ASSESSMENT OE INIRAPERITONEAL FLUID THERAPY IN CHILDREN WITH DEHYDRATION

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INTRODUCTION:

Gastroenteritis with dehydration constituted 20% of total admission to Paediatric wards of Khartoum Hospital (El Shazali 1970).

The intravenous route has been the main line of deyhdration in the Sudan. The intraperitoneal route has been used extensively in East Africa (Jelliffe 1966), and has been recommended in children with moderate dehydration because of its simplicity, safety and effectiveness (Jelliffe 1966, Ransome-Kuti et al 1969).

The aim of this study is to assess the clinical and biochemical factors that influence the response to this regimen of therapy using one type of fluid and accordingly to outline simple criteria for selection of patients for this method.

SUBJECTS AND METHODS:

39 children admitted to the Paediatric causalty department of Khartoum Civil Hospital with moderate dehydration were studied, the degree of dehydration was assedssed clinically (Jelliffe 1966). The intra peritoneal fluid infusions were performed as described by Lennox and Jelliffe (1970). The fluid used was 0.45 saline in 2.5% dextorse in a dose of 75mls/kg. body weight as lower doses of fluids were found to be indaequate for complete replacement therapy (Ransome-Kuti et al 1969).

The patients were assessed clinically and a blood sample was drawn from each before and four hous after the intraperitoneal infusion. The blood samples were analysed for Na+,K+,glucose, PCV, and osmolality, the last was measured

by an electronical semi miero osmometer (Knauer).

On the second clinical examination an emphasis was made on assessing the effectiveness of therapy. Those who were judged to have deteriorated or showed no appreciable improvement were given fluids intravenously. The clincial assessment and biochemical analysis were done by two separate observers. Statistica. analysis was done by grouping of data and application oft test independent or X2 test. Levels are expressed as mean – S.E.M.

RESULTS:

Clinical Assessment:

Of the 39 cases, 25 were evaluated to have good response and commenced oral fluid intake and were discharged within 24 housr, (groupA). 14 cases needed intravenous fluid therapy group B), 3 of them died in hospital.

The mean age of children in group A was 9.6 month – 2.7 in group B was 20.5 – 4.8, the difference being significant, (P– 0.05). The duration of diarrhoea and vomiting in group A was 5.3 days – 3.4, in group B 14.2 days – 5.8 (P—05) 12 in group A were breast fed compared to 3 in group B, using X2 test (P—0.01) All those in group B showed signs of worsening dehydration. 9 had persistant diarrhoea and vomiting, 3 had fever due to malaria and one developed signs of acidosis.

BIOCHEMICAL RESULTS:

TABLE 1 compares the initial levels of Na, K–, osmolality P.C.V. and glucose before the infusion in the two groups. The levels of sodium and osmol ality were lower in those who later didnot respond to the infusion. Na 142.6 – 2.5 130.9 – 2.5 respectively (P—.05) osmolality was 278 – 6.5 – 254 – 5.8 respectively (P—0.05).

FIG.1 Shows the changes in the levels of Na, osmolality, K, P.C.V. and glucose following the intraperitoneal infusion in the two groups. The sodium and osmolality levels in group S showed no change, while there was an insignificant increase in soidum level in group B for 130.0 – 2.5 to 136 – 2.6 and a significant increase in the osmolality from 254 – 5.8 to 271.6 – 3.8 (P—0.05). There was no significant change in P.C.V. or K in the two groups. Inspite of the increase in the level of Na and osmolality in group B the final levels were lower than in group A but the differences not statistically significant.

FIG. 2 shows the commulative results of initial levels of Na grouped arbitrarily into 3 ranges. 10 were hyponatraemic with sodium of less than 135 m. equiv./L. 15 had sodium levels within the normal range of 135 to 149 m.eq./L and 5 were considered hypernatraemic with sodium levels — 149 m. equiv./L. Those in the hyponatraemic range showed a significant increase in soduim in response to the infusion, 123 – 2.8 to 132 – 2.5 (P—05) but were still below

TABLE 1:

COMPARISON OF THE INITIAL LEVELS OF NA, K, OSMOLALITY AND GLUCOSE IN THE TWO GROUPS

	GROUP A		GROUP B		
PARAMETER	N	MEAN – S.E.M.	N	MEAN – S.E.M.	P
SODIUM m eq/L.	16	142.6 – 2.5	10	130.9 – 2.5	0.05
POTASSIUM m eq/L	20	3.81 – 0.3	10	3.5 – 0.3	0.8
OSMOLALITY m.osmol/L	20	278 – 6.5	11	254 – 5.8	0.05
P.C.V.	17	34.4 – 5.4	7	31.3 – 5.4	0.9
GLUCOSE	24	102 – 4.5	12	107.8 – 9	0.6

FIGURE 1

Depicts the Na level, osmolality, K level, PCV and glucose concentration before and after I.P therapy In each of the five graphs group A are represented by closed circles and group B by closed triangles. S.E.M. is shown as a vertical line.

