

Laja Manda & Peya: A Study on Rehydration & Nutritional Effect in Infantile Diarrhea

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Abstract :

Acute diarrhea remains a common and life threatening disease among the infants through out the world. Laja Manda (scum) / Peya (scum having small quantity of rice) are used to treat diarrhea, thirst and vomiting. This study was randomized and comparative evaluation was done to find out the efficacy of Laja and Manda in management of diarrhea associated with dehydration. A total of 100 infants, aged 3 to 7 month having acute diarrhea, with or without vomiting and mild to moderate dehydration; comprised into 5 groups 'A' control, 'B' - Laja Manda, 'C' medicated Laja Manda, 'D'-Laja Peya, & 'E' medicated Laja Manda with 20 infants in each group, (medicated = MASS Drug.). The test recipe was given as per group regimen in a dose of 20 ml/kg/hr (minimum). The effect of recipe, based on scoring system, suggested good effect in group 'C' (55%), group 'B' (45%) and group 'E' (40%), while the gain in weight, reduction in stool frequency & amount, urine frequency & amount were found highly significant ($p < 0.001$) in groups, relatively.

This study revealed that the recipe (medicated Laja Manda) may be the best option to treat acute diarrhea in infants, especially in rural area.

Key words : MASS Drug (Musta, Anardana, Saunth, Saunf and Dhanyaka); Laja Manda, Laja Peya,

Worldwide, diarrhea is the leading cause of pediatric morbidity and mortality, with 1.5 billion episodes and 1.5-2.5 million deaths estimated to occur annually among children aged less than five years (Kosek M, et al, Bull WHO 2003; Black TE et al 2003; Parashar U et al 2003). Infants, due to having low status of defense mechanism are more at risk to develop various simple to life threatening disorders. Thus they suffer from infections, malnutrition & dehydration alone or in combination. The oral rehydration solution (ORS) solution, recommended by WHO, is safe and effective for treating diarrhea with dehydration (Avery and Snyder, 1990). It dramatically decreases diarrhea related mortality as it provides 80 Kcal/L, but does not reduce the volume and duration of diarrhea. (Pierce et. al 1968; 1973; Hirsch horn et al, 1968; 1973; Mohalanabis et al, 1974; Sack al et al, 1978). In vitro and in vivo data support the role of continued nutrition in improving gastrointestinal function and anthropometric, biochemical and clinical outcomes. (Duggan et al, 1997; Sandhu BK, 2001). Various strategies have been evolved to combat menace of diarrhea globally and the main thrust now has been provided to appropriate diet along with treatment in diarrhea (Nanulescu et al, 1995;

Sandhu, 1995). Diarrhea has been dealt in great extent in Ayurvedic classics in a more rational manner. Accordingly, diarrhea is dependent upon the status of Agni, which interferes at various levels in the body starting from digestion, absorption and ultimate assimilation at cellular levels. Thus it enables optimum utilization of ingested material and its elimination from the body as excreta. Approach to management of acute diarrhea also envisages modification in food with introduction of better digestible food materials which might have been the cause of diarrhea in addition to fluid management. However, addition of Agni-vardhaka drugs and diet further helps in control of diarrhea as well as initiates improvement in nutritional status.

Laja is a type of puffed rice, prepared from paddy parched with hot sand in an iron container. It has Kashaya and Madhura (astringent and sweet) Rasa (S. Su 46/419), Laghu (easily digestible and produces lightness), (Ra. Ni. Tr. Pari 481) Sheeta (coldness), and alleviates

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vomiting, thirst & diarrhea (B. P. Kritanna Varga 175), while the prepared Laja Manda alleviates thirst, diarrhea, maintains equilibrium of Dhatu (homeostasis) (Y. R. Siddhannadi Pak Guna-13; S. Su 46/342-343, Y.R. 5/33), the recent experimental and clinical studies have documented that the Laja Manda (Plain) contain 1.14 mg/ml protein, used as effective ORS (Oral Rehydration Solution) in diarrhea (Virendra et. al 1994).

