Research Article

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EFFECT OF KARSHYAHARA YOGA IN THE MANAGEMENT OF MALNUTRITION IN PRESCHOOL CHILDREN

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ABSTRACT

Objective of the study was to evaluate the effect of Karshyahara Yoga on malnutrition in children and also to compare the effect of Karshyahara Yoga and standard control drug on the same. 106 malnourished children of either gender between the age group of 3 to 6 years as per the clinical criteria framed for the study were selected and allocated into two groups of 55 and 51 patients each. 55 malnourished children of group A (trial group) was advised to take Karshyahara Yoga (18 grams) with 10 grams of ghrita and mixed with sufficient quantity of warm water to make it into a laddu and indicated orally followed by anupana of 150ml of milk with 10 grams of sugar and 5 grams of honey twice daily (morning and evening) for a period of 3 months. 51 malnourished children of group B (control group) was advised to take the control drug - Poshaka laddu mix (ICDS) (18 grams) mixed with little warm water to make it into a laddu and is administered orally, twice daily (morning and evening) for a period of 3 months. After the completion of treatment, children were followed up for one month. It was found that Group A showed highly significant results in subjective parameters such as general weakness, state of hunger, activity or interest as well as in objective parameters such as weight in Kg, height in cm, chest circumference, mid arm circumference and B.M.I when compared with Group B. Karshyahara yoga was proved to be effective for weight gain in children with malnutrition as there is more improvement as compared with control drug.

Keywords: Karshyahara Yoga, malnutrition, preschool children, Poshaka laddu mix

INTRODUCTION

According to National Center for Health Statistics (NCHS), nutrition state where the weight for age, height for age and weight for height indices are below -2 Z-score is referred as malnutrition.[1] Malnutrition is not only a huge burden on the health systems, but also in the entire social, cultural and economic status of the society.[2] Malnutrition among preschoolers is an important public health problem and the most lethal form of malnutrition worldwide as per World Health Organization (WHO).[3] It was estimated that one in every three preschool children is malnourished where 35.8% of preschool children in developing countries are underweight, 42.7% are stunted, and 9.2% are wasted.[4] Malnourished children have poor immunity leading to compromised resistance to diseases, consequently they fall sick, and the malnourishment worsens.[5] The foremost problems contributing to malnutrition in children include inadequate care giving capacity, insufficient household food security and unwholesome environment predisposing children to infectious agents.[6] Malnutrition has devastating effects by increasing morbidity and mortality rates, also diminising the cognitive abilities of children and lower their educational accomplishment.[7] Regardless of rapid income growth, malnutrition affects both poor and non-poor households if effective approach to battle the problem is missing.[8] Studies have been conducted on the effectiveness of various Ayurvedic formulations in children.[9-11] As there were not much promising results from these studies and palatability being a challenge in children, the present study was proposed.

MATERIALS AND METHODS

Objective: To study the effect of Karshyahara Yoga[12] on malnutrition in children and also to compare the effect of Karshyahara Yoga and standard control drug on the same.

Method of collection of data

Source of data: Malnourished children were selected from outpatient department of Kaumarabhritya, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan - 573201, Karnataka, India

Ethical clearance: Ethics clearance was obtained from Institutional Ethic committee of SDM College of Ayurveda and Hospital, Hassan, Karnataka, India (IEC No. SDMCAH/IEC/102/12-13).

Diagnostic criteria: Diagnosis was made on the basis of anthropometric measurements. Anthropometry was evaluated with due importance to Expected weight for age criteria, Chest

Circumference, Head Circumference, Mid Arm Circumference, Body Mass Index (BMI). Indian Academy of Pediatrics (IAP) classification for malnutrition was used to select mild and moderate malnourished children.

IAP Classification of Malnutrition

Nutritional Status	Weight for the Age (% of expected)
Normal	>80
Grade I PEM	71-80
Grade II PEM	61-70
Grade III PEM	51-60
Grade IV	<50

Inclusion criteria: The children of either gender between the age of 3-6 years who fall under mild to moderate malnutrition, according to IAP classification.

Exclusion criteria: According to IAP classification, more than 80 % (Normal) and less than 61 % (Nutritional grade III – IV) and children suffering systemic disorders, congenital anomalies, neurological disorders, endocrine disorders and anatomical defects, chronic diarrhea, primary complex etc. were excluded from the study.

