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Research Article

EFFECT OF KUSHMANDAVALEHA IN MALNUTRITION OF PRESCHOOL CHILDREN

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Abstract

Malnutrition is more prevalent in preschool children belonging to low socioeconomic population. Unfortunately, over 50% of under – fives in our country are malnourished. The study was aimed to assess the effect of Kushmandavalehain mild to moderate malnutrition in preschool children of coastal areas Poonthura and Valiyathura of Thiruvananthapuram district. A randomized controlled trial conducted to study the effect of *Kushmandavaleha* in mild to moderate malnutrition in preschool children. At first a camp was conducted to study the prevalence of mild to moderate malnutrition in preschool children residing in Valiyathura and Poonthura and for recruiting the malnourished children to the clinical trial. The children screened and diagnosed as cases of mild to moderate malnutrition were recruited for trial. They were divided randomly into two groups' study and control groups. Both the groups were given *Ashtachurnam* in the dose of 5 g / day for 3 days. The study group was given *Kushmandavaleha* in the dose of 10 g / day for a period of 45 days while the control group was given health mix in the dose of 30 g / day mixed with hot water for a period of 45 days. Prevalence of mild to moderate malnutrition in Valiyathura and Poonthura was found to be 19.84%. Statistically significant results ($p<0.05$) was observed in anthropometric measurements – weight and quetlet index in trial group. The trial control and control drug was equally effective in alleviating clinical symptoms. There were no significant changes observed in hematological and biochemical parameters.

Keywords: Malnutrition; *Kushmandavaleha*; Anthropometric measurements; Health mix.

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INTRODUCTION

Owing to the immature biological systems pre-school children form the most vulnerable segment of any community. Under nutrition among them is one of the greatest public health problems in developing countries and is associated with child mortality rate. According to National Family Health Survey the percentages of children who are underweight were 47% in NFHS-2, 43% in NFHS-3, and 36% in NHFS - 4. Early childhood malnutrition leads to physical and mental impairment, and also early death.[1] If alive, in later period of life suffer from cognitive and behavioral problems[2] and due to reduced immunity suffer from more infections.[3]

Ignorance about proper health maintenance, improper intake of food in terms of quality as well as quantity fosters malnutrition and leads to diminution of tissue elements as well. By emphasizing more on the gravity of proper nutritious food, and on the eating habits, Ayurveda advises the significance of nutritious food in leading a healthy life. A child who receives inadequate nutrition during intra uterine life and born underweight, if not given proper care subsequently often suffers from serious nutritional disorders in his childhood. The children receiving poor qualitative and quantitative food are susceptible to impaired digestive capacity, poor nutritional status and diminished tissue elements manifesting as poor weight gain and impaired growth which is termed as karshyam[4]/sosam[5] (underweight) in Ayurveda. The Ayurvedic approach in management of sosam (underweight) is unique as it aims not only to cater essential nutrients but also augments the digestive power, assimilation and absorption.

Ayurveda recommends many herbal formulations that can improve the nutritional status of children. Attempt has been made to conduct a randomized controlled trial to study the effect of Kushmandavaleha in malnutrition in preschool children. Apart from nutritional value the formulation possesses curative effects and improves the immunity. The drug selected for the study Kushmandavaleha[6]having multitude of properties can improve the digestive capacity and nourish the tissue elements thereby promoting growth and weight of the child.

AIMS AND OBJECTIVES

The major aim of the study was to find out whether Kushmandavaleha is effective in correcting mild to moderate malnutrition in preschool children. The other objectives were to assess the rate of growth and nutritional status by means of anthropometric measurements, to assess the nutritional status by hematological and biochemical parameters and to assess improvement in clinical parameters.

MATERIALS AND METHODS

Research design and method

It is a therapeutic randomized controlled trial. To fix the sample size prevalence of mild to moderate malnutrition in the coastal areas - Poonthura and Valiyathura have to be known. Hence a screening camp was arranged to survey the prevalence of malnutrition in preschool aged children of the coastal areas of Valiyathura and Poonthura.

