Original Research Article

Efficacy of Davanegere Mix on Nutritional Status of Preschool Children with Malnutrition - A Pilot Study

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ABSTRACT

Background: Nutrition is essential for human development and the focal point of health and well-being. It is accepted that the lack of proper nutrition leads to irreversible effects, endangering survival and development of the child.

Aim: To assess effectiveness of Davanagere Mix on Nutritional Status of Pre School children with malnutrition.

Materials and Methods: The study conducted using Randomized block design. 19 children (10 in Experimental Group and 9 in Control group) aged between 3 to 6 years attending Anganwadis of Aihole Village of Bagalkot District with mild or moderate malnutrition were selected by complete enumeration method as per the inclusion criteria. WHO Anthro software was used to screen the children for enrolment. The data regarding socio demographic factors was collected using structured interview schedule. Anthropometric measurements were done using standard techniques. Davanagere mix was administered for experimental group children for one month i.e weekly four days (Monday, Tuesday, Wednesday, Thursday). Whereas the parents of control group children were given with health education on nutritional supplementation to improve the children's nutritional status

Results: Findings shows that, there was a significant difference in post test scores of weight (t=2.491, P< 0.05) and mid upper arm circumference (t=3.947, P< 0.01) between experimental and control group subjects. Hence, Davanagere Mix was effective in improving the nutritional status of children with malnutrition in terms of gain in their weight and mid upper arm circumference. No significant difference was found between post test scores of height (t=0.540, P> 0.05) between experimental and control group subjects.

Conclusion: Use of foods rich in protein is highly essential strategy to bridge the gap between growth of children and their nutrition. Supplementary feeding of infants and young children with good quality protein as ground nuts and Bengal grams nut flour is a cheap food protein, hence one of the best provisions is to treat malnutrition with Davanagere mixture.

Keywords: Davanegere Mix, Nutritional Status, Preschool Children, Malnutrition

INTRODUCTION

Malnutrition is one of the most serious nutritional problems affecting several thousand young children in India. The problem of malnutrition takes on a much larger scale and significance in rural India. NFHS-4 data show that the proportion of underweight children was higher in rural areas (38.3 percent) compared to urban areas (29.1 percent). One way to reduce the global threat of malnutrition is to fortify plant-based foods. Consuming protein-rich foods is a highly critical strategy to bridge the gap between children's growth and nutrition. As a legume, ground nut is an important global crop that provides oil and

protein to users. It is the richest source of protein among plant foods. Demonstration and use of the Davanegere mixture has been practiced in many homes for a long time.

The reports from UNDP related to achievement of millennium development goals suggests that the achievement of first goal to halve the proportion of people suffering with hunger is very slow in progress and not been achieved by 2018. The 4th MDG to reduce the under five children mortality is also moderate in progress and not achieved by 2015. These data propose adaptation of more grass route level measures and involvement of professionals of all health care sectors, especially nurses who are consistently in touch with needy either in community as community health officers or in hospitals as nursing officers.

The World Bank report described malnutrition as India's silent emergency and stated that the rate of malnutrition cases among children in India is almost five times more than in China, and twice than in Sub-Saharan Africa. According to UNICEF, wasting, or low weight for height, is a strong predictor of mortality among children under five years of age. Wasting occurs due to constant food deprivation or illness. UNICEF on developing countries reports that millions of children in the developing world suffer from a range of health problems with a common root cause: under-nutrition. Many children who live in poverty don't get enough food or the right kind of food to support normal growth and development. Millions also frequently suffer from illnesses such as diarrhoea that sap the nutrients they consume. Nutrition-related factors account for about 35 percent of the deaths of children under age 5.

One way to curb the global menace of Malnutrition is through fortification of food from plant origin. Food fortification is broadly aimed to allow all people to obtain from their diet all the energy, macro- and micronutrients they need to enjoy a healthy and productive life. Legumes are one of the world's most important sources of food supply especially in the developing countries in terms of protein, energy as well as other nutrients. As a nut, ground nut max is an important global crop that provides oil and protein for users. Bengal gram is also a rich source of protein and Ragi is millet rich in Iron and Calcium and Jaggery is a rich source of Iron and Carbohydrates. Hence with all these ingredients Davanegere Mix will be an effective dietary supplement for children with mal nutrition.

