Experience with 100 Diarrhoea Cases treated at Narayani Zonal Hospital Rehydration Therapy Centre, Birgunj

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Introduction-

Diarrhoeal disease is regarded as the biggest Killer of Children in our country. It is the second leading cause of death worldwide. All signs, symptoms, morbidity and mortality in diarrhoea is due to fluid and polyelectrolyte loss from the body. Accordingly, prevention and management of this great public health problem has begun to get attention not only by the affected countries but also reputed organisations like H.O. I and Dr. I. B. Khatri, the Civil Surgeon of Narayani Zonal Hospital, Birgunj, the privilege of attending a course on Rehydration Therapy Centres held at Bangladesh Burma respectively, as a result of which a small rehydration unit was started in Birgunj Hospital which was later converted into a regular Rehydration Therapy Centre.

I propose to present to you in this paper a brief report on our experience with 100 diarrhoea cases treated in this centre and recommendations to establish similar Rehydration Therapy Centres all over the country.

Paper read in VII All Nepal Medical Conference 1975
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ETIOLOGY & PATHOPHYSIOLOGY OF ACUTE DIARRHOEAL DISEASES

Diarrhoeal disease is endemic in the developing world. The term ‘Diarrhoea’ is used to mean “an abnormal frequency and liquidity of faecal discharge” as defined in writing by Hippocrates. Most these diseases occur in less than 5 years of age. The etiology of diarrhoea is not properly understood. Only less than 40% of the cases have recognised etiologic agents.

Fig 1

- 12% Normal stools
- 24% from diarrhoeal stools using routine hospital technique
- 36% from diarrhoea stools using elaborate technique

The source of etiological agents are contaminated food and water. The etiologic agents are viruses, Bacteria, Fungi parasites and others. Among the Bacteria the most common are shigella, salmonella, staphylococi, cholera, enteropathogenic E. coli and clostridia. The parasites are Amoeba histolytica, Giardia, Trichuris and strongylids. Other condition are Tropical Sprue, Weanling diarrhoea, lactose deficiency and malabsorption states.

THE RESULTS OF FLUID AND ELECTROLYTE LOSS

Apart from diarrhoea and vomiting Potassium is also lost from the kindey and water also from the skin. Hypokalaemia is usually not seen in the serum but beings to occur during rapid rehydration. This results in cardiac arrythmia, muscular weakness and most commonly paralytic ileus-distension of abdomen in severe diarrhoea.

The saline depletion results in most of the sign of severe diarrhoea. This dehydration can be classified as 1°, 2° or 3° or as Mild, Moderate and severe Stages. (REFER TO THE ATTACHED PRINTED FROM)

Metabolic acidosis occurs due to loss of bicarbonate in stool. This results in first respiratory compensation and then impaired cardiac function leading to CCF during rapid rehydration, if acidosis is not simultaneously corrected.

Among other complications the increased Katabolic processes in the body during
illness causes increase breakdown of proteins and this supplemented with dietary restriction results in severe weight loss and malnutrition. Tetany, hypoglycaemia and seizures may also occur.

**Fluid and electrolyte content of small Intenonine (in m Eq/l)**

<table>
<thead>
<tr>
<th></th>
<th>Na</th>
<th>K</th>
<th>Cl</th>
<th>HCO$_3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal small Intestine Illum</td>
<td>135–140</td>
<td>5–10</td>
<td>100–120</td>
<td>10–25</td>
</tr>
<tr>
<td>Jajumun</td>
<td>135–140</td>
<td>5–10</td>
<td>90–110</td>
<td>25–35</td>
</tr>
<tr>
<td>Acutipaediatric diseases Cholera</td>
<td>105</td>
<td>26</td>
<td>95</td>
<td>31</td>
</tr>
<tr>
<td>Infantile diarrhoea</td>
<td>56</td>
<td>35</td>
<td>55</td>
<td>14</td>
</tr>
<tr>
<td>Actual deficits at the time of admission Cholera</td>
<td>11.5</td>
<td>6.5</td>
<td>9.5</td>
<td>106</td>
</tr>
<tr>
<td>Infantile diarrhoea</td>
<td>9.5</td>
<td>10.4</td>
<td>9.2</td>
<td>125</td>
</tr>
</tbody>
</table>

Fig. 2- consolidated from Dr: Saakslecture series.