Method of sample selection: 106 malnourished children of either gender between the age group of 3 to 6 years as per the clinical criteria framed for the study were selected and allocated into two groups using randomized allocation tables. The clinical data was collected by direct interaction with parents and examination of child and details were noted down in specified clinical proforma prepared for the study. The anthropometric data was noted by the researcher himself. The laboratory data - was collected by blood investigation reports. De-worming was done by oral administration on Albendazole (400 mg) once to all selected malnourished child in both the group before the administration of the drug.

Plan of study: 106 patients were allocated into two groups of 55 and 51 patients each.

Group A (trial group): 55 malnourished children were advised to take Karshyahara Yoga (18 grams) with 10 grams of ghrita and mixed with sufficient quantity of warm water to make it into a laddu and indicated orally followed by anupana of 150ml of milk with 10 grams of sugar and 5 grams of honey twice daily (morning and evening) for a period of 3 months.

Group B (control group): 51 malnourished children were advised to take the control drug - Poshaka laddu mix (ICDS) (18 grams) mixed with little warm water to make it into a laddu and was administered orally, twice daily (morning and evening) for a period of 3 months.

Diet and Restrictions: All the patients were advised to take the normal diet to which they have been accustomed, any special diet was not recommended. They were advised to avoid spicy meal as possible for them.

Follow up study: After the completion of treatment, children were followed up for one month.

Assessment Criteria: Assessment was done based on improvement in the signs and symptoms**.** Following parameters were assessed before, at interval of every month, during treatment and one month after the treatment.
Subjective parameters (detailed in Table 1)
Objective parameters: Weight, Height, Mid Arm Circumference, Head circumference, Chest circumference and Body Mass Index (BMI)

Statistical analysis: The results were documented, analyzed and interpreted using statistical analysis tools like SPSS version 20, Independent Samples t-Test and Mann-Whitney U Test (t-Test for between subjects' designs) and Paired Samples t-Test and Wilcoxon Test (t-Test for within subject's designs).

Table 1: Subjective parameters

Domain	Assessment	Grades
Appearance	Ill at ease	3
	Dull looking	2
	Playful look	1
	Healthy looking	0
Kshudha (Appetite)	Child does not take food considerably even by force	3
	Child does not ask but takes food considerably by request	2
	Child himself ask food but not take adequately	1
	Child himself asks food and take adequately	0
Nidra (Sleep)	Crood	3
	Disturbed	2
	Short but sound	1
	Long and sound	0
Bowel habit	Irregular for more than 2 days	3
	On alternate day	2
	Daily but hard stool	1
	No constipation	0
Daurbalya (General weakness)	Dull	3
	Moderately active	2
	Active	1
	Very active	0
Interest in activities	Dull	3
	Involves when forced	2
	Actively involves on motivation	1
	Very active	0

Table 2: Pair wise Comparison of anthropometrical measurements before and after treatment (within the groups)

Parameter	Group	Pair	Mean	SD	t	Sig. (2-tailed)	Remark
Weight	Study	WT_BT - WT_AT	-1.140	.3013	-26.50	.000	HS
	Control		-.7765	.2469	-22.01	.000	HS
Height	Study	HT_BT - HT_AT	-2.5714	1.1815	-15.235	.000	HS
	Control		-2.1735	.6735	-22.589	.000	HS
Head circumference	Study	HC_BT - HC_AT	-.9204	.4587	-14.046	.000	HS
	Control		-.9224	.2974	-21.712	.000	HS
Chest circumference	Study	CC_BT - CC_AT	-2.0816	.6948	-20.971	.000	HS
	Control		-1.2857	.3680	-24.457	.000	HS
Mid arm circumference	Study	MAC_BT - MAC_AT	-1.026	.1630	-44.08	.000	HS
	Control		-.6490	.2542	-17.86	.000	HS
Body mass index	Study	BMI_BT - BMI_AT	-.4890	.3724	-9.192	.000	HS
	Control		-.2967	.3860	-5.381	.000	HS