Source population

Source population was 2-5 years old preschool children selected from the rural areas Valiyathura and Poonthura of Thiruvananthapuram district, Kerala, India. The subjects were randomly divided into two groups, study and control group respectively.

Research setting

The study was conducted at Cheru Reshmi Center (Nursery) in Valiyathura and

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Poonthura. These rural areas were selected for study since malnutrition is more prevalent in low socio-economic population.

Inclusion criteria

Children in the age group of 2 - 5 years and who are suffering from mild to moderate malnutrition associated with minor discomforts like reduced appetite, weakness, poor concentration and memory power, lethargy etc. were recruited in to the study. Mild to moderate malnutrition was diagnosed by comparing the weight with expected weight for age given in incremental growth chart/velocity growth chart. Children with weight 71-80 percent of expected for age was considered as case of mild malnutrition and those with weight 61-70 percent of expected for age was considered as case of moderate malnutrition.

Exclusion criteria

Well-nourished children, severely malnourished children and children with congenital anomalies and/or suffering from malnutrition associated with chronic illnesses were excluded from the study.

Drugs

Kushmandavaleha and Ashtachurnam

Kushmandaavaleha described in Ashtanga Hridaya[6] was selected as study drug. The same formulation with similar composition was described by Sarangadhara[7] also. Ashtachurna mentioned in Sahasra yoga was utilized to improve the digestive capacity.

Health-mix

Wheat, Bengal gram and ground nut were roasted separately and ground into coarse powder and then mixed together along with powdered jaggery. This health mix was formulated by National Institute of Nutrition, Hyderabad for supplementary feeding program to the malnourished children. Nutritive value of in gradients of health mix.[8] (Table 1)

Treatment Schedule

A camp was conducted to study the prevalence of mild to moderate malnutrition in preschool children residing in Valiyathura and Poonthura and for recruiting the malnourished children to the clinical trial. Children in age group of 2 – 5 years from three nurseries were screened for growth failure and nutritional status using the Proforma and diagnosed cases were recruited for study. They were divided randomly into two groups' study and control groups. An informed consent was obtained before recruiting into the trial.

Both the groups were given Ashtachurnam which has carminative and digestive effect and also anthelmintic property, in the dose of 5 g / day for 3 days. The study group was given Kushmandavaleha in the dose of 10 g / day for a period of 45 days while the children selected to the control group was given health mix in the dose of 30 g / day mixed with hot water for a period of 45 days. The study was conducted for a period of 18 months.

Assessment Criteria

Both the groups were assessed before, during and after the study.

a) Assessment of clinical parameters[9][10] was done. Clinical parameters include the symptoms of Sosa based on diminution of tissue elements – agnimandhyam (poor digestive capacity), roukshyam (dryness), srama (weakness), sosa (wasting) etc.
b) The nutritional status was assessed using anthropometric measurements
c) Nutritional status was also assessed by using hematological and biochemical parameters which include level of hemoglobin and serum protein, serum

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albumin, serum globulin, albumin/globulin ratio respectively. Malnutrition is always associated with anemia and so hemoglobin level has been included.

OBSERVATIONS AND RESULTS

At first, a screening camp was conducted to survey the prevalence of mild to moderate malnutrition in Poonthura and Valiyathura. Of the 149 children who attended the screening camp, 131 belong to the age group of preschool children. 26 subjects out of 131were diagnosed to be malnourished accounting prevalence of mild to moderate malnutrition to be 19.84% in preschool children of the coastal areas of Valiyathura and Poonthura.

Distribution of cases according to the signs and symptoms are given in the Table 2.

4% of children belong to the age group of 2 years and 2.5 years each.33% of the age group 3 years, 25% of 3.5 years, 17% of 4 years, 4% of 4.5 years and 13% of 5 years.

In study group as well as Control group 33% of children were born with weight less than 2.5 Kg. 33% of children in study group, and 6% of children in control group were weaned before the age of 6 months. 25 % in Study group and 8% in control group were subjected to delay weaning. 17% of children in study group and 8% in control group received no breast milk at all. 17% in Study group and 33% of children in control group received breast milk for less than a year. 25% in Study group and 17% of children in control group received breast milk for a year. 42% in Study Group as well as Control Group received breast milk for more than a year.

