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Infant Diarrhoea and Ayurveda

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Research Article

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Abstract

Diarrhoea is a major cause of morbidity and mortality among infants worldwide. In developing countries, diarrhoeal disease accounts for an estimated 17.5–21% of all deaths in children under the age 5 years, equivalent to 1.5 million deaths per year of all child deaths from diarrhoea. The commonest cause of diarrhoea during infancy is either viral or nonspecific or dentition diarrhoea. Commonly prescribed anti-diarrhoeal consists of potent antibacterial and antiprotozoal which results in mucous colitis, post diarrhoeal urinary tract infection and a long term manifestation of cartilaginous osteoarthropathy.

Material & Methods: Infants attending Centre for Diarrhoeal Disease Research Warisaliganj were selected for clinical evaluation were duly examined and evaluated for base line bio parameters. In addition parent or attendants were thoroughly interrogated for clinical presentation, history of treatment and their result.

Result: All infants taking HERINA drop shows earliest change in consistency and frequency of stool with complete normalization within 72 hours while others had deterioration of hydration status (39%) and needed intravenous fluid administration with advocation of HERINA drop. Crave for water in infants on HERINA drop ceased within 24 hours though some had within 12 hours while in others persisted for more than a week. 93% infants taking HERINA drop had grade I clinico- pathological cure while others had worsening of hydration state in majority (89%) and needed fluid transfusion and advocation of HERINA drop.

Conclusion: HERINA a safe herbo mineral composite proves worth in infantile diarrhoea limiting duration of treatment, loss of fluid and electrolyte and cost of therapy without any untoward effects.

Keywords: Diarrhoea Morbidity; Mortality antibacterial; Antiprotozoal; Mucous Colitis; Cartilaginous Osteoarthropathy; Herbomineral

Introduction

Diarrhoea ,a biggest infant killer worldwide specially in developing countries like India, Nepal, Bangladesh and Shrilanka , where a child suffers on an average 3-6 episodes of diarrhea in first year of life claiming death rate of 20-60/thousand children annually [1-5]. Interaction between diarrheal disease and nutritional status are complex and synergistic and serious issues globally., as they affect thousands of millions of young children every year and causes >3 million death of children < 5yrs in spite of intensive filed based diagnosis and treatment ,1,2 usually 109 of every 1000 children dies before 5 yrs (Unicef report 2012) and 11% death is due to diarrhoea, present death rate of 38 per thousand in India to be achieved by 2015 ,though diarrheal death dropped in India Usually child lose water and electrolyte alike adult due to fairly large area of secreting intestinal mucosa [6,7].

The commonest cause of diarrhoea during infancy is virus (Rotavirus) or non-specific though diarrhoea significantly alter nutrition but simultaneously malnutrition also predisposes diarrhoea due to declined immune response and aggravated secretory function of intestinal mucosa. As during infancy the major cause of diarrhoea is increased secretion due to increased cyclic AMP during dentition phase or due to organismal toxin. 2 In spite of its non-bacterial pathogenesis, the commonly prescribed preparation constituting even contra indicated antimicrobial agent (Quinolone) combination is quite in vogue and prescribed even by qualified and specialized clinician which not only causes therapy related untoward effect but also presents with manifestation of superinfection e.g.- candidiasis, fungal diarrhoea urinary tract infection and mucous colitis Though various antidiarrheal are in vogue (even containing contraindicated molecules) , which not only cause various therapeutic hazards like post diarrhoea mucous colitis, urinary tract infection, fungal super infection and mortality due to post diarrhoeal dehydration and encephalopathy [8,9]. Hence considering the mortality and morbidity in infants due to altered secretory and absorptive mechanism of intestinal mucosa, a clinical study to evaluate a herbo mineral anti-diarrheal composite HERINA in declining the secretion of intestinal mucosa and promotion of fluid and electrolyte transport in changing the consistency and frequency of stool and safety profile in infant diarrhoea is planned

Material & Methods

Design and Study

Comparative clinical study to evaluate HERINA drop orally in management of infant diarrhoea

Patients: 1760 infants presenting with lose motion with various stage of dehydration without any other systemic disease or sequelae attending at pediatric out door of RA.Hospital & Research Centre during Jan 2008- March 2009 were selected by Centre For Diarrheal Disease Research (CDDR).