**USUAL MANAGEMENT IN OUR COUNTRY**

Diarrhoea and vomiting are treated in this country mainly by 5% Glucose with or without normal saline by I.V. route, Normal Saline with hyalase given subcutaneously to infants, and oral drugs like Sulfathizole, Sulfaguanidine, Bismuth, Pectin, Kaolin, Enzymes, Chloramphenical plus Streptomycin preparations and newer antibiotics if available. “Nothing by mouth until diarrhoea controls”, “Bowel rest” and ‘Barley water’ for a long period are the conventional supplement for therapy. The necessary attention is not paid to the proper replacement of lost electrolytes.

These are very expensive and unnecessary wastage of valuable resources. Further, the diarrhoea - malnutrition - infection cycle which is being created artificially is another potent cause of death in children. In our country almost 40% of the population is that of children and no matter how much we try conventionally, it is impossible to hospitalise and treat these case by I.V. fluid and sophisticated guidance of serum electrolyte levels, stool culture etc. It will be more rational to presume the presence of hypokalemia and metabolic acidosis in all cases of acute diarrhoeal disease and start with adequate replacement of sodium, potassium and bicarbonate along with water to prevent comp and death.

Hence, it is time that we choose a new approach to this problem - a technique which is very simple and effective, needs least trained manpower; is very cheap and can be easily available throughout the country. This is the concept of “Rehydration Therapy Centre” where stress is laid on “Oral fluid therapy” to match the fluid loss in diarrhoea or “ad lib” therapy until the refusal to drink.
REHYDRATION THERAPY CENTRE OF
NARAYANI ZONAL HOSPITAL

The Rehydration Therapy Centre at Birgunj Hospital, the first centre of its kind in the country, was started last year during summer, when the prevalence of diarrhoea disease greatly increases in our country. This is a two room centre with two beds available throughout the year for admitting severe diarrhoea cases. It can accommodate with difficulty up to 10 beds if necessary. This centre is under the Senior Paediatrician, while the sister in-charge of the hospital is responsible for training and supervising the nursing aspect. The paramedical staffs are AHW & ANM and any body else who is willing to work will be able to measure the fluid loss and coax the guardian of the patient to feed the patient with the fluid supplied.

The list of other requirements are:

(a) Equipments - Weighing scales, Beds ("Cholera cots") (made from discarded old cots with a central hole freely available in our hospitals) and plastic sheets, calibrated buckets and cups, Arm boards, Measuring spoons, Feeding Cups, stethoscope, I.V. Stand, Urinals, Almirah, sphygmomanometer (optional), stretcher, big jars.

(b) Supplies - I.V. giving sets, Scalp vein needles, Cut down Sets, syringes and needles, Thermometers, Nasogastric tubes.

(c) Fluids, Chemicals and antibiotics - Ringer Lactate, Flexi-Flac (limited supply) RD Sol packets for making oral solution, supplies of sodium chloride, sodium bicarbonate, potassium chloride and Glucose for making Birgunj solution, Tetracycline-syrup and capsule (for limited use). FURAZOLIDONE syrup and tablets. Disinfectants.

CHOLERA COT

The Birgunj solution is prepared in Pharmacy and is supplied to poor patient who cannot afford to buy RD Sol packets. The doctor in the OPD explains that the patient should be drinking the solution as much as he feels thirsty ('ad lib') to cater for diarrhoea. Only moderate to severe cases are admitted in Rehydration Therapy Centre. Severe cases who are in shock or in a state of stupor are given I.V. Fluids until they return to full consciousness and
moderate stage dehydration. When the therapy is switched over to oral fluid only by mouth or via nasogastric tube. A child in profound shock and dehydration as shown by absent radial pulse, poor skin turgor, lack of response etc. represents a medical emergency and an all out attempt is made to start I.V. fluids by placing the needle in the usual site, if necessary in the unconventional sites too by several doctors (when available) at once. Mild cases are sent home with either the prescription of RD-Sol or supply of hospital pharmacy prepared Solution (BIRGUNJ SOLUTION). The only drugs that are used are Furazolidone and occasionally Tetracycline and Ampicillin. The steroids etc. are never used neither the previously mentioned other drugs.

