

REDUCING THE OSMOLARITY OF THE ORAL REHYDRATION SOLUTIONS IN ACUTE GASTROENTEROCOLITIS IN THE NEW BORN

RODICA FĂRCĂȘANU

PhD candidate, "Lucian Blaga" University of Sibiu

Abstract: Diarrhoea is a relative frequent affection in the new born, affection that rapidly leads to a syndrome of dehydration, as a result of the hydro-electrolytic and acidobasic equilibrium particularities of the new born. The first stage in the physiopathogenic treatment of diarrhoea is the oral rehydration. The aim of the scientific research is to prove the efficiency and the superiority of the osmolarity reduction of the oral solutions of rehydration in the treatment of diarrhoea in the new born.

Keywords: diarrhoea, oral rehydration, reduced osmolarity oral rehydration solutions.

Rezumat: Diareea reprezintă o afecțiune cu o frecvență crescută la vârsta de sugar, afecțiune care duce rapid la un sindrom de deshidratare, datorită particularităților echilibrului hidro-electrolitic și acido-bazic al sugarului. Prima etapă în tratamentul fiziopatogenic al diareei, îl reprezintă rehidratarea orală. Obiectivul cercetării științifice îl reprezintă demonstrarea eficienței și superiorității reducerii osmolarității soluțiilor orale de rehidratare în tratamentul diareei la sugar.

Cuvinte cheie: diaree, rehidratare orală, soluții de rehidratare cu osmolaritate redusă

INTRODUCTION

Premises

The research theme represents a new approach in the treatment of acute gastroenterocolitis, that is the reduction of the osmolarity of the oral solutions of rehydration in acute gastroenterocolitis in the new born and is due to the following reasons.

PURPOSE OF THE RESEARCH

- **The large frequency of acute gastroenterocolitis** still remains a major cause of mortality and morbidity in children, counting 1,8 million of deaths in the children under the age of 5 and approximately 17% of the total of the infantile deaths.(1) In reality, diarrhoea is the major clinical expression of water and electrolytes disorder at the level of the digestive tube, including their absorption and secretion processes.(2)
- **The new born has a maximum rhythm of accomplishing ADS** (acute dehydration syndrome) consecutively to the acute gastroenterocolitis, due to

the particularities of the hydroelectrolytic and acidobasic metabolism.(3,9)

- The therapeutic attitude recommended by WHO (World Health Organization), of oral rehydration, as the first stage of the therapeutic protocol for the treatment of ADS, secondarily to any type of diarrhoea, in acute gastroenterocolitis.(4,12) Oral rehydration has numerous advantages: it is a simple, comfortable, easy to approach method (even at home), with a very good cost/efficiency relation.(5,6)
- Recent data regarding a new approach in the oral rehydration of acute gastroenterocolitis.

The research and the studies developed starting with 2002, have revealed that in osmotic and secretory diarrhoea, *reduced osmolarity rehydration solutions* are very benefic.(7)

- According to the physiopathologic data in acute gastroenterocolitis of viral or parasitary etiology, as in persistent diarrhoea, *faecal sodium* excretions are relatively reduced (50 mmol/l), while stool osmolarity > the sum of the faecal electrolytes (Na + K) faecal x 2, indicating the existence of the osmotic diarrhoea, with the incomplete absorption of the nutrients. (2,3,16)
- The oral rehydration formulae recommended by WHO-ORS were determined taking into account the losses of Na⁺ from the faeces: Na >90 mmol/l of the secretory diarrhoea with an osmolarity of 311 mmol/l.(10) Recent studies show that these formulae have also certain limits, in the sense that they do not reduce the volume of the stools, neither the length of diarrhoea.(8) It results that ORS formula with 90 mmol/l Na⁺ and 311 mmol/l osmolarity is not ideal for the rehydration of the new born with osmotic diarrhoea. *Reduced osmolarity rehydration solutions* (RORS) would be benefic.(7,11,13,15)
- RORS decrease the intraluminal osmolarity, favouring the absorption of electrolytes through the action of solvent drag!(14) Recent studies show the advantages of the use of the *reduced osmolarity rehydration solutions in secretory diarrhoea as well.*(13,16,18)

Objectives

Is the reduced osmolarity rehydration solutions

CLINICAL ASPECTS

(RORS) benefic or not in the treatment of acute gastroenterocolitis in the new born?

MATERIAL AND METHOD

The scientific research method that I considered oportune was the sample method.

Researched sample:

The new born hospitalized in the Pediatric Clinic of the city of Sibiu, between: 01.10.2007 – 30.09.2008

Hospitalization diagnosis: acute enterocolitis

- Aqueous diarrhoea
- Mild ADS
- Without severe malnutrition - G correlated with the age > percentile 60

The new born with the following affections were excluded from the research:

- Systemic infections under AB treatment;
- Muco-*sanguinolent* evacuations.