Method: After proper knowledge regarding the proposed study written consent of the parent was taken and selected infants were duly examined and patient's informants (parent or attendant) were interrogated thoroughly for frequency, consistency and odor of stool ,therapeutics taken and their effects and mode and type of feedings.

Index of acute diarrhoea [10,11].

- Loss of stool consistency with pasty or liquid stool
- Increase in stool frequency >3 /24 hours
- In the first few months of life, changes of stool consistency compared to the usual situation for the individual child are a more significant indication of an acute diarrheal illness than stool frequency.

Patients were also assessed for their hydration and thermal state. Dehydration state was assessed as per following index of assessment [12,13] (Table 4).

Dehydration	Characteristic feature
Mild Moderate	Irritable, craving for water, Irritable, weak pulse, restlessness, decreased urine volume, Depressed anterior fontanel, Face dry and pinched
Severe	Moribund, apathetic, peripheral circulatory Failure, marked reduction in urine volume Markedly depressed anterior fontanel Eye ball markedly sunken, .lips parched Face markedly dry and parched, buckle Mucosa dry, loss of skin turgor, craving for Water (intense thirst)

Table1: Characteristic Features of Dehydration.

Selected patients were investigated for serum electrolyte, stool routine and culture, urine routine and culture was duly done. Selected patients were classified in to two groups constituting equal number of infants of similar status to adjudge the comparative therapeutic status of HERINA drop in infant diarrhoea (Table 2).

Trial group patients been given HERINA drop while control group placebo.

Dose of the Prescribed Drug	
1-5 month	1.0 ml 8 hourly
6-12 month	2.5 ml 8hrly
With palatable drinking water	

Table 2: Dose of the Prescribed Drug.

- **Composition of HERINA drop** (Table 3)

Each 5 ml constitutes	
Berberis aristata (wood)	500mg
Woodfordia floribunda (flower)	500mg
Embelia ribes (seed)	500mg
Holarrhena antidysterica (Bark)	250mg
Cyprus rotandus (rhizome)	250mg
Symplocos racemosus	250mg
Aconite heterophyllum (purified)	100mg
Zingiber officinale (dried rhizhome)	100mg
Purified gairic pashan	250mg
Saindhav and sanchal (equal Parts)	12.5 mg

Table 3: HERINA Drop Composition.

Each mother or parent were given a follow up card to enter the following

- Frequency of lose motion every day
- Consistency of stool i.e.- watery, semisolid or formed
- Fever
- Excessive crying
- Abdominal distension,
- Status of dehydration,
- Urine out put

After completion of 72hrs of therapy, each patient was evaluated for-

- Consistency and frequency of stool
- Culture and sensitivity of stool and urine
- Blood for haematological status and renal status

Post therapy status of the patient was assessed as per following index i.e.-

- Any relapse,
- Recurrence or persistence,
- Urinary complaints,
- Persistence of pyrexia,
- Mucous colitis.

Based on the therapeutic response and post therapy follow up clinical response was graded as in Table 4.

Clinical grades	Characteristics
I	Completely formed stool within 48hrs without any consequent sequel.
II	Decrease in frequency of stool and change in consistency of stool in 48hrs without any adversity.
III	Decline in frequency and consistency but no Formed stool with adversity
IV	No effect within 72hrs

Table 4: Characteristics Features of Clinical Grades.

Results

Among the selected infants ,majority (39%) were of age group 6-9 months and 17% were of age group 3-6 months. 32% infants had frequency of motion 4-6 every 24 hours while 19% shows >13 every 24 hours.

- (T-1). Out of all 65% (1136) infants present with lose watery motion 23% and 12% infants had greenish lose motion and lose motion with mucous and froth respectively, 85% had fever and 80% presented with scanty urine.
- (T-2)As per hydration status all are dehydrated but 41% and 39% were with severe and moderate dehydration respectively
- (T- 3) Stool examination of the infants shows absence of respective pathogens in 33% male and 34% female though 12% of both male and female show presence of Shigella and 16% of male and 15% female shows presence of Salmonella.
- (T- 4) No infants with history of fever show significant bacteriuria or positive Microstix -N test for Urinary tract infection.