Methodology

To assess rehydration and nutritional consequences of the Laja Manda and Peya (Medicated & nonmedicated) based oral rehydration therapy, 100 male infants (age 3 month to 7 month), having complains of loose stool with a duration of less than 5 days with or without vomiting and dehydration of mild to moderate degree were selected from Kaumarbhritya OPD/IPD S.S. Hospital; B.H.U. Cases of bronchopneumonia, meningitis, UTI, severe dehydration requiring i. v. fluids etc were excluded. Each case was examined and data recorded on a uniform clinical data sheet. Thereafter, relevant investigations were done. During case study, special emphasis was given on thirst, vomiting and stool (Frequency, amount & consistency) Urine (frequency and amount) and serum electrolytes levels of Na⁺, Cl & K⁺. The samples were divided in five groups A, B, C, D, & E with 20 infants in each group. 'A': control group; 'B': Laja manda; 'C': Medicated Laja manda; 'D': Laja Peya and 'E': Medicated Laja Peya.

Pre weighed diapers were used during first 24 hrs of management to obtain stool weight, and the mean weight of stool was taken, while the urine was collected for 24 hours in bottles.

During the total period of treatment, a non restricted diet, according to the age of children was given. For the purpose of diagnosis, rehydrational assessment and data analysis, the important findings

were gathered e.g. weight, thirst, vomiting, dehydration, frequency and consistency and amount of stool, urine frequency and amount, serum electrolytes. The effect of recipe was assessed for 48 hours.

Preparation of Manda, Peya & R-ORS (Ricetral-FDC) :

The '**MASS Drug**' comprised 5 drugs viz Cyperus rotundus, Punica granatum, Zingiber officinale, Foeniculum vulgare, Coriandrum sativum. Dry water extract was prepared and dispensed in the form of tablets along with a packet of Laja powder mixed with 0.4 gm table salt (10gm). To prepare Laja Manda & Peya one packet of 10 gm Laja powder was boiled with 140 ml water until 120 mill oo ml fluid remained for Laja Manda & Peya respectively. To prepare medicated Laja Manda and Peya, the "MASS Drug" in a dose of 20 mg/liter was added and advised to feed accordingly (table-I). R-ORS was prepared as per manufacturer (FDC) recommendation and given to the Control group-A. The test recipe was given as per group regimen in a dose of 20 ml/kg/hr frequently in small quantity (Babies rehydrate usually with in 6 hrs.).

After rehydration (Post rehydration phase), children were put on maintenance fluid and ongoing losses were replaced with the Laja Manda/Peya with or without "MASS drug" as per group regimen on a volume to volume basis until diarrhea stopped. Cessation of diarrhea was defined as the passage of two soft, formed or no stool in last 12 hr. Episodes separated by two days of normal stool were counted as separated episodes of diarrheas (Mola A.M. et al, 1992).

The scoring system was devised for the purpose of assessment of severity and reduction in elemental and laboratory findings to assess the effect of treatment on each aspect (table-I)

Table-I: Scoring System

Parameters	Scores (Final Vs Initial)				
	1	2	3	4	5
Weight (gm/day)	Decreased	No change	Mild (200-400)	Moderate (400-600)	High (600-800)
Thirst	Increased /same	Moderate	Mild	Normal	-
Vomiting (frequency/ day)	Increased (>5)	Moderate (3-5)	Mild (1-2)	Nil	-
Dehydration	Severe	Moderate	Mild	No dehydration	-

The patients getting mean scores 2.5 to 3.0 of different symptoms/signs were labeled as partial effect; whereas mean scores between 3.0-3.5 were termed as moderate effect of treatment. However, those cases having mean scores 3.5-4.0 were considered as having good effect of treatment.

Observations and Result

The data shows (**Table No-II**) that the incidence of thirst and dehydration were mild to moderate in all

the five groups before treatment, while the majority of cases were having normal thirst and hydration, after treatment. Vomiting was found mild degree in about 30%-35% cases before treatment and cured (100%) in almost all the cases of group II-V. Gain in weight was noticed more significant ($p < 0.001$) in groups C ($t = 15.32$) & E ($t = 16.37$) in comparison to other groups