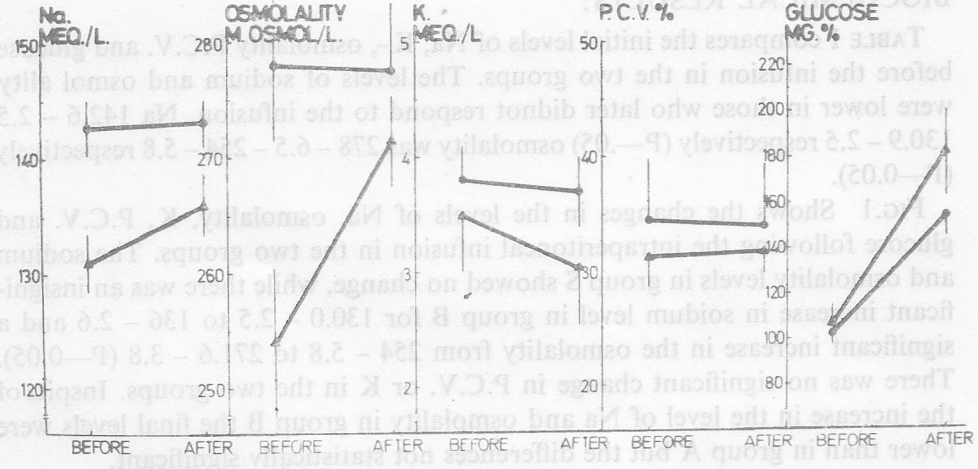


FIGURE II

Showing the changes in Na levels in the hyponatraemic (—135 m Eq.) the isonatraemic (135–149) and yhpernatraemic (1—149) groups before and after therapy.

Open columns represent the level before therapy and stippled columns represent the level after therapy. The S.E.M. is shown as a vertical line at the top of each column.

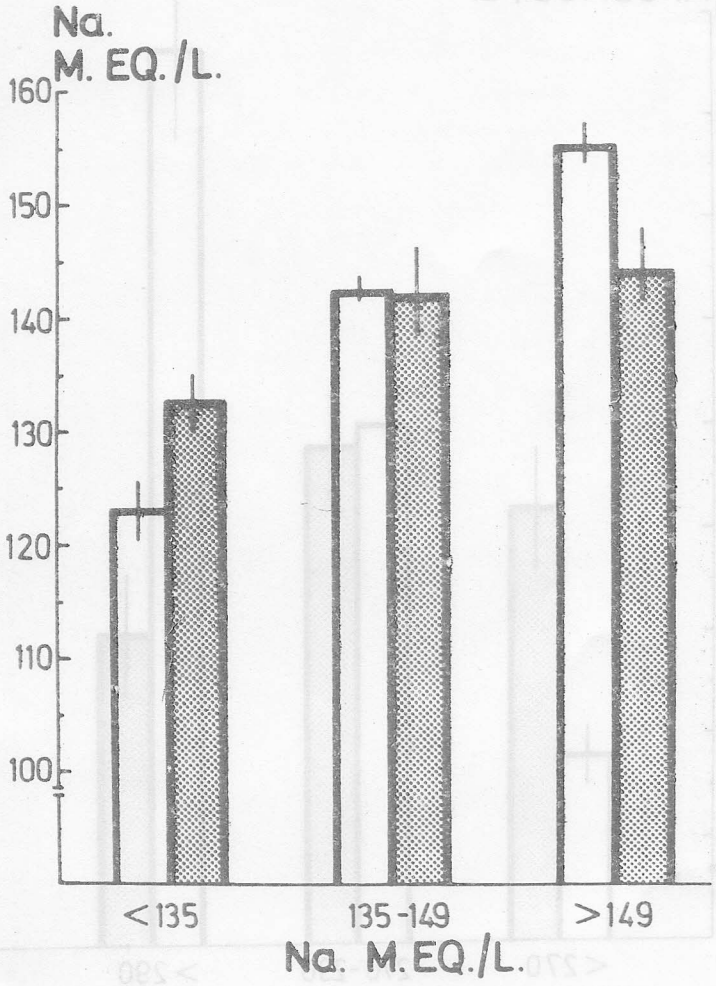
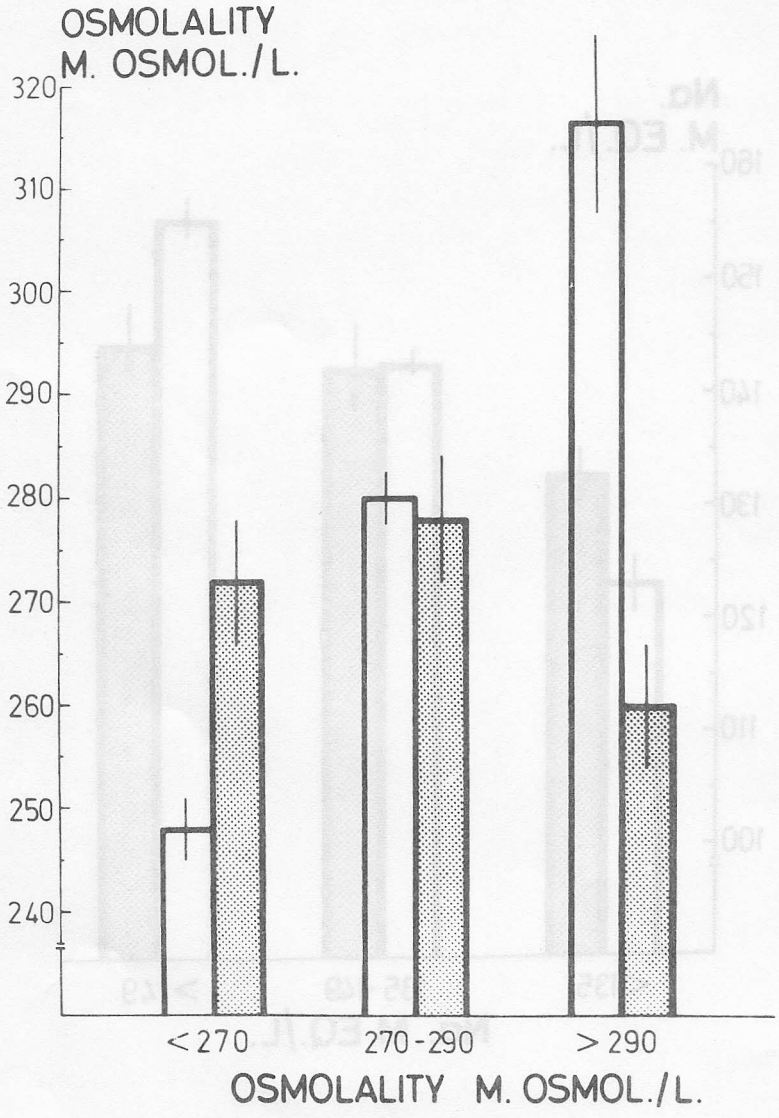


