series. Respiratory distress was present in 35.92% cases which is similar to the findings of other workers<sup>26,29,30</sup>. Abdominal distension in neonates in this study was 31.87% which is higher than other studies.<sup>31,32</sup>.

Among the minor infections, Omphalitis was the commonest. Most of them (84%) had foul smelling purulent discharge and periumbilical redness. Diagnosis of neonatal infection is one of the most difficult task in clinical medicine. Different authors have suggested several laboratory determinants<sup>33</sup>. Presence of neutrophil precursors is more suggestive of infection than the total differential count. Other authors demonstrated that a Low (<15000/cm<sup>3</sup>) or high (>20,000/cm<sup>3</sup>) WBC count were associated with neonatal infection<sup>34</sup>. In this series lowest WBC count was 8000/cm<sup>3</sup>. However a count over 20,000/cm<sup>3</sup> was found in 37.5% cases. Thus in this series a high WBC was a useful indicator of infection. Culture of Umbilical swabs were done in all case of Omphalitis. In this study predominant organism were gram positive cocci. Staphylococcus aureus was found in 55.15% cases and E. coli in 5.88%. The findings contrasts to the earlier findings where E. coli was found in 55.6% and staph aureus in 20%. On the otherhand it has similarities with the findings of Ahmed Haque et al<sup>35</sup>. In this series no group B streptococci was isolated. The etiology of neonatal seticaemia varies from country to country and from one hospital to the other. The difference is due to prevailing obstetric and nursery facilities and pattern of usage of antimicrobial agents. Blood culture done in 184 cases revealed positive culture in 41 (22.28%) cases. Sinha et al reported an isolation rate of 28.08%, Khatua et al found a much higher rate of isolation (60%). This high rate of isolation could probably be due to the use of more sensitive media. Chest X-ray showing Unilateral and bilateral patchy opacities in various zones of lungs were the radiological evidence of presence of pneumonia. Most patients had received antibiotic prior to admission. More rate of isolation of organisms could be expected if prior antibiotics were not given. 20 (6.25%) patients with neonatal infections died in the hospital, most of these cases were preterm-low birth weight and were hospitalized in a critical state of illness.

## Conclusion

Neonatal sepsis still remains a dreaded disease. Preterm low birth weight, prolonged rupture of membrane, birth asphyxia, home delivery etc. were the

important risk factors for infection. Septicaemia, pneumonia, meningitis, diarrhoea, UTI were the major infections presented either singly or in combination. Omphalitis was the commonest minor manifestation. Although this is a hospital based study in a referral hospital, it has been able to find out the clinical pattern of neonatal infection. More extensive studies involving larger sample of neonates with good microbiological support is desirable to study the clinical pattern of neonatal infections in the country.

**Table-1**

Age and Sex Distributions (N = 320.)

Sex	Number	Percentage
Male	212	66.20
Female	108	33.80
Total	320	100.00

Age Distributions

Age in days	Number	Percentage
1-5	88	27.50
6-9	105	32.81
10-14	72	22.50
15-19	36	11.25
20-24	14	4.38
25-28	5	1.56
Total	320	100.00

**Table-II**

Spectrum of Infection (N=320)

Infections	No. of cases	Percentage
<u>Major infections :</u>		
Septicacemia	118	36.87
Pneumonia	70	21.87
Meningitis	20	6.25
Diarrhoea	7	2.19
UTI	6	1.87
<u>Minor infections :</u>		
Omphalitis	101	31.56
Pemphigus	28	8.75
Conjunctivitis	7	2.19

There were overlapping of major infections in some patients

**Table-III**

## Age at onset of Infections

Type of Infection	Age (Hours)	Number	Percentage
Major (N =184)	< 48	50	27.17
	> 48	134	72.83
Minor N =136	< 48	55	40.44
	> 48	81	59.56

**Table-IV**

## Risk Factors for Infections

Risk Factors	Number	Percentage
1. Preterm low birth wt.	228	71.25
2. Prolonged rupture of membrane	108	33.75
3. Birth Asphyxia	46	14.37
4. Home delivery Untrained person	52	16.25
5. Use of Unsterile blade for cutting cord.	36	11.25

There were more than one risk faefor in many subjects.

**Table-V**

## Mode of Presentation

Clinical Presentation	Number	Percentage
Fever	160	50.00
Respiratory distress	115	35.92
Reluctant to feeds	112	35.00
Abdominal distension	102	31.87
Vomiting	98	30.62
Apnoeic spells	28	8.75
Jaundice	36	11.25
Foul smelling umbilical discharge	80	25.00
Hypothermia	11	3.44
Pemphigus	28	8.75
Convulsions	20	6.25

**Table-VI**

## Organisms Isolated

Culture	Total No. of Cases	Positive culture	Organism Isolated	Percentage
<b>MAJOR (N=184)</b>				
Blood	184	41	E. coli 35 Stap aureus 6	19.02 3.26
Urine	184	15	E. coli 15	8.15
Stool	160	6	E. coli 6	3.75
<b>MINOR (N=136)</b>				
Umbilical swab	136	83	S. Aureus 75 E. coli 8	55.15 5.88
Swab from skin infections	35	22	S. Aureus -	62.85

**Table-VII**

## Haematological Data in Infection

Haematological Data	Range	Number	Percentage
TWBC	8,000-10,000	60	18.75
	10,000-20,000	140	43.75
	20,000-30,000	120	37.50
Total		320	100.00

**Table-VIII**

## CSF Study in Meningitis (N=20)

CSF	Number of Patients	Percentage
<u>Colour</u> (Hazy)	16	80
WBC (Neutrophils) Plenty	16	80
<u>ORGANISMS</u> (Gram Stain)		
Gram Positive	6	30
Gram Negative	8	40
No organisms	6	30
CULTURE	20	No growth
<u>BIOCHEMISTRY</u>		
	RANGE	MEAN
Protein mg/dl	140-160	152
Sugar mg/dl	15-35	22

**Table-IX****Radiological findings in Pneumonia (N=70)**

Findings	Number	Percentage
Bilateral patchy opacity in lung fields	30	42.86
Opacity in the RT uoer and midzones	16	22.86
Opacity in the RT upperzone of the lungs	24	34.28
Total	70	100.00

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