The research period: 01.10.2007- 30.09.2008 – Pediatric Clinic of the city of Sibiu

Total of the hospitalized patients 0 – 18 years old = 5.850

Total of the hospitalized patients: 0 – 1 year old = 1.410

Total of the patients included in the study: 0 – 1 year old = 236 (16,73% of the hospitalized new born)

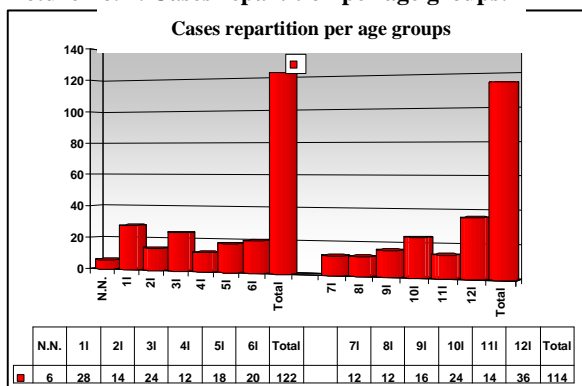
Table no. 1. New born repartition per age groups: 0 – 6 months = 122

N.N.	1 month	2 months	3 months	4 months	5 months	6 months	Total
6	28	14	24	12	18	20	122

Table no. 2. New born repartition per age groups: 7 – 12 months = 114

7 months	8 months	9 months	10 months	11 months	12 months	Total
12	12	16	24	14	36	114

Picture no. 1. Cases repartition per age groups:



- Those 236 patients included in the study were randomized in two age groups: the group between 0 – 6 months and the group between 7 – 12 months;
- The two groups were each divided in: batch rehydrated with standard osmolarity solutions, recommended by WHO; a batch rehydrated with reduced osmolarity solutions.

Oral rehydration therapy – ORT

The composition of the used rehydration solutions:

- WHO - ORS solution = GESOL 311 mmol/l (Na = 90mmol/l);
- RORS solution = Humana Elektrolit 230 mmol/l (Na = 60mmol/l).

Picture no. 2. Cases repartition according to the type of rehydrated solution.

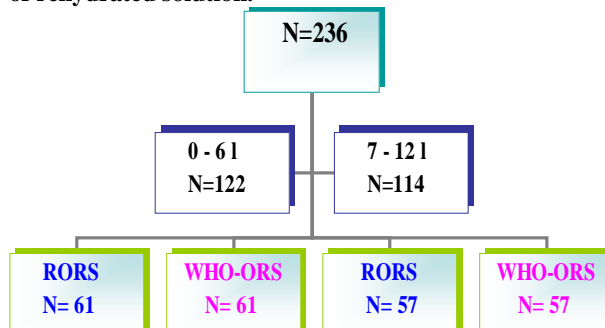


Table no. 3. Composition of rehydration solutions.

Ingredients (mmol/l)	RORS	WHO-ORS
Na	60	90
K	20	20
Cl	51	80
Citrate	10	10
Glucose	89	111
Osmolarity	230	311

The oral rehydration scheme was that recommended by IOMC.(5)

1. during the 4 hours of therapy: 50 - 100 ml/kgc = according to the clinical form;
 - 50 ml/kgc – mild form of ADS < 5%;
 - 100 ml/kgc – medium for of ADS 5 – 7 %.
2. 4 hours later: (+)50 ml/each evacuation. The administration will be made at room temperature; the pill will be dissolved, fractioned in small quantities and administered at short periods of time during the proposed period of time.

After oral rehydration, the early feed is to be instituted, according to the new recommendations.(5,12)

1. Early feed!
 - New born fed naturally or mixed
 - Continuation of the breast feeding
 - New born artificially fed:
 - < 5 l: **Lactose-free milk**
 - > 5 l: BV; mixed up meat; cereals, rice, fruits/vegetables (OP+BV, OP+flat apple or OP+banana, SM+PL+CM);
 - day 4 = standard powered milk
- + 50 - 100 ml ORS (between meals) for each evacuation or 10 ml/kgc/evacuation.

