# TABLE OF CONTENTS

| 1. INTRODUCTION | 1-14 |
| 1.1 CLINICAL | 1-6 |
| 1.1.1 Magnitude of the Problem | 3-4 |
| 1.1.2 What is not Diarrhoea in neonates | 4 |
| 1.1.3 Peculiarities of diarrhoea in newborns | 4 |
| 1.1.4 Clinical Aspects of Neonatal Diarrhoea | 5 |
| 1.1.5 Seasonal variation | 6 |

| 1.2 MICROBIOLOGICAL ASPECTS | 6-8 |
| 1.2.1 Bacterial Diarrhoea | 6-7 |
| 1.2.2 Rotavirus Diarrhoea | 7 |
| 1.2.2.1 Human Rotavirus clinical features | 8 |
| 1.2.2.2 Transmission of Rotavirus in neonatal period | 8 |
| 1.2.2.3 Methods of Laboratory Diagnosis of Rotavirus | 8 |

| 1.3 BIOCHEMICAL ASPECTS | 9-11 |
| 1.3.1 Sodium Homeostasis | 9 |
| 1.3.2 Hypernatremia | 10 |
| 1.3.3 Hypokalemia | 10 |
| 1.3.4 Acidosis | 10 |
| 1.3.5 Lipid Profile | 11 |

| 1.4 IMMUNOLOGICAL ASPECTS | 11 |

| 1.5 MANAGEMENT ASPECTS | 12-14 |
| 1.5.1 Clinical Assessment | 12 |
| 1.5.2 Drug Therapy | 13 |
| 1.5.3 Prevention of dehydration | 13 |
| 1.5.4 Treatment of dehydration | 13 |
| 1.5.5 Nutritional therapy | 13 |
| 1.5.6 Convulsions in Neonatal Diarrhoea | 14 |
| 1.5.7 Complications | 14 |
2. REVIEW OF LITERATURE 15-48

2.1 CLINICAL ASPECTS AND EPIDEMIOLOGY 15-19

2.2 MICROBIOLOGICAL ASPECTS 19

<table>
<thead>
<tr>
<th>2.2.1</th>
<th>Esch. coli</th>
<th>19-35</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.1.1</td>
<td>General Characterization of Esch. coli</td>
<td>20</td>
</tr>
<tr>
<td>2.2.1.2</td>
<td>Detection of Esch. coli</td>
<td>21</td>
</tr>
<tr>
<td>2.2.1.3</td>
<td>Clinical Features of Bacterial Diarrhoea</td>
<td>22-24</td>
</tr>
</tbody>
</table>

2.2.2 Salmonella Diarrhoea 24-27
2.2.3 Shigella causing Diarrhoea in Neonate 27-28
2.2.4 Rotavirus Diarrhoea 28

<table>
<thead>
<tr>
<th>2.2.4.1</th>
<th>Incidence and its prevalence</th>
<th>28-32</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.4.2</td>
<td>Seasonal Distribution</td>
<td>32</td>
</tr>
<tr>
<td>2.2.4.3</td>
<td>Diagnostic technique for isolation of Rotavirus</td>
<td>33-34</td>
</tr>
<tr>
<td>2.2.4.4</td>
<td>Lactose Intolerance</td>
<td>34</td>
</tr>
<tr>
<td>2.2.4.5</td>
<td>Faecal Leucocytes</td>
<td>35</td>
</tr>
</tbody>
</table>

2.3 BIOCHEMICAL ASPECTS 36-39

2.4 IMMUNOLOGICAL ASPECTS 39-44

2.5 MANAGEMENT ASPECTS 44-48

<table>
<thead>
<tr>
<th>2.5.1</th>
<th>Prevention of Diarrhoeal Deaths</th>
<th>45-46</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5.2</td>
<td>Management of Dehydration</td>
<td>47-48</td>
</tr>
</tbody>
</table>