BT – before treatment; AT – after treatment; HS – highly significant; HT – height; WT – weight; HC – head circumference; CC – chest circumference; MAC – mid arm circumference; BMI – body mass index

Table 3: Pair wise Comparison of anthropometrical measurements before and after treatment (between the groups)

Parameter	Group	Mean	Mean Difference	t	Sig. (2-tailed)	Remarks
Weight	Study	1.1408	.36429	6.546	.000	HS
	Control	.7765				
Height	Study	2.5714	.39796	2.048	.043	S
	Control	2.1735				
Head circumference	Study	.9204	-.00204	-.026	.979	NS
	Control	.9224				
Chest circumference	Study	2.0816	.79592	7.086	.000	HS
	Control	1.2857				
Mid arm circumference	Study	1.0265	.37755	8.751	.000	HS
	Control	.6490				
Body mass index	Study	.4890	.19224	2.509	.01	S
	Control	.2967				

HS – highly significant; S – significant; NS – non significant

Table 4: Pair wise Comparison of subjective parameters at different intervals of treatment (within the groups)

Parameter	Group	Pair	Mean Rank	Chi square	Z	P	Remark
Daurbalya	Study	Daurbalya_AT - Daurbalya_BT	2.01	150.772	-6.219[b]	.000	HS
	Control		2.16	101.064	-5.303[b]	.000	HS
Kshudha	Study	Kshudha_AT - Kshudha_BT	1.72	160.123	-6.548[b]	.000	HS
	Control		2.19	112.950	-3.831[b]	.001	S
Nidra	Study	Nidra_AT - Nidra_BT	1.79	150.113	-6.223[b]	.000	HS
	Control		2.45	89.714	-3.196[b]	.001	S
Appearance	Study	Appearance_AT - Appearance_BT	1.97	136.554	-5.978[b]	.000	HS
	Control		2.39	98.412	-5.112[b]	.001	S
Bowel habits	Study	Bowel habit_AT - Bowel habit _BT	2.16	132.572	-5.520[b]	.000	HS
	Control		2.10	102.121	-5.771[b]	.000	HS
Interest in activities	Study	Interest in activities_AT - Interest in activities _BT	1.97	144.335	-6.397[b]	.000	HS
	Control		2.36	107.165	-5.657[b]	.000	HS

BT – before treatment; AT – after treatment; HS – highly significant; S – significant

Table 5: Pair wise Comparison of subjective parameters at different intervals of treatment (between the groups)

Parameter	Pair	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Remark
Daurbalya	Daurbalya_AT - Daurbalya_BT	160.500	1385.500	-8.018	.000	HS
Kshudha	Kshudha_AT - Kshudha_BT	160.500	1385.500	-8.018	.000	HS
Nidra	Nidra_AT - Nidra_BT	375.500	1600.500	-6.454	.000	HS
Appearance	Appearance_AT - Appearance_BT	675.000	1851.000	-4.240	.000	HS
Bowel habits	Bowel habit_AT - Bowel habit _BT	638.500	1863.500	-4.239	.000	HS
Interest in activities	Interest in activities_AT - Interest in activities _BT	1111.500	2336.500	-1.112	.266	NS

BT – before treatment; AT – after treatment; HS – highly significant; NS – non significant

OBSERVATIONS AND RESULTS

Among 106 patients, 32% (n=34) patients were of 3 years, 37% (n=39) patients were 4 years, 20% (n=21%) patients were 5 years and 11% (n=12) patients were of 6 years of age. 44% (n=47) patients were males and 56% (n=59) patients were females. 88% (n=93) patients were Hindu, 11% (n=12) patients were Muslims and 1% (n=1) patient was Christian. 2% (n=02) patient were of upper class, 9% (n=10) patients were of upper middle class, 33% (n=35) patients were of upper lower class, 50 % (n=53) patients were of lower middle class and 5.7% (n=6) patients were of lower class.[13] 60% (n=64) patients were of nuclear family, 40% (n=42) patients were of joint family type. 48% (n=51) patients were of single child, 50% (n=53) patients were two children and 2% (n=2) patient were three children per family. 74% (n=78) patients were of first child, 24% (n=25) patients were second children and 1% (n=1) patient was third and 2% (n=2) patients were of twin pregnancy. 51% (n=54) patients were belonging to urban area, 33% (n=35) patients were from semi urban area and 16% (n=17) patient were from rural area. 100% (n=106) patients had complaint of poor weight. 87% (n=92) patients were having loss of appetite and 13% (n=14) patients did not have the complaint of loss of appetite.

