Research Article

Effectiveness of Nutritious Laddu on Hemoglobin Level and Body Weight of Preschool Children, among Selected Anganwadi Center

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Abstract

Aim: This study aims to assess the effectiveness of nutritious laddu on hemoglobin level and body weight of preschooler children among Anganwadi center and to differentiate in pre-test and post-test hemoglobin level and body weight of preschooler children between the experimental group and control group.

Methodology: A true experimental pretest-posttest control group research approach was adapted as research design. Sixty samples were selected using simple random sampling technique which were assigned into two groups, that is, experimental group $n = 30$ and control group $n = 30$. Research tool was prepared by expert validation to collect the data. Descriptive and inferential statistics used to analyze the data according to objectives.

Results: The finding of the study shows that nutritious laddu was effective in improving hemoglobin level and body weight of preschooler children, that is, improved mean value from pre-test assessment of hemoglobin level (10.80) and body weight (14.11) in the experimental group and in the control group hemoglobin level (11.03) and body weight (14.27) after 30 days post-test finding of hemoglobin level (12.09) with "*t*" value (11.66) and body weight (15.48) with "*t*" value (9.6) in the experimental group and in the control group hemoglobin level (10.79) with "*t*" value (–3.87) and body weight (14.17) with "*t*" value (–0.85) which shows statistically significant at the level of 0.05 ($P > 0.05$).

Conclusion: The study finding concluded that nutritious laddu is effective food which can help in improving hemoglobin level and body weight of preschool children and this indirectly helps to reduce the chance of anemia and malnutrition among preschool children.

Keywords: Nutritious laddu, Hemoglobin level, Body weight, Preschool children, Anganwadi center

Introduction

Traditional sweet is laddu, it has a special value in India. Laddus having calorie dense traditional sweet with protein quality and many essential nutrients which are required by growing children as well as pregnant and undernourished population, etc. Laddus are prepared with variety of local ingredients, widely accepted by all age groups and easy to consume. Sometimes, laddus prepared using functional ingredients including fenugreek seeds, gum, dry dates powder, dry coconut, groundnut powder, soybean powder, jaggery, garden cress seeds, sesame seeds, Amla powder, and ghee.[1]

Preschool children age is dynamic period of growth and development as the children undergoing physical, psychological, and emotional development during this time, due to this adequate nutrition is most important for their growth and development. Although nutrition is important throughout the childhood but it is more crucial during infancy when rapid growth is occurring.[2]

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According to the World Health Organization (WHO) (2013–14), percentage of underweight children in India was 43% which was highest percentage than other countries, 4% of underweight children was in China, 2% of underweight children was in Brazil, and 9% of underweight children was in South Africa. The health condition of children is worst in India as comparatively to other developing countries.[3] In Maharashtra, 35.4% were stunted, 18.6% were wasted, and 25.2% underweight children. In Punjab, 30.5% were stunted, 8.7% wasted, and 16% underweight children. In Rajasthan, 36.4% has stunted, 14.1% has wasted, and 31.5% has underweight children. In Tami Nadu, 23.3% were stunted, 19% were wasted, and 23.3% were underweight children.[3]

According to NHFS (National Family Health Survey)-4 2016, stunting among children under 5 years of age varies widely across district of Maharashtra, ranging from 21.3% to 47.6%. Suburban Mumbai has the lowest level of stunting. About 22.4% were in Pune, 25.4% were in Solapur, 28.3% were in Ratnagiri, 23.3% was in Satara, and 23.3% were in Sangli which have medium prevalence of stunting. High prevalence of stunting in Thane was 38.5%, Ahmadnagar were 33.4%, Aurangabad was 38.6%, Gadchiroli was 32.5%, and Wardha was 30.5%. About 43.5% were in Nashik, 47.6% were in Nandurbar, 44.1% were in Jalana, 43.9% were in Buldana, and 47.4% were in Yavatmal which have very high prevalence of stunting. Nashik were 32%, Ahmednagar were 21.7%, Pune were 23.4%, and Osmanabad were 21.9% which have wasting among under 5-year children.[4]

Researcher has observed that preschooler children's are most vulnerable group so they need to be give special attention. They are easy to prone for malnutrition. Second, the balanced nutrition is important for life time health, strength, and intellectual capacity in this period. More death resulting from malnutrition in developing countries.[5]

Nutrition is one of the major factors that impact child's development. During pediatric clinical and community posting, researcher saw children are suffering with nutritional problems, that is, anemia, growth retardation, malnutrition, etc., in rural area. Many parents are unaware about balanced diet which affects child's growth and development so that researcher thought to contribute herself to improve children health status by providing nutritious laddu and will try to evaluate effect of nutritious laddu on hemoglobin and weight. Thus, researcher felt to conduct study on "Effectiveness of Nutritious Laddu on Hemoglobin Level and Body Weight of Preschool Children, Among Selected Anganwadi Center."