Hematological status of majority infants was within normal limit or non-reveal haemoglobin deficiency or any haemato pathology. All infants taking HERINA drop shows earliest change in consistency and frequency of stool with complete normalization within 72 hours while others had deterioration of hydration status (39%) and needed intravenous fluid administration with advocation of HERINA drop. Crave for water in infants on HERINA drop ceased within 24 hours though some had within 12 hours while in others persisted for more than a week. 93% infants taking HERINA drop had grade I clinicopathological cure while others had worsening of

hydration state in majority (89%) and needed fluid transfusion and advocation of HERINA drop (Tables 6-10).

Age group	Number of patients							
Frequency of motion/24hr---	4 - 6		7 - 9		10 - 12		>13	
	M	F	M	F	M	F	M	F
1-3 months	50	46	56	40	32	20	42	30
3-6 months	60	48	46	35	30	22	32	25
6-9 months	120	89	110	78	94	68	76	45
9-12months	80	60	75	55	60	47	51	38
	310	243	287	208	216	157	201	138

Table 6: Distribution of Patients as Per their Age, Sex and Frequency of Motion.

Particulars	Number of patients		
	Male	Female	Total
Lose watery motion	714	422	1136
Lose greenish motion	190	213	403
Lose motion with froth	110	111	221
Abdominal distension	880	530	1410
Prone lying	912	625	1537
Irritability	1006	703	1709
Scanty urine	718	698	1416
Depressed anterior fontanelle	886	526	1412
Fever	846	649	1495

Table 7: Distribution of Patients as Per Clinical Presentation.

Dehydration state	Number of patients			
	Male	Female	Total	%
Mild	128	220	348	20
Moderate	450	244	694	39
Severe	436	282	718	41

Table 8: Distribution of Patients as Per their Dehydration Status.

Isolated pathogen	Number of patients		
	Male	Female	Total
No organism	332	254	586
Salmonella	160	109	269
Shigella	124	88	212
Escheresia coli	198	121	319
Giardia	200	174	374

Table 9: Distribution of Patients as Per Status of Stool Pathogen.

Particulars	Number of patients			
	Group A		Group B	
	Male	Female	Male	Female
	(588)	(292)	(588)	(292)
Hydration status				
Improved	in all	in all	084	016
Declined	none	none	504	276
Untoward sequel Abdominal distension	none	none	262	108

Vomiting	none	none	280	128
Irritability	none	none	314	192
Grade of clinical cure				
I	546	272	046	012
II	042	020	488	072
III	-	-	054	208
Post therapy sequel				
Mucous colitis	-	-	117	144
UTI	-	-	124	106
Persistent diarrhea	-	-	044	173

Table 10: Outcome of the Study.

Discussion

In spite of enormous advancement in diarrhoeal management mortality and morbidity remain very common in infants due to acute diarrhoea [14-17]. Present study reveals earliest decline in frequency and change in stool consistency, resulting in short duration of therapy and minimal .loss of fluid and electrolytes, checks need of intravenous fluid and electrolyte supplementation. Limitations of disease's duration also check untoward effects as revealed by unaltered haematological, hepatic and renal function. Early change in consistency and decline in frequency of lose motion and loss of fluid and electrolytes in infants taking loss of fluid and electrolytes, checks need of intravenous fluid and electrolyte supplementation. Not only this short duration of diseases check untoward effects as revealed by unaltered haematological, hepatic and renal function. Early change in consistency and decline in frequency of lose motion and loss of fluid and electrolytes in infants taking Herina drop can be explained as-Constituents of Herina drop inhibits intestinal enkephalin (a membrane bound metalo peptidase) and prolong the anti-secretory effect of encephalin resulting in reduced secretion of water and electrolyte in the intestinal lumen, ultimately declining the intestinal load and intestinal stretch receptor response, finally reduce stretch, stimulation of the intestinal musculature leading to decline in tenesmus and defecation response [18]. Without increasing intestinal transit time and promoting bacterial colonization or fluid pooling in the distended bowel lumen or causing constipation can be explained as-Active bio molecule of Herina drop constituents inhibits intestinal enkephalin (a membrane bound metalo peptidase) and prolong the anti-secretory effect of encephalin resulting in reduced secretion of water and electrolyte in the intestinal lumen, ultimately declining the intestinal load and intestinal stretch receptor response , finally reduce stretch ,stimulation of the intestinal musculature leading to decline in tenesmus and defecation response. Without increasing intestinal transit time and promoting bacterial colonization or fluid pooling in the distended bowel lumen or causing constipation