FIGURE III

Showing the changes in osmolality in the hypoosmolar (—270 m osm./1), the isoosmolar (270—290) and hyperosmolar (—290 m osm.(L) groups before and after therapy.

Open columns represent the level before therapy and stippled columnaf ter therapy. The SEM is shown as a vertical line at the top of each column.



normal values for sodium. Those who were isonatraemic remained so, while those who were hypernatraemic showed a significant decrease in soduim level in response to therapy, from 154.6 – 1.6 to 143.8 – 3.5 (P—0.05). These results were confirmed by similar analysis of osmolality results where 32 readings were available as shown in Fig. 3. 17 were hypo-osmolar (—270m. osmol/L), 10 were iso - osmolar (270–290m-osmol/L) and 5 were hypresrosmolar (—290 m-osmol/L) The osmolality in the first group increased significantly from 248 – 3 to 272 – 6 (P—.05). The second group remained isosmolar while the third group showed a significant decrease in osmolality from 316 – 8 to 260 – 6 (P—.01).

Of the three who died in the trial, one had hypernatraemia, with Na– of 162 maequiv./L; and two had hypo Kalaemia with pottasium of 1.4 m. equiv./L each.

DISCUSSION:

The results of this study confirmed the experience of Jelliffe 1966 about the safety and effectiveness of this method of therapy. 63% of the patients in this study responded to one intraperitoneal infusion compared to 65% in the Lagos study (Ransome-Kuti et al 1969).

Those with younger age, a shorter duration of illness and who were breast fed responded better to intraperaitoneal fluid therapy. On the other hand persistance of diarrhoea and vomiting after admission, fever and signs of acidosis were associated with lack of response. These clinical factors when taken together with the degree of dehydration on admission will make better criteria for selection of cases.

Those who did not respond had a significantly lower initial levels of sodium and osmolality. This information can be made use of in cases treated in hospitals where analysis of blood is readily available. Otherwise the clinical criteria quoted above will be the only way of selecting cases for intraperitoneal fluid therapy.therapy.

The fluid used in this study, 0.45 saline in 2.5% glucose is the one that can be made available in any health centre because it is simple to prepare and cheap. The use of full strength saline or full strength Darrows solution may be dangerous in chi.dren with hypernatraemia (Ransome-Kuti eta al 1969). The fluid used in this study was found to be equally effective in maintaining normal levels of sodium and osmolality in cases of hypo, iso or hypertonic dehydration, (Fig.2) and (Fig.3) .Jelliffe 1966 and ransome-Kuti et al 1969 recommended the use of half strength Darrows. We refrained from its use because of the concern about the blind use of potassium solutions which will be given in a single dose intraperitoneally particularly in children who may prove oliguric.

Our fears were unjustified since the final serum levels in this study were low: 3.7 – 0.3 – 0.5 in group A & B respectively. Moreover in two patients the cause of death was probably hypokalaemia. On account of this in future potassium chloride should be added to the previous solution and the benefit will outweigh the risk.

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