Study management

- Anamnesis
 - Origin environment
 - Onset of the disease

CLINICAL ASPECTS

- Dietetic errors
- Other associated affections
- Symptoms (inappetence, vomiting, thirst or the refuse of the feeding bottle)
- Stools number and aspect
- Diet and other treatments administered at home
- Clinical examination
 - Nutrition general condition (IP, IN)
 - Loss of weight
 - Clinical signs of ADS
- Laboratory examinations:
 - Establishing the etiology
 - coprocitogram, repeated plate culture of faeces, virusologic studies
 - (Ag rotavirususes), coproparasitologic examination.
 - Presence of the infection - HLG, VSH, PCR, fibrinogen
 - Physiopathologic disorders.
 - HE and AB equilibrium:
 - Serum ionogram (Na, K, Cl, Ca, Mg)
 - Astrup parameters (pH, pCO₂, BE, BS)
 - ECG
 - Hemoconcentration syndrome (Ht, Pt)
 - Renal insufficiency – urea, creatinine
 - Adaptive reactions – glycaemia
 - Complications:
 - Systemic infections (hemoculture)
 - Cerebral oedema (ex. FO, LCR, EEG)
 - Parenteral focus:
 - ORL sphere (radiography sinuses, *pharynx* examination)
 - respiratory (pulmonary radiography, IDR - PPD)
 - urine culture

Monitoring:

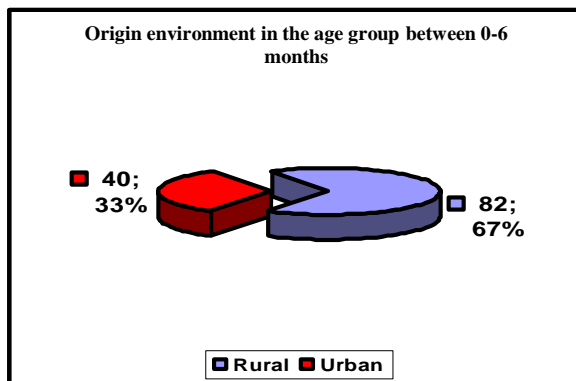
1. Clinically: daily monitoring:
 - Vital signs
 - increta, excreta
 - weight
 - fever curve
 - stools frequency and aspect /24h
 - diarrhoea length
2. Paraclinically : upon hospitalization, day 3, day 6, upon discharge
 - Usual blood determinations: HLG, ionogram and Astrup parametres
 - Stool examination: ph of the stool, faeces culture
3. Treatment
 - PEV (12-24 hours in ADS 5-7%)
 - Oral rehydration with ORS (quantity, length of rehydration)
 - AB
 - Intestinal Eubiotics

RESULTS

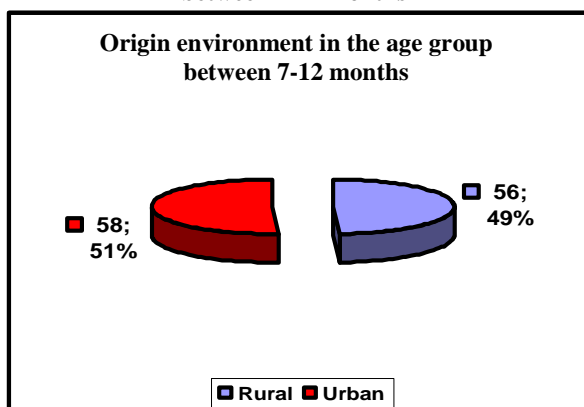
Table no. 4. Origin environment

Age	Rural	Urban	Total
0 - 6 l	82	40	122
7 - 12 l	56	58	114

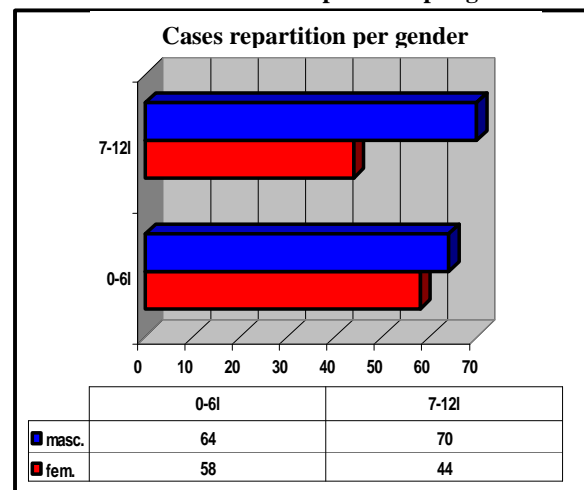
Picture no. 3. Origin environment in the age group between 0-6 months



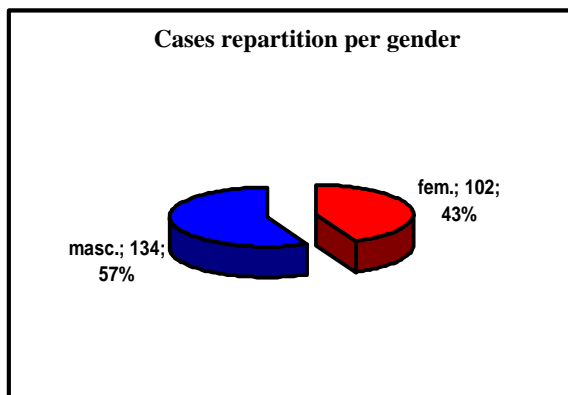
Picture no. 4. Origin environment in the age group between 7-12 months