3. SCOPE AND PLAN OF THE PRESENT INVESTIGATIONS 49-59

3.1 CLINICAL ASPECTS 49-52

<table>
<thead>
<tr>
<th>3.1.1</th>
<th>Identifying Clinical Parameters</th>
<th>52</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.2</td>
<td>Algorithm for neonatal diarrhoea</td>
<td>52</td>
</tr>
<tr>
<td>3.1.3</td>
<td>Maternal hygiene to diarrhoea</td>
<td>52</td>
</tr>
</tbody>
</table>

3.2 MICROBIOLOGICAL ASPECTS 52-54

<table>
<thead>
<tr>
<th>3.2.1</th>
<th>Bacterial Pathogen and Clinical Importance</th>
<th>54</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.2</td>
<td>Stool Culture Studies</td>
<td>54</td>
</tr>
<tr>
<td>3.2.3</td>
<td>Sensitivity Pattern</td>
<td>54</td>
</tr>
<tr>
<td>3.2.4</td>
<td>Blood culture Studies</td>
<td>54</td>
</tr>
</tbody>
</table>
3.3 BIOCHEMICAL ASPECTS

3.3.1 Clinical Relevance
3.3.2 Altered Biochemical Parameters

3.4 IMMUNOLOGICAL ASPECTS

3.4.1 Immunological Profile and Compliment

3.5 MANAGEMENT ASPECTS

3.5.1 Etiological Organisms, Sensitivity Pattern
3.5.2 Role of Blood Transfusion in Sepsis

4. MATERIALS AND METHODS

4.1 CLINICAL

4.1.1 Sample Size
4.1.2 History and Examination
4.1.3 Maternal History

4.2 MICROBIOLOGICAL ASPECTS

4.2.1 Specimen Collection
4.2.2 Isolation and Identification of Bacteria
4.2.3 Serogrouping and confirmation
4.2.4 Enteropathogenicity Studies
4.2.4.1 By Ligated Rabbit Ileal - loop method
4.2.4.2 Preparation of Intestinal loop segments
4.2.4.3 Inoculation of Enterotoxin
4.2.5 Blood Culture for Enteropathogens
4.2.6 Analysis of Rotavirus from neonatal faecal specimen
4.2.6.1 Electrophoresis of Genomic RNA
4.2.7 Faecal leucocytes
4.2.7.1 Methylene Blue Stain for Leukocytes
4.2.7.2 Lactose Intolerance
4.2.7.2.1 By Qualitative Benedict's Test
4.2.7.2.2 Modified Rubner's Test
4.3 BIO-CHEMICAL ASPECTS

4.3.1 Sodium and Potassium 72
4.3.2 Plasma Bicarbonates 73
4.3.3 Blood Glucose 74
4.3.4 Plasma cholesterol 75-76
4.3.5 Plasma Triglycerides 76-78
4.3.6 Plasma Phospholipids 78-79
4.3.7 Blood Urea 79-80
4.3.8 Serum Creatinine 80-81

4.4 IMMUNOLOGICAL ASPECTS 83-84

4.4.1 Immunoglobulins and Compliments 83
4.4.2 General Principle 83
4.4.3 Specimen collection and storage 83
4.4.4 Test Procedure 83-84

4.5 MANAGEMENT ASPECTS 84-85

4.6 STATISTICAL METHOD USED FOR ANALYSIS 85-86

5. RESULT 87-131

5.1 DEMOGRAPHIC PATTERN 87-93

5.1.1 Age and Sex 87
5.1.2 Gestational Age 87
5.1.3 Housing Condition 88
5.1.4 Socio Economic Status 88
5.1.5 Place of Delivery 88
5.1.6 Order of Birth 88
5.1.7 Mode of Delivery 89
5.1.8 Single/Multiparous 89
5.1.9 Maternal Sepsis 89
5.1.10 Prelacteal Feeds 89
5.1.11 Feeding Pattern 89
5.1.12 Method of Feeding 89
5.1.13 Hand Washing 90
5.1.14 Drug Intake before Hospitalisation 90
5.1.15 Weight on Admission 90
5.1.16 Umblical Sepsis 90
5.1.17 Clinical Signs of Cases 90-91
5.1.18 Symptoms Noted in Cases 91
5.1.19 Residence 91
5.1.20 Characteristics of the Stools in Cases