EXPERIENCE WITH 100 DIARRHOEA CASES

100 patients ranging from 2 days after birth to 14 years were admitted in the Rehydration Therapy Centre during 3 months of summer of 1974. On admission a detailed history and other observations were recorded in a specially prepared from which is attached here. Special emphasis was given to nutritional status and degree of dehydration. Associated systemic infections were also noted. Immediately, following admission the moderately dehydrated cases were started on ‘Ad-lib’ Birgunj solution or RD Solution. Cases bordering to severe dehydration or already severely dehydrated cases were immediately given I.V. infusion along with simultaneous feeding of oral poly electrolyte solution by mouth or by a nasogastric tube. Depending upon the state of the peripheral veins all available sites e.g. Scalp Vein, External Jugular Vein, Femoral Vein were utilized for immediate infusion of I.V. Solution. A wide variety of I.V. Solution including Flexilac was used depending upon availability. The amount of fluid given was calculated according to the degree of dehydration and weight on admission. For example if the child’s weight is 10 kg., 1 litre of I.V. Saline was injected at a speed of 20-30 ml. 1 kg. over first hour. The remaining calculated deficit was given over the next 8 – 12 hours. Roughly 250-500 ml/hour in severely dehydrated child during the first 12-24 hours. Just after saline infusion oral therapy was also started. The quantity of replacement fluid was increased in proportion to match the concurrent losses by way of stools, urine and vomiting. Severe cases returning to moderate levels with obvious improvement were then continued only with the oral solution, I.V. infusion being stopped. No drugs were used to control vomiting, and oral feeding was not stopped, due to vomiting. The amount of fluid lost in vomiting was replaced with equal amount of oral solution. Vomiting was stopped in a few hours. However care was taken to prevent aspiration of vomitus. Stool examination was not
done routinely except in a few of find the invasive etiological agent, by direct microscopic examination of stool. Stool culture was not done as we do not have the facility in our zonal hospital and so also the electrolyte estimation which we do think is necessary too. Antidiarrhoeal agents that were used in all cases was FURAZOLIDONE (Furoxone) except in two cases where oxytetracycline and 3 cases where ampicillin was used—which were thought to be invasive type of Bacillary Dysentry.

Table: ORAL Solution available for use

<table>
<thead>
<tr>
<th>Solution</th>
<th>Na⁺ (mEq/L)</th>
<th>K⁺ (mEq/L)</th>
<th>Cl⁻ (mEq/L)</th>
<th>HCO₃⁻ (mEq/L)</th>
<th>Glucose (mM/L)</th>
<th>made with (per litre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO COURSE</td>
<td>90</td>
<td>20</td>
<td>80</td>
<td>30</td>
<td>150</td>
<td>3.5g 2.5g 1.5g 25.0g</td>
</tr>
<tr>
<td>6DACCA SOLUTION</td>
<td>120</td>
<td>25</td>
<td>97</td>
<td>48</td>
<td>110</td>
<td>4.2g 2.0g 2.7g 20.0g</td>
</tr>
<tr>
<td>GE-SOL</td>
<td>81</td>
<td>18</td>
<td>71</td>
<td>28</td>
<td>139</td>
<td>oo 1/3 1/3 2</td>
</tr>
<tr>
<td>RD-SOL</td>
<td>95.60</td>
<td>17.43</td>
<td>77.33</td>
<td>35.75</td>
<td>3.5g</td>
<td>3.0g 1.3g 25g</td>
</tr>
<tr>
<td>BIRGUNJ SOLUTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 1/3 1/3 3</td>
</tr>
</tbody>
</table>

- Designed for cholera patients
- oo standard measurements for United States
- oo as Potassium citrate rather than KCL

Table: Summary Observation of all 100 cases

<table>
<thead>
<tr>
<th>Age group (in years)</th>
<th>total</th>
<th>Nutritional Status</th>
<th>Dehydration</th>
<th>Cured</th>
<th>Expired</th>
<th>Lata</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
<td>OBE</td>
<td>NOR</td>
<td>THI</td>
<td>MAL</td>
<td>Moderate</td>
</tr>
<tr>
<td>0-1</td>
<td>52 X</td>
<td>6</td>
<td>40</td>
<td>6</td>
<td>31</td>
<td>21</td>
</tr>
<tr>
<td>1-5</td>
<td>32 X</td>
<td>8</td>
<td>20</td>
<td>4</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td>6-10</td>
<td>10 1</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>10+</td>
<td>6 X</td>
<td>2</td>
<td>4</td>
<td>X</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>
Total number of cases with diarrhoea + systemic Infection — 6
  with " + hypokalemia — 2
  + hypoglycemia — 1

17 out of 21 cases died within 24 hours of admission. This is a very significant observation because it shows that these cases were severely dehydrated at the time of admission due to lack of facility for enough scalp vein set and visible peripheral veins some cases could not be infused with I.V. fluid immediately.