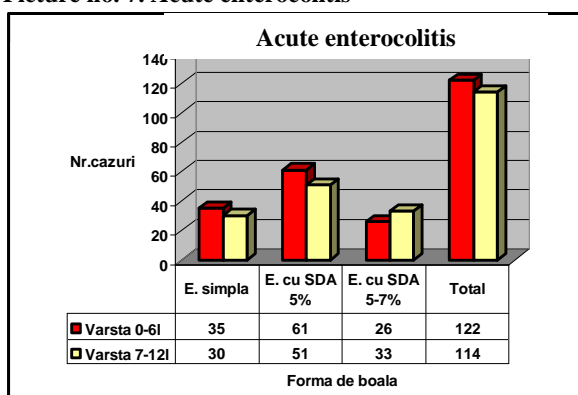
Pictures no. 5 and 6. Cases repartition per gender



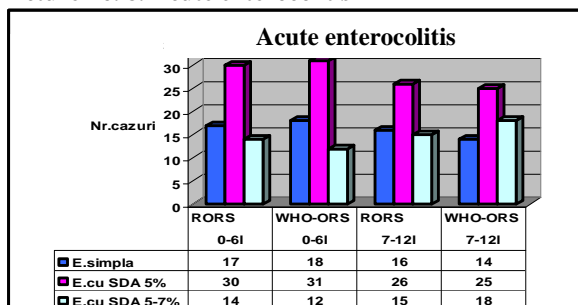
CLINICAL ASPECTS



Picture no. 7. Acute enterocolitis



Picture no. 8. Acute enterocolitis



REFERENCES

1. Levine A, Santucci Karen A. Paediatrics Gastroenteritis. Last Updated, June 14, 2006.
2. Maiorescu M, Anca I. Bolile diareice acute ale sugarului și copilului mic. Editura Academiei, București 1985.
3. Geormăneanu M. Tratat de pediatrie vol.2. Nutriție și alimentație rațională. Boli ale tractului digestiv. Ed Med. București 1984.
4. Barclay L, Vega Ch. Oral rehydration may be the best for children with gastroenteritis. Paediatrics 2005, 115.
5. Cazan Corina. Elemente de bază în nutriția clinică pediatrică. Ed. ULB Sibiu 2004.
6. Neamțu M, Cazan Corina. Patologie digestivă la copil. Ed. ULB Sibiu, 2005.

7. Fuchs G. Reduced Osmolarity Oral Rehydration Solutions: New and Improved ORS. J of Pediatric Gastroenterology & Nutrition March 2002;34(3):252.
8. Dale J. Oral rehydration solutions in the management of acute gastroenteritis among children. Journal of Pediatric Health Care Jul-Aug 2004.
9. Egland Ann G, England Terrance K. Paediatrics Dehydration. Last Updated, March 23 2006.
10. Ellsbury Dan L, George S. Caroline. Dehydration. Last Updated, March 30 2006.
11. Duggan C, Fontaine O, Pierce NF et al. Scientific rationale for a change in the composition of oral rehydration solution. Jun 2, JAMA 2004.
12. Endorsed Clinical Practice Guideline. Managing acute gastroenteritis among children: Oral rehydration, maintenance and nutritional therapy. Paediatrics 2004;(114)2.
13. Pulungrih Pandam S, Puyabi NH. Standard WHO-ORS versus reduced-osmolarity ORS in management of cholera patients. Journal Health Pop Nutrition March 24 2006.
14. Enhanced Diarrhoeal Disease Control. Oral rehydration therapy ORT and low osmolarity oral rehydration solution ORS. Diarrhoea Treatment Guidelines, January 2005.
15. Nalin DR, Hirschhorn N, Greenough W et al. Clinical concerns about reduced-osmolarity oral rehydration solution. Jun 2 JAMA 2004.
16. Szajewska H, Hoekstra JH, Bhupinder S. Management of acute gastroenteritis in Europe and the impact of the new recommendations: A multicenter study Journal of Pediatric Gastroenterology and Nutrition May 2000;30(5).
17. Ulrickson M. Oral rehydration therapy in children with acute gastroenteritis. Official Journal of the American Academy of Physician Assistants 2005;18(1).
18. Alam NH. Modified ORS in malnourished children with watery diarrhoea. Apgan Last Updated December 10, 2001.