5.1.20.1 Frequency of Stool
5.1.20.2 Stool Consistency
5.1.20.3 Odour of the Stool
5.1.20.4 Colour of the Stool
5.1.20.5 Stool Reducing Substances by Benedict’s Test
5.1.20.6 Stool Reducing Substances by modified Rubner’s Test
5.1.20.7 Stool Microscopy
5.1.21 Hemogram
5.1.22 X-ray chest and Abdomen

5.2 MICROBIOLOGY

5.2.1 *Esch. coli* Serotypes
5.2.2 Sensitivity pattern of *Esch. coli* isolates in motion
5.2.3 The pathogenicity studies by RIL Assay
5.2.4 Bacterial Isolates in Stool culture studies
5.2.5 Sensitivity pattern of Stool isolates
5.2.6 Blood culture studies in cases and controls
5.2.7 Sensitivity pattern of positive culture studies
5.2.8 Rotovirus Isolation

5.3 BIOCHEMICAL

5.3.1 Serum Sodium
5.3.1 Serum Potassium
5.3.2 Serum Biocarbonate
5.3.4 Serum Cholesterol
5.3.5 Serum Phospholipids
5.3.6 Serum Triglycerides
5.3.7 Blood Urea
5.3.8 Serum Creatinine
5.3.9 Blood Sugar
5.3.10 Serum Proteins

5.4 IMMUNOLOGY

5.4.1 Serum IgA
5.4.2 Serum IgG
5.4.3 Serum IgM
5.4.4 Serum Compliment C₃
5.4.5 Serum Compliment C₄
5.5 TREATMENT

5.5.1 Supportive therapy
5.5.2 Antibiotics
5.5.3 Complications
5.5.4 Blood Transfusion
5.5.5 Immunoglobulins

5.6 NATURE OF ILLNESS AMONG CONTROLS

5.7 STATISTICAL ANALYSIS

5.7.1 Gestational Age
5.7.2 Housing Conditions
5.7.3 Socio Economic Status

5.8 OUTCOME IN NEONATAL DIARRHOEA - DEATH 104-105

Table 1 Sex Distribution vs Age 106
Table 2 Gestational Age and Weight 107
Table 3 Clinical Signs 108
Table 4 Symptoms 109
Table 5 Abnormal X-Ray Findings 110
Table 6 Bacterial Isolates in Stool Culture 111
Table 7 Esch. coli Serotypes and Pathogenicity 112
Table 8 Sensitivity pattern of Stool Esch. Coli and Klebsiella Isolates 113
Table 9 Blood Culture Studies 114
Table 10 Sensitivity Pattern of Positive Blood Culture 115
Table 11 Distribution of Rotavirus 116
Table 12 Controls 117
Table 13 Datas in cases and controls 118-120
Table 14  Risk Factors for Neonatal Diarrhoea - Clinical  121-122
Table 15  Matched Univariate Analysis - Microbiological  123
Table 16  Biochemical Matched Univariate analysis  124
Table 17  Immunological Matched Univariate analysis  125
Table 18  Multivariate analysis for Risk factors for Diarrhoea  126
Table 19  Risk factors for Death-unmatched univariate analysis-clinical  127
Table 20  Microbiological univariate analysis unmatched  128
Table 21  Biochemical univariate analysis unmatched  129
Table 22  Immunological univariate unmatched analysis  129
Table 23  Multivariate analysis for Risk factors for death in neonatal diarrhoea  131

6.  DISCUSSION  132-145
7.  SUMMARY  146-147
8.  CONCLUSIONS  148-150
9.  RECOMMENDATIONS  151-152
10.  FUTUROLOGY  153
11.  REFERENCES  154-176