Table: Sex-Age distribution (100 cases)

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Total</th>
<th>Age Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>22</td>
<td>52</td>
<td>0 - 1</td>
</tr>
<tr>
<td>20</td>
<td>12</td>
<td>32</td>
<td>2 - 5</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>10</td>
<td>6 - 10</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>6</td>
<td>11+</td>
</tr>
</tbody>
</table>

This table shows that more attention is paid to the male children similar observation was reported earlier too.\textsuperscript{1,2}

Table: duration of hospitalization

<table>
<thead>
<tr>
<th>Duration</th>
<th>0 - 1</th>
<th>2 - 5</th>
<th>6 - 10</th>
<th>11+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 24 hrs.</td>
<td>16</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td>24-48 hrs.</td>
<td>23</td>
<td>4</td>
<td>1</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>48-72 hrs.</td>
<td>13</td>
<td>11</td>
<td>4</td>
<td>-</td>
<td>28</td>
</tr>
<tr>
<td>72 hrs.-4 days</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>4 days +</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>32</td>
<td>10</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

less than 48 hours 70% including death, more than 48 hours 30%

This table shows that almost half the cases need to stay in the therapy centre for about two days. One quarter leave (either die) before 24 hours and remaining cases might take up to 4 days. These last are the cases which might have concurrent infections or other complications.

Our sample of 100 cases is rather a small number to be very emphatic on specific points but it none the less points towards the overall favourable impact of such a rehydration therapy centre.

DISCUSSION

The concept of oral electrolyte therapy was introduced by Darrow and his
associates as long ago as 1949⁵. The addition of glucose in the solution is found to increase the absorption of water and electrolytes, from the small intestines. Hirschhorn and associates⁷. Clearly have pointed out that the oral therapy of polyelectrolyte solution is suitable to infants with acute diarrhoeal disease of diverse etiology. Love.⁸ Nalin,⁹ Pierce¹⁰ and others have clearly shown that sodium, potassium and bicarbonate given orally in a glucose containing solution are well absorbed even during diarrhoea. The report of studies of Bangladesh refugees in India during 1973 and that of Indonesia¹¹ and Wr Sack¹² in his series of lectures on diarrhoeal diseases and management recommend the above mentioned therapy in diarrhoeal disease. David Morley in his book “emphasises the need of nutrition in diarrhoea so as to minimise the diarrhoea–malnutrition–infection cycle. Our study also shows that the malnourished children are the biggest risk (Table).

One of the many questions that are raised in ‘ad lib’ and oral therapy is whether excessive rehydration might cause harm. This problem never occurred in our present and earlier¹³ studies. Even it such a thing might occur it is negligible for practical purposes.

Regarding the type of dehydration it is the Isotonic one which is the most common form (70–90% more than 90%). Hypertonic dehydration can be diagnosed with history and clinically detected by patients marked thirst, extreme dry mucous membrane or hyperirritability. Hypotonic dehydration is difficult to detect clinically however there may be most mucous membrane and child may be in coma.

One of the biggest errors’ or difficulty is how to recognise the exact state of dehydration. In a fairly well nourished child this is not a problem. But the problem is enhanced if an already marasmic child or a severely under nourished child comes with dehydration. As such time the patient should be treated as having severe dehydration until obvious improvement comes.

The routine administration of FURAZOLIDONE is to be on the safe side: experience is the supply of watery Birgunj solution does not satisfy the parents. To distinguish from water and other solutions and also for flavour and colour we add Tr. Carl. Co.® perera has recommended¹⁴.

Rehydration Therapy Centres have been opened in many South American Countries as long as 12 years ago. Many other countries all over the world are also trying to cope up with the gigantic problem of diarrhoeal disease by establishing such centres in their respective countries in maximum number.

CONCLUSION

The oral therapy for dehydration is a very effective, safe, cheap and readily available
method for controlling the alarming no. of death in the children, as well as in adults. If needs very little training, a good program of Health Education. It does not need any new physical facility. Every Health Post or Panchayat can have rehydration therapy centre and most cases of diarrhoeas and vomiting can be controlled at the mild level. This concept has not been included in the medical text books and hence fresh medical graduates should be oriented in this technique – not only the AHW and ANMs and nurses. Major organisations like WHO and UNICEF should conduct courses on Rehydration Therapy Centre in Nepal. The concerned authority should make more and more RD-Sol packets available in country and restrict the wastage in sulfaguanadine etc. Every hospital and health posts should start keeping this ‘holy water’ in big jars and supply the poor patients with diarrhoeal disease free of cost.

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