25% of children in Study Group and 8% of Children in control group received inadequate quantity of food. 75% in Study and 92% in Control group received inadequate quantity of poor quality food.

Increase in family size results in decrease in per capita food and nutrition availability and this slows down the quality of nutrition and improvement of health standards. The family with 2 Adults and 2 children is considered a small family. 25% of Children in Study Group and 17% of Children in Control group belong to a small family, and 75% of Children in Study Group and 83% in Control group belong to a large family.

History of past illness reveals that 42% in Study group and 17% in Control group suffered from Worm infestations, 25% in Study group and 17% in Control group suffered from Measles, 25% in Study group and 50% in Control group suffered from Recurrent Respiratory Tract infections, 8% in Study group and 17% in Control group suffered from disorders due to vitiation of breast milk. 17% in study group suffered intra-uterine growth retardation.

In study group, 83% belonged to grade I malnutrition before treatment. It was reduced to 17% after treatment period and 8% after the 2 months period of follow up. There were 17% of grade II malnutrition before treatment, changed to 8% after treatment and there were no grade II cases during follow up.75% 0f children attained normal weight after treatment and 92% reached normal weight for age during follow up.

In control group, 75% of grade I malnutrition before treatment changed to 33% after treatment period and 42% after the 2 months period of follow up. There were 25% of grade II malnutrition before treatment, changed to nil after treatment and were 8% grade II cases during follow up.67% attained normal weight after treatment and decreased to 50% during follow up.

Comparison of change in Weight between subsequent follow up within group are shown in Table 3.

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There was no significant difference when the comparison was made between the study group and control group after treatment period (Table 4).

This showed that both the drugs less potent to make changes within a short period. After first and second follow up weight gain in study group was more significant as shown by p = 0.003 and 0.004, lower mean rank and lower sum of ranks of study group indicating that the trial drug was more effective than the control drug**.** Comparisons of change in Height between two groups are shown in Table 5.

Biochemical parameters

Since few patients were reluctant for investigation, comparison was made on available data. Comparison of changes in biochemical and hematological parameters – serum protein, serum albumin, serum globulin, A/G ratio and hemoglobin between before and after treatment within study group and within control group reported that there were no significant changes as p value was greater than 0.05.

Clinical parameters

Clinical parameters – poor digestive capacity, pallor, emaciation, weakness, dryness were predominantly seen in patients and hence only these five symptoms were included for analysis. Statistical evaluation of comparison of changes in clinical parameters – poor digestive capacity, pallor, emaciation, weakness, between before and after intervention within same group revealed significant changes implying both the drugs were equally effective.

However in study group, the digestive capacity of all the subjects was poor before intervention and was totally relieved after treatment whereas in control group poor digestive capacity was present in 100% before treatment and changed to 25% after treatment. Likewise, before treatment pallor was present in 58% in control group and 67% in study group and changed to 8% in control group and totally alleviated in study group.

DISCUSSION

Demographic data revealed Male preponderance was seen in contrary to high prevalence of malnutrition in female since the nurseries constitute only less female children. Statistical analysis of baseline data – age, sex, religion revealed p>0.05, therefore both the groups were equally distributed and were comparable.

Data show that greater part of children received less nutritious diet during intra uterine life and post natal life. All the subjects were receiving less nutritious food and their diet pattern was lack of vegetables, roots and tubers, fruits, egg and meat as evident by dietary history. Apart from less nutritious diet their past illnesses also affect their health.

In study group 75% of children attained normal weight after treatment and 92% reached normal weight for age during follow up whereas in control group 67% attained normal weight after treatment and decreased to 50% during follow up. This can be attributed to the effect of Kushmandavaleha. Kushmandavaleha[11] owing to its agnivardhana (augment digestive power) property it increases the secretion of digestive enzymes and so improves the digestive, assimilative and absorptive capacity.