68% (n=72) patients had H/O previous illness and 32% (n=34) patients did not had H/O previous illness. 26% (n=28) patients had h/o Diarrhoea and 74% (n=78) patients did not had h/o Diarrhoea. 8.5% (n=09) patients had h/o Measles and 74% (n=97) patients did not had h/o Measles. 65% (n=69) patients had h/o URTI and 35% (n=37) patients did not had h/o URTI. 69% (n=73) patients had h/o fever and 31% (n=33) patients did not had h/o fever. 69% (n=73) patients had h/o worm infestation and 31% (n=33) patients did not had h/o worm infestation. 46% (n=49) patients were of normal delivery, 54% (n=57) patients were of LSCS Delivery. 85% (n=90) patients were of full term gestation 15% (n=16) patients were of preterm Delivery. 77% (n=82) patients were of Normal weight, 22% (n=23) patients were of underweight and 0.9% (n=1) patient was overweight. 81% (n=86) patients were of Exclusive breast fed children, 19% (n=20) patients were of not Exclusive breast fed. 9.4% (n=10) patients had a history of New Born complication, 91% (n=96) patients did not had h/o New Born complication. 62% (n=66) patients had a history of weaning at 6 months of age, 32% (n=34) patients did not had h/o early weaning and 6% (n=6) patients had H/o delayed weaning. 41% (n=43) patients were breast fed till one year of age, 47% (n=50) patients were breast fed till one and half year of age and 12.3% (n=13) patient were breast fed up to two years of age. 32% (n=34) patients were bottle fed and 68% (n=72) patients were not fed with bottle. 99.1% (n=105) patients were immunized and only 0.9% (n=1) patient was not immunized. 34% (n=36) patients were vegetarians and 66% (n=70) patients were of mixed diet. 73% (n=77) patients were taking de-worming regularly and 27% (n=29) patients were not taking de-worming prophylaxis.

24% (n=25) patients were having Samyak Kshudha, 76% (n=80) patients were having Alpa Kshudha and only 0.9% (n=1) patient had Ati Kshudha. 21% (n=22) patients were having Mrudhu Kostha, 38% (n=40) patients were having madhyama Kostha and 21% (n=44) patients were having krura Kostha. 67% (n=71) patients were having Manda Agni, 24% (n=25) patients were having Samaagni and 09% (n=10) patients were having Vishama agni. 57% (n=60) patients were of Madhura rasa lovers, only 3% (n=3) patients were eating more Amla rasa and 30% (n=32) patient were liking Katu rasa and 10% (n=11) patients were eating food with Sarvarasa. 47% (n=50) patients were habituated of chocolates and biscuits 19% (n=20) patients were having habit of eating junk foods and chips along with chocolates and biscuits and 26% (n=28) patients were eating lots of ice-cream and drinking cold drinks 6% (n=6) patients were habituated of coffee / tea and only 2% (n=2) patients were having a habit of eating fruits. 21% (n=22) patients were of habit of mud eating and 79% (n=84) patients were not having habit of mud eating.

Pair wise Comparison of anthropometrical measurements before and after treatment (within the groups) is detailed in table 2. Pair wise Comparison of anthropometrical measurements before and after treatment (between the groups) is detailed in table 3. Pair wise Comparison of subjective parameters at different intervals of treatment (within the groups) is detailed in table 4. Pair wise Comparison of subjective parameters at different intervals of treatment (between the groups) is detailed in table 5.