Table : II

Showing status of thirst, Vomiting & Dehydration before and after the treatment

Parameter	Control -I (n=20)		Laja Manda -II (n=20)		Medicated Laja Manda-III (n=20)		Laja Peya - IV (n=20)		Medicated Laja Peya -V (n=20)	
	BT	AT	BT	AT	BT	AT	BT	AT	BT	AT
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
(a) Thirst										
Normal (4)	0(0)	16(80)	0(0)	18 (90)	0 (0)	20(100)	0 (0)	16 (80)	0 (0)	17 (85)
Mild (3)	10(50)	3 (15)	9 (45)	2 (10)	8 (40)	0 (0)	9 (45)	4 (20)	10(50)	3 (15)
Moderate (2)	10(50)	1 (5)	11 (55)	0 (0)	12(60)	0(0)	11 (55)	0 (0)	10(55)	0 (0)
Increased (1)	-	0(0)	-	0 (0)	-	0(0)	-	0 (0)	-	0 (0)
(b) Vomiting										
Nil (4)	12(60)	18(90)	12(60)	20(100)	13(65)	20(100)	11 (55)	20(100)	14(70)	20(100)
Mild (3)	6(30)	2(10)	7(35)	0(0)	6(30)	0(0)	7 (35)	0 (0)	6 (30)	0 (0)
Moderate (2)	2(10)	0(0)	1(5)	0(0)	1(5)	0(0)	2 (10)	0 (0)	0 (0)	0 (0)
Increased (1)	-	0 (0)	-	0 (0)	-	0 (0)	-	0 (0)	-	0 (0)
(c) Dehydration										
No dehydration (4)	0(0)	16(80)	0(0)	18(90)	0(0)	20(100)	0(0)	16(80)	0 (0)	17(85)
Mild (3)	9(45)	3(15)	9(45)	2(10)	8(40)	0(0)	10(50)	4(20)	7(35)	3(15)
Moderate (2)	11(55)	1(5)	11 (55)	0(0)	12(60)	0(0)	10(50)	0 (0)	13(65)	0 (0)
Severe(1)	-	0 (0)	-	0 (0)	-	0 (0)	-	0 (0)	-	0 (0)

Comparatively better ($t = 6.70$) values for stool amount was noticed in group 'C' than other groups. Urine frequency per day and urine amount (ml/kg/day) was found enhanced significantly ($P = 0.001$) in all the study groups. Change in serum electrolytes such as Na +, Cl-

and K + level were not found more significant. However, group 'A' (R - ORS) revealed increase in K + level - (table III).

Table III- Showing 't' values of intra group comparison of different parameter in all the groups of acute diarrhea -

Parameters	A= I Control (N=20)	B=II Laja Manda (N=20)	C=III Medicated Laja Manda (N=20)	D=IV Laja Peya (N=20)	E=V Medicated Laja Peya (N=20)
Gain in Weight (kg/d)					
d±SE	0.23 ± 0.058	0.41 ± 0.035	0.50± 0.033	0.41 ± 0.033	0.47 ± 0.029
't'	4.482****	11.42****	15.32****	12.57****	16.37****
Reduction in Stool fTeq./d					
d±S E	2.2 ± 0.659	1.5 ± 0.559	3.1 ± 0.434	2.4 ± 0.60	2.8 ± 0.536
't'	3.338****	2.68**	7.142****	4.0****	5.223****
Reduction in Stool amount (gm/kg/d)					
d±SE	4.81 ± 3.009	8.07 ± 2.586	10.475 ± 1.56\	5.6±1.617	8.845 ± 2,622
't'	1.387*	3.122***	6.7****	3.463***	3.373***
Gain in Urine frequency/d					
d±S E	2.0 ± 0.42	1.8 ± 0.307	2.45 ± 0.387	1.75 ± 0.42\	1.76 ± 0.39
't'	4.76****	5.863****	6.330****	4.\56****	4.510****
Gain in Urine amount (mild)					
d±S E	100.25± 16.\7	110.85± 16.65	126.9± 16.04	89.05± 13.703	82.2±11.48
't'	6.002****	6.655****	7.910****	6.498****	7.160****
Gain in S .sodium (mEq/L)					
d±SE	2.08 ± 0.690	1.98 ± 0.723	1.55 ± 0.597	0.875 ± 0.434	0.73 ± 0.433
't'	3.014***	2.738**	2.143**	2.099**	1.685*
Gain in S. chloride(mEq/L)					
d ± SE	2.4 ± 0.659	1.705 ± 0.921	1.96 ± 0.662	1.1 ± 0.632	0.71 ± 0.41
't'	3.092***	1.851 *	2.96***	1.740*	1.731*
Gain in S. potassium(mEq/L)					
d ± SE	0.247 ± 0.086	0.05 ± 0.035	0.05 ± 0.027	0.06 ± 0.06	0.04 ± 0.022
't'	2.86***	1.428*	1.81 *	1.0*] .81 *

P: * Insignificant (>0.05). **Significant (<0.05), *** Very significant (<0.01), **** Highly significant (<0.001)

On the basis of criteria (Table - IV), moderate to good effect was found in group 'C' (55 %), group 'E' 45 %) and group 'E' (40%),