MATERIAL AND METHODS
Study Design and Participants
Present study was a true experimental study with randomized block design conducted 15th September 2021 to 15th October 2021 at Aihole Village, Bagalkot among pre-school children aged between 3 to 6 years of age who are attending the Anganwadis of Aihole Village. Researcher visited anganwadi and screened the weight for age of all the 63 children studying in anganwadi and available at the time of data collection. 19 children were found with moderate malnutrition, with WAZ between -2 to > -3. The estimated sample size for the main study, considering the attritions was 138 (69 +69). So the pilot study required about 14 subjects considering 10% of the sample size of main study. The researcher enrolled all the 19 children available expecting better outcomes.

Instruments
1. Structured interview schedule was used to elicit information for socio demographic and other variables from mothers of preschool children.
2. WHO Anthro software was used for screening the preschool children for malnutrition.
3. Weight was checked with weighing machine with child standing bare foot and undressed or with minimum clothing on it, Height, upper mid arm circumference was measured using measuring tape.
4. Screening Tool: STRONG kids: Nutritional risk screening tool for

children: This tool has been used in the study to screen the children with mild to moderate malnutrition for the presence of any such disorder which increases the risk of malnutrition and to assess the present nutritional status of children so that children with high nutritional risk can be identified and excluded from the study.

Data Collection Procedures

Prior permissions were taken from relevant institutions before the beginning of data collection procedure. Researcher visited anganwadi and screened the weight for age of all the 63 children studying in anganwadi and available at the time of data collection. 19 children were found with moderate malnutrition, with WAZ between -2 to > -3. The researcher appointed a second level investigator residing in the same area. The researcher, second level investigator and the anganwadi helper visited the houses of all the 19 children found with WAZ scores between -2 to -3. The study was explained to all the parents and informed consent was taken from either available parent.

The researcher screened all the 19 selected children for presence normal vital signs and chronic medical illnesses. When it was confirmed that the children had normal vital signs and do not have any medical illnesses all the children were enrolled in the study. The base line data of all the enrolled children was collected and the data regarding Age and gender was given to statistician for random allocation of the subjects to experimental group ad control group. 10 Children were enrolled in experimental group and 9 children in control group.

The Anthropometric data was collected again on 15-09-2021 and intervention (Davanagere Mix) was begun to experimental group and control group was given just health education. The Davanagere Mix was given 4 times a week, upto 15-10-2021. One child from experimental group discontinued the study. The post test was conducted for 18 children on 15-10-2021.

Data Analysis

SPSS Statistics (Version 25) was used for data analysis. Descriptive statistics were calculated for all study variables. Appropriate inferential statistical methods were employed which included, t test and chi square test.

RESULTS

Pre intervention comparison of Socio-demographic characteristics of subjects

Table No: 1 Pre intervention comparison of Socio-demographic characteristics of subjects n=9+9

Sl.	Variables	Experimental Group		Control Group		T Value	P Value
		Mean	S. D	Mean	S. D		
	Age in years	3.0111	0.56446	2.8578	0.6013	0.558	0.585
	Family Monthly Income	9611.1	3407.508	9000	1936.5	0.468	0.646
	Age of Weaning	5.00	1.118	4.89	1.054	0.217	0.831
	Duration of exclusive breast feeding	4.78	0.833	5.11	0.782	-0.875	0.394
	Age up to which breast feeding given	2.11	0.601	2.22	0.667	-0.371	0.715

Table 1 shows that, there is no significant difference between the experimental and control group preschool children with respect to age, family monthly income and age of weaning and duration of exclusive breast feeding and age up to which breast feeding was given.

Table No: 2 Pre intervention comparisons of Socio-demographic characteristics of subjects n=9+9

Sl.	Variables		Experimental Group		Control Group		Fisher's Exact/ χ^2 Value	P Value
			Freq	%	Freq	%		
	Gender	Male	4	44.4	5	55.6	1.000	
		Female	5	55.6	4	44.4		
	Religion	Hindu	9	100	8	88.9	1.000	
		Christian	0	00	1	11.1		