DISCUSSION

The childhood (preschool) period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of school age and adolescences.[14] Malnutrition during this period interfere with school performance; harm body functions, physical growth and working capacity.[15] These may be due to lack of proper knowledge regarding health and nutritional status, lack of proper care, lack of knowledge about nutritious values of food and poor personal hygiene.[16]

For the prevention of nutritional disorders, the identification of such cases is very important.[17] More emphasis is required on early detection of children with nutritional deprivation.[18] The major limiting factor in the diet of preschool children (3-6 years) is energy and the lack of protein is more often due to low food intake.[19] Mild to moderate malnutrition and those cases of uncomplicated undernutrition, who have fairly good appetite , normal body temperature and who are conscious and active and without evidence of serious infection, can be best managed with adequate diet and supplementary energy dense feeds.[20] The main goal of the treatment is to provide adequate calories to build up nutrition and to replace the losses.[21] The common feeds advocated are double or triple mixtures of cereals and pulses, sugar, jiggery, milk and milk products. Emphasis must be laid on adding enough oil or ghee to the diet to increase calories and palatability. Besides correcting the deficiency of one or more nutrients by various supplements, it is highly desirable to give the safe and non-hormonal anabolic drug (Brumhana drugs) which is energy dense and fasten the catch-up growth.[22]

Preschool children are fussy eaters, so the drug palatability counts a lot.[23] Karshyahara yoga is the Churna of Vidarikanda (*Pueraria tuberose* (Willd.) DC.),[24] Yava (*Hordeum vulgare* Linn.)[25] and Godhuma which is to be consumed with ghee followed by Anupana of milk with Sita, Madhu and Ghrita. The standard control drug Poshaka ladu mishrana is a supplementary food preparation which is recommended by ICDS for preschool children in the form of laddu. To have a similarity in both groups and for easy palatability the study drug form was modified into a laddu from. The dose was fixed considering drug dosage in children as well as standard control drug dosage.

The drug Karshyahara Yoga[12] has base of three ingredients viz. Vidarikanda, Godhuma,[26] and Yava. Yava is having both Madhura and Kashaya rasa while Vidarikanda and Godhuma with Madhura rasa only. Vidarikanda and Godhuma possesses snigdha property, Yava is having Ruksha property. Guru property and Sheeta Virya is exhibited by all the three drugs. Vidarikanda and Godhuma[27] is Madhura Vipaka and Yava[28] is Katu in nature. Ksheera, Gruta, Madhu and Sharkara are the

Anupana mentioned. Karshyahara Yoga possesses Agni Deepana and Brumhana action. All the components of Karshyahara yoga are of Jivaniya, Balya, Santarpana, Rasayana and Sthairyakarana property. Vidarikanda and Godhuma are Vatapittahara, whereas Yava is Pittakaphahara in Doshaghnata.[29]

Karshyahara yoga, the study drug contains drugs like Vidarikanda, Yava and godhuma which are very rich sources of carbohydrates and proteins which helps in overall growth and repair of the body.[30] Sitopala provides instant energy. Ghee milk, honey provides energy, protein and vitamins, thus increases immunity in children.[31] The drugs like Ela (*Elettaria cardamomum* Maton.)[32] and Pippali (*Piper longum* L.)[33] increase the palatability, as they give good taste and improve digestion thus increasing the appetite. Pippali is proved drug for increasing the bioavailability thus helps in absorption of vitamins and mineral.[34] Hence, Karshyahara yoga was selected to enhance the weight gain and physical strength of children. Significant improvement was observed in both the group but more improvement was seen in study group. The standard control drug is also a mix of pulses and grains with sugar but the added effect which was observed in the study group may be because of the drugs like Vidarikanda, Pippali, Ela, honey and ghee. In subjective parameters like Nidra, Krodha and interest in activities, significant improvement was seen due to the Rasayana and Santarpana properties of the drugs. By the Vatanuloma and Agni Deepaka property, significant improvement in the Kshudha and Vibhandha was seen. Vidarikanda, Godhuma and Yava, all have fibrous content in them which is also essential to relieve constipation. In the blood parameters, only in haemoglobin percentage there was significant improvement. In other blood parameters like total count, ESR and serum protein level, there was no noticeable improvement observed. Thus, the study drug must have helped in increasing the weight in malnourished children.

CONCLUSIONS

By the administration of Karshyahara yoga, all the anthropometrical parameters improved. Significant improvement was also observed in appearance, appetite, sleep, bowel habit, general weakness and interest in activities. The evidences obtained from the present study suggest that Karshyahara yoga can be used effectively for increasing the weight and in improving the general health in malnourished children. Hence further research studies with comparison to normal growth patterns in underweight children as well as normal children involving larger samples can be carried out.

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