Table IV - Result of the treatment (Score basis) of all the groups

Grading of Scores	(A) Control (n=20) No (%)	(B) Laja Manda (n=20) No (%)	(C) Medicated Laja Manda (n=20) No (%)	(D) Laja Peya (n=20) No (%)	(E) Medicated Laja Peya (n=20) No (%)
Partial effect (2.5-3.0)	8 (40)	2 (10)	1 (5)	4 (20)	2 (10)
Moderate effect (3.0-3.5)	7 (35)	9 (45)	8 (40)	9 (45)	10 (50)
Good-Effect (3.5-4.0)	5 (25)	9 (45)	11 (55)	7 (35)	8 (40)

Discussion

In 1975, WHO and UNICEF agreed to promote WHO recommended oral rehydration solution as safe and effective for treating diarrhea and dehydration (Avery and Snyder, 1990) with electrolyte loss in varying degree of infection [e.g. rota virus diarrhea is associated with stool sodium loss of approximately 30-40 m Eq / L, enterotoxigenic E. coli infection with losses of 50-60 mEq/L and cholera infection with losses of >90 mEq/L (Molla A et al, 1981)]. However, subsequent clinical research (Hahn et al, 2001) has supported adoption of a lower osmolarity ORS (i.e. reduced concentration of Na⁺ and glucose) (WHO, 2002). It dramatically decreases diarrhea related mortality and provides only 60-80 k.cal./L, (WHO-2002; Hirschom et al, 1968; mahalanabis et. al, 1974, Sack et al, 1978; Bhan et al, 1994)

The ORS especially R-ORS has the properties to rehydrate and correct electrolyte imbalance. It also improves nutritional status (Pizzaro, 1982, Molla et al, 1982, Molla et al, 1985, Bhan et al, 1994). Thus, R-asORS was taken the control in this study. The recipe "MAAS Drug" with Manda & Peya, based on textual reference and experience, being Deepana - Pachan, Grahi, and Brimhana may have additional benefits. The prepared Laja Manda and Peya have approximately sodium: 56.67 and 70 mmol/L, chloride: (1 gm salt provides 17 mEq/L, carbohydrate concentration (as Laja): 70mg/ml and 90 mg/ml and provide energy 228.9 kcal/L and 294.3 k.cal, respectively. The sodium concentration in Laja Manda is relatively lower (56.67) than WHO 2002 / 1975 recommended ORS (75 / 90 mEq / L respectively), but it provides more energy. Thirst, vomiting and dehydration were modified after treatment in all the groups, however comparatively better result was in medicated Laja Manda and non-medicated Laja Manda because they contain relatively more quantity of water. Thirst being the reflection of dehydration, improvement had been found proportionate to dehydration in children. Absence of vomiting tendency in majority of cases of B, C, D, E group revealed effect of Laja in subsiding vomiting (Comparatively less in control group)

Various studies conducted globally (Leonard et al, 1988, Baherman et al, 1992) had revealed that weight is the most sensitive aspect to estimate the degree of dehydration in diarrhea. Weight had significantly improved in all groups but comparatively good in Laja Manda and Peya. The enhancement in weight had revealed the role of recipes (with or without, 'MAAS Drug') in comparison to R-ORS. Increase frequency of stool per day gravely affects the physical status of the infants due to more loss of fluid and nutrients in the stool (Nanulescu et al, 1995). Amount of stool defecated per day is indicative of the better status of intestinal absorption of nutrients and residual evacuation and functional status of the intact mucosa of the intestinal villi.

Significant reduction in frequency and amount of stool was observed in medicated Laja Manda group in comparison to others (table-III). Thus medicated Laja Manda seems to have enhanced absorption as well as helped in remodeling of intestinal physiology. Frequency and amount of urine is usually proportionate to absorption of water at intestinal level. It may be possible that the recipe had reduced excretion of water at kidney level by release of aldosterone and high concentration of glucose, the final product of Laja Manda may be helpful for solvent drug, thrush the cell junction and through the para-cellular spaces thus increased urine frequency and amount.

Overall assessment of the study revealed that Laja especially medicated Laja Manda possesses the capacity to normalize thirst as an outcome of rehydration. Reduction in frequency & amount of stool and increase in urine output seems to result in weight gain by means of increasing absorption and normalized intestinal motility. With regards to Ayurvedic recipe action seem to intervene at etiological level (modified food), besides enhancement of Agni, which ultimately enhanced absorption. Grahi (enhanced absorption) effect of "MASS Drug" has further played a positive role by way of reducing fecal matter. Thus, the test recipes could intervene in this area by correcting dehydration.

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