Also due to nutritive value the drug nourishes the rasa dhatu (circulatory fluid) and owing to its rasayana (nourishes the tissues) property, it enriches all seven tissue elements which produced sustained improvement. While the control drug possess only nutritive value and hence produced improvement during the period of administration alone and caused deterioration once its administration was stopped.

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Table 1: Nutritive value of in gradients of health mix

Ingredients	Moisture g/100g	Protein g/100g	Fat g/100g	Fibre g/100g	Carbohydrate g/100g	Energy k.cal
Wheat	12.8	11.8	1.5	1.2	71.2	346
Bengal gram	10.7	22.5	5.2	1.0	58.1	369
Ground nut	1.7	26.2	39.8	3.1	26.7	570
Jaggery	3.9	0.4	0.1	-	95	383

Table: 2. Distribution of cases according to the signs and symptoms

Signs and symptoms	No. of cases	Percentage
Growth failure	26	100
Reduced appetite	22	84.61
Weakness	17	65.38
Inactivity	11	42.3
Wt.for age	26	100
Ht.for age	26	100
MUAC	11	42.3
CC/HC	12	46.15
QI	23	88.46

Table 3: Comparison of change in Weight between subsequent follow up within group

Weight	Group	N	Mean rank	Sum of ranks	Wilcoxon signed Rank test Z value	P value	Significance
B.T. vs. A.T	Control Study	12	6.5	78	3.133	0.002	S
		12	6	66	3.02	0.002	S
B.T vs. FU1	Control Study	12	5.5	55	2.844	0.004	S
		12	6.5	78	3.114	0.003	S
B.T. vs. FU 2	Control Study	12	4.5	36	2.588	0.01	S
		12	6.5	78	3.086	0.003	S

Table: 4. Comparison of Weight gain between study and control group

Weight	Group	N	Mean rank	Sum of ranks	Mann-Whitney U	P value	Significance
B.T. vs. A.T	Control Study	12	12.38	148.5	70.5	0.923	N.S
		12	12.63	151.5			
B.T vs. FU1	Control Study	12	16.71	200.5	21.5	0.003	S
		12	8.29	99.5			
B.T. vs. FU 2	Control Study	12	16.54	198.5	23.5	0.004	S
		12	8.46	101.5			

Table: 5.Comparison of change in Height between two groups

Height	Group	N	Mean rank	Sum of ranks	Mann-Whitney U	P value	Significance
B.T. vs. A.T	Control Study	12	12.04	144.5	66.5	0.580	N.S
		12	12.96	155.5			
B.T vs. FU1	Control Study	12	13.71	164.5	57.5	0.366	N.S
		12	11.29	135.5			
B.T. vs. FU 2	Control Study	12	13.58	163.0	59	0.420	N.S
		12	11.42	137.0			

[B.T. – Before treatment; A.T. – After treatment; N – Number; S – Significant; N.S. – Non significant]

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Comparison of nutritional status based on anthropometric measurements within group revealed that weight was gained in both the groups after treatment period but the effect produced by study drug was less when compared to control drug. Nevertheless the trial drug produced good improvement in the follow up period when compared to control drug. This may be due to slow action of drug in initial phase but overpowered the control drug later. This was also proved by comparison of weight gain between study and control group which revealed that trial drug produced good response during follow up.

Statistical analysis of hematological and biochemical parameters revealed no significant changes as the sample size was less and the study period was short.

Few symptoms of rasa dhatukshaya (diminution of circulatory fluid) were presented by patients and were analyzed. Evaluation of clinical parameters showed significant changes between subsequent follow ups within group whereas between groups comparison revealed the changes were statistically insignificant. Both Kushmandavaleha and Health-mix were found to be effecting in alleviating the clinical symptoms.

CONCLUSION

Prevalence of mild to moderate malnutrition in Valiyathura and Poonthura was found to be 19.84%. Kushmandavaleha was found to be effective in reducing mild to moderate malnutrition. It improved the nutritional status that reflected by anthropometric measurements. The effect of the treatment was stable. The study did not provide significant changes in hematological and biochemical parameters. Kushmandavaleha and Health mix were equally effective in improving clinical conditions.

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