- Active constituents of the composite-Discourage further multiplication or proliferation of causative pathogen [18].
- Adsorb the toxin secreted by microbes, hence relieves toxin induced tenesmus with check on intestinal hyperperistalsis.
- Astringent action of the constituents also bio regulate gut motility.
- Digestive tonic action promote appetite hence rejuvenate lust of breast sucking.
- Desired dilution of the suspension provides adequate water, in addition to electrolytes provided by the constituent.

Holarrhena Antidysentrica

Kurchisin and *Holarrhenin* seed also contain an alkaloid conesine C24H40N2Conessidine, conessimine and isoconessimine, conessine, conimine, conkurchine, holadiene, holarr-henine, holarrhimine (also in stem-bark), conamine, conarrhimine, conkurchinine, trimerthylconkurchine (irehline), holarrhine, holarrhessimine, kurchine, kurchicine, lettocine.

Woodfordia Floribunda

Woodfordins A, B, C, D, E and F, trimeric hydrolysable tannins and tetrameric hydrolysable tannins. Other **chemical compounds** available in this herb are lupeol, betulin, betulinic acid, urosolic acid, sisterol and olealonic acid.

Cyperus Rotandus

An escenced Oil, Fat, Sugar, Carbohydrate, Albuminoids and an active alkaloid Cyperine and a glucosid Rotundine. Isocyperone;cyperenone; camphene; β-pinene; 1,8-cineole; limonene; P-cymene; cyperene;

selinatriene; β-selinene; βcyperone; patchoulenone; α-rotunol; β-rotunol; cyperol; isocyperol; copadiene; epoxyguaine; cyperolone; rotundone; kobsone; isokobusone; 4α-5α-oxidoeudesm-11-en-3β-ol; alfacopaene; β-elemene; caryophyllene; α-humulene; γ-cadinene; calamene; cyperotundone; patchoulenylacetate; segeonol; sugeonol acetate

Zingiber Officinalis

Contains 0.25–3% of a volatile oil of light yellow colour and characteristic odour. Oil of ginger contains terpenes (dcamphene and B phellan drine) sesquiterpene (Zingiberene), Cineole, Citral and borneol, Gingerol a yellow pungent body and oleoresin-gingerin. It also constitute potassium oxalate, starch and other resins. The essential oil and resine responsible for pungent flavour occurs just beneath the skin/epidermals.

Aconitum Heterphyllum

The weak base fraction yielded heterophyllisine, heterophylline and heterophyllidine. These compounds are lactone alkaloids which are structurally related to heteratisine. The strong base fraction yielded besides atisine, two new alkaloids atidine and F-dihydroatisine similarly the very strong base fraction yilded in addition to hetidine, alkaloids designated as hetidine and hetisinone.

Symplocos Racemose (Lodhra)

Constitute Colloturin, loturine, loturidine (bark), 3 monoglucofuranoides of 7-O-methyl and 4'-O-methylleucopelargonidin, Alpha amyrin, Acetyl oleanolic acid, betulin, betulinic, ellagic and oleanolic acids, (-) epiafzelecithin and its 7 Beta-D-glucopyranoside, 24Hydroxyolean12-en-3-one, 28-Hydroxy-20 Alpha-urs-12, 18(19) dien-3Beta acetate, 3-oxo-urs-20-Alpha-12, 18 (19) dien-28-oic acid and Beta-sitosterol (stem bark)

Conclusion

Diarrhoea in infants' posses' high risk and mortality. Prescription of antimicrobial and antiprotozoal preparation poses life threatening sequel as infants diarrhoea is usually viral or nonspecific or dentition diarrhoea caused due to altered enkephalin secretion and Sodium potassium ATPase pump activity, Thus herb mineral preparation which possess natural soothing agent, and Enkephalin bio regulator and promote pump activity bioregulation without any adversity securing ensured diarrhoea control .

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