		Table 2 To Be Continued…					
	Fathers Education	Illiterate	1	11.11	1	11.11	1.000
		Primary Education	4	4.44	4	4.44	
		Secondary/ Higher Secondary	3	33.33	3	33.33	
		Graduate	1	11.1	1	11.1	
	Mothers Education	Illiterate	5	55.6	2	22.22	0.157
		Primary Education	4	44.4	4	44.44	
		Secondary/ Higher Secondary	0	00	3	33.33	
	Father Occupation	Self Employed	0	00	3	3.33	0.072
		Government employee	2	22.22	1	11.11	
		Private employee	0	00	3	33.33	
		Agriculture	4	44.44	1	11.11	
		Coolie	3	33.33	1	11.11	
	Mother Occupation	Home Maker	5	55.55	2	22.22	0.145
		Agriculture	4	44.44	3	33.33	
		Coolie	0	00.00	4	44.44	
	Type of family	Nuclear	5	55.55	6	66.66	1.000
		Joint	4	44.44	3	33.33	
	Diet Pattern	Vegetarian	7	77.77	7	77.77	1.000
		Mixed	2	22.22	2	22.22	
	Birth Weight	Normal	7	77.77	7	77.77	1.000
		Under Weight	2	22.22	2	22.22	
	Congenital Anomaly	Yes	0	00	0	00	1.000
		No	9	100	9	100	
	Place of Birth	Home	4	44.44	3	33.33	1.000
		Hospital	5	55.55	6	66.66	
	No. Of Family members	Less than 5 members	2	22.22	6	66.66	0.153
		More than 5 members	7	77.77	3	33.33	
	No. Of siblings	Less than 2	4	44.44	5	55.55	1.000
		More than 2	5	55.55	4	44.44	

Table 2 shows that, there is no significant difference between the experimental and control group preschool children with respect to gender, religion, fathers' education, mothers education, fathers occupation, mothers occupation, type of family, dietary pattern, birth weight, presence of any congenital anomaly, lace of birth, no. of family members and no. of siblings.

Table no: 3 Pre-intervention Comparison of Nutritional Status (Weight, Height and Mid Upper Arm Circumference) between Experimental and Control group subjects. n=9+9

Sl.	Variables	Mean	S. D	T value	P Value
1	Weight				
	Experimental group	10.4222	0.68333	0.565	0.580
	Control group	10.2444	0.65021		
2	Height				
	Experimental group	87.0000	4.03113	0.249	0.807
	Control group	86.5556	3.53946		
3	Mid Upper Arm Circumference				
	Experimental group	13.2333	0.31623	1.971	0.066
	Control group	12.8444	0.50028		

Baseline equivalence
Table 1, 2 and 3 depicts that randomization resulted in a balanced distribution of subjects across both Experimental and Control groups. At pre-measurement, there were no statistically significant differences in any of the measures between the two groups. This indicated that Experimental and Control groups were similar with respect to their variables before treatment. Therefore, they are comparable.

Efficacy of Davanagere Mix on Nutritional Status (Weight, Height and Mid Upper Arm Circumference) of Preschool Children with Malnutrition.

Table no: 4 Comparison of mean post-test scores of Experimental and Control group subjects for Weight, Height and Mid Upper Arm Circumference. n=10+10

Sl.	Variables	M	S. D	T Value	P Value
1	Weight				
	Experimental group	11.0778	0.76775	2.491	0.024*
	Control group	10.2444	0.64636		
2	Height				
	Experimental group	87.7778	4.20648	0.540	0.597
	Control group	86.7778	3.63242		
3	Mid Upper Arm Circumference				
	Experimental group	13.3556	0.32830	3.947	0.001**
	Control group	12.6556	0.41866		

* P < 0.05,**P<0.01

The above table depicts that, there was a significant difference in post test scores of weight and mid upper arm circumference between experimental and control group subjects. Hence, Davanagere Mix was effective in improving the nutritional status of children with malnutrition in terms of gain in their weight and mid upper arm circumference. No significant difference was found between post test scores of height between experimental and control group subjects.

DISCUSSION

This a true experimental study with randomized block design included a sample of 19 children (10 in Experimental Group and 9 in Control group) aged between 3 to 6 years attending Anganwadis of Aihole Village of Bagalkot District with mild or moderate malnutrition to assess effectiveness of Davanagere Mix on Nutritional Status of Pre School children with malnutrition. Findings revealed that, there was a significant difference in post test scores of weight (t=2.491, P< 0.05) and mid upper arm circumference (t=3.947, P< 0.01) between experimental and control group subjects. Hence, Davanagere Mix was effective in improving the nutritional status of children with malnutrition in terms of gain in their weight and mid upper arm circumference.

Similar findings were found in a randomized, controlled trial conducted to evaluate the effectiveness of a locally made ready-to-use therapeutic food (RUTF) in decreasing mild to moderate malnutrition in Christian Medical College, Vellore TN. 18 - 60 months with Weight-for-Age 2 SD were selected by convenient sampling. The intervention was a locally produced energy-dense supplement (RUTF), and the current standard of care [teaching caregivers how to make a fortified cereal-milk supplement called High Calorie Cereal Milk (HCCM)]. The data was collected with reference to increase in weight-for-age status; increase in levels of plasma zinc, vitamin B12, serum albumin and haemoglobin. Results showed that the Mean (SD) weight gain at 3 months was higher in the RUTF group: RUTF (n=51): 0.54 kg; (SE = 0.05; 95% CI = 0.44 - 0.65) vs HCCM (n=45): 0.38 kg;(SE = 0.06; 95% CI = 0.25 - 0.51), P = 0.047. The weight gain per kilogram of body weight was directly proportional to the severity of malnutrition. The study concluded that Community-based treatment showed weight gain in both groups, the gain being higher with RUTF. [8]

In the present study, no significant difference was found between post test scores of height (t=0.540, P> 0.05) between experimental and control group subjects. Contradictory findings were found in a systematic review and meta-analysis conducted to summarize the evidence of ONS intervention effects on growth for 9-month- to 12-year-old children who were undernourished or at nutritional risk. Eleven randomized controlled trials met the inclusion criteria; trials compared changes in anthropometric measures in children using ONS or ONS + DC (dietary counselling) to measures for those following usual diet or placebo or DC alone. The RCTs included 2287 children without chronic diseases (mean age 5.87 years [SD, 1.35]; 56% boys). At follow-up time points

up to 6 months, results showed that children in the ONS intervention group had greater gains in weight (0.423 kg, [95% confidence interval 0.234, 0.613], $p < 0.001$) and height (0.417 cm [0.059, 0.776], $p = 0.022$) versus control; greater gains in weight (0.089 kg [0.049, 0.130], $p < 0.001$) were evident as early as 7–10 days. Longitudinal analyses with repeated measures at 30, 60, and 90 days showed greater gains in weight parameters from 30 days onwards ($p < 0.001$), a trend towards greater height gains at 90 days ($p = 0.056$), and significantly greater gains in height-for-age percentiles and Z-scores at 30 and 90 days, respectively ($p < 0.05$). Similar results were found in subgroup analyses of studies comparing ONS + DC to DC alone.[9]

Since it was a pilot study, the intervention was administered for only monthly and even the post intervention assessment was done for only once immediately after the one month administration of Davanegere Mix, probability of improvement in height of the preschool children in very less. Hence, the researcher has decided to address this issue in the main study, where the intervention will be administered for three months and follow up assessments will be done for three months as well.

CONCLUSIONS

The pilot study has concluded that, Davanagere Mix was effective compared to simple health education, in improving the nutritional status of children with malnutrition in terms of gain in their weight and mid upper arm circumference.

On completion of pilot study, observations made were; it was feasible to undertake the main study. However, follow up of subjects for the post-test, particularly in control group was found difficult. And to come to a conclusion about the effect of Davanagere Mix on height of malnourished children, intervention must be given for a minimum of three months and follow up assessment should be done for minimum of 3 months after the completion of intervention.

REFERENCES

1. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, De Onis M, Ezzati M, Grantham-McGregor S, Katz J, Martorell R, Uauy R. Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet. 2018; 382(9890): 427–451.
2. UNICEF-WHO-The World Bank Group. Joint child malnutrition estimates. 2018.
3. UNICEF, WHO, and World Bank. Joint child malnutrition estimates. 2019.
4. Black RE, Allen LH, Bhutta ZA, Caulfield LE, De Onis M, Ezzati M, Mathers C, Rivera J, Maternal and Child Undernutrition Study Group Maternal and child undernutrition: global and regional exposures and health consequences. Lancet. 2018;371(9608):243–260.
5. Ghimire U, Aryal BK, Gupta AK, Sapkota S. Severe acute malnutrition and its associated factors among children under-five years: a facility-based cross-sectional study. BMC Pediatr. 2020;20:1–9.
6. Jones KD, Hünten-Kirsch B, Laving AM, Munyi CW, Ngari M, Mikusa J, Mulongo MM, Odera D, Nassir HS, Timbwa M, Owino M. Mesalazine in the initial management of severely acutely malnourished children with environmental enteric dysfunction: a pilot randomized controlled trial. BMC Med. 2021;12(1):1–4.
7. Fuchs C, Sultana T, Ahmed T, Iqbal HM. Factors associated with acute malnutrition among children admitted to a diarrhoea treatment facility in Bangladesh. Int J Pediatr. 2021; 2014:267806.
8. Singh AS, Kang G, Ramachandran A, Sarkar R, Peter P, Bose A. Locally made ready to use therapeutic food for treatment of malnutrition a randomized controlled

trial. Indian Pediatr. 2018 Aug;47(8):679-86.

9. Zhang Z, Li F, Hannon BA, et al. Effect of Oral Nutritional Supplementation on Growth in Children with Undernutrition: A Systematic Review and Meta-Analysis. *Nutrients*. 2021;13(9):3036.

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