Research Methodology

Objectives of the study

The objectives of the study were as follows:

1. To assess hemoglobin level among preschool children (3–6 years) of the experimental and control groups.
2. To assess body weight among preschool children (3–6 years) of the experimental and control groups.
3. To study the effect of nutritious laddu on hemoglobin level and body weight of preschool children (3–6 years) among the experimental group.
4. To differentiate in pre-test and post-test hemoglobin level and body weight of preschool (3–6 years) children between the experimental group and control group.

Materials and Methods

The study was conducted in Anganwadi Satpur, Nashik. Research design selected for the present study was true experimental research design, pretest-posttest control group design. The study period was from November 7, 2017, to December 8, 2017. A total of 60 preschool children were selected out of that 30 for experimental and 30 for control groups which were selected using simple random sampling technique (lottery method).

Data Collection Instrument

Section I

Demographic data of child (This section consists of 4 items include age, gender of child, and type of diet and socioeconomic status of family per month).

Section II

Estimation of hemoglobin level (value) by Sahli's hemoglobinometer and assessment of body weight by analog weighing scale of the experimental and control groups preschool children.

Data Collection Procedure

The researcher has obtained ethical committee approval and written informed consent was taken from parents of preschool children. Deworming and pre-test done on same day for both groups. The researcher administered every morning of Monday to Saturday of morning one nutritious laddu 50 g to each preschool children from the experimental group for 30 days. Saturday of every week mother of preschool child was called and one packet of nutritious laddu 50 g was given to her and explained to give it to child on Sunday morning, and replaced empty packet on next Monday to researcher. During data collection, four children were absent on different days so, researcher went to their home and on same day provided nutritious laddu to particular children. No intervention to the control group. Post-test was done for both groups on the 31st day after completed intervention phase

Statistical Analysis

Demographic variables were analyzed in terms of frequency and percentages. Paired *t*-test was used to determine the significance of mean difference between pre-test and post-test. Independent sample *t*-test was used to find out differentiation of hemoglobin level and body weight between the experimental group and control group.

Results

The study shows most of samples from 5–6 years age group 43.33% from the experimental group and 60% from the

control group and the remaining from up to 3 years 6.67% from the experimental group and 13.33% from the control group. 50% male child from experimental and control group, also 50% female child from experimental and control group. Majority of samples taking mixed type of diet 53.33% from the experimental group and 56.67% from the control group. Most of samples, that is, 36.67% had monthly socioeconomic status of family 20,001–30,000 from both groups [Table 1].

The study shows that the experimental group pre-test mean score of hemoglobin level was 10.08 which was increased in post-test 12.09. Paired *t*-test calculated value was 11.669 which was more than table value at 0.05 level of significance ($P > 0.05$). The control group pre-test mean score was 11.03 it decreased in post-test 10.79. Paired *t*-test calculated value was –3.870 which was less than table value at 0.05 level of significance ($P < 0.05$). Experimental group pre-test mean score of body weight was 14.11 which was increased in post-test 15.48. Paired *t*-test calculated value was 9.601 which was more than table value at 0.05 level of significance ($P > 0.05$). The control group pre-test mean score was 14.27 it decreased in post-test 14.17. Paired *t*-test calculated value was –0.859 which was less than table value at 0.05 level of significance ($P < 0.05$). Hence, nutritious laddu was effective in improving hemoglobin level and body weight of preschool children of the experimental group [Table 2].[6]

The study shows that pre-test hemoglobin mean score of the experimental group was 10.8033 and the control group 11.0333. Independent sample *t*-test value was –0.78867 which was less than table value 1.96. Body weight mean score between the experimental group was 14.11 and the control group 14.2767. Independent sample *t*-test was –0.8005 which was less than table value 1.96. Hence, there was no differentiation in pre-test hemoglobin level and body weight between the experimental group and control group [Table 3].[7]

Table 1: Demographic data of preschool children in terms of frequency and percentage

Demographic variables	Experimental group *n*=30		Control group *n*=30	
	n	%	*n*	%
Age of the child				
Up to 3 years	2	6.67	4	13.33
3–4 years	8	26.67	4	13.3
4–5 years	7	23.33	4	13.34
5–6 years	13	43.33	18	60
Gender of the child				
Male	15	50	15	50
Female	15	50	15	50
Type of diet				
Vegetarian	14	46.67	13	43.33
Mixed	16	53.33	17	56.67
Socioeconomic status of family (per month)				
Below 10,000	6	20	3	10
10,001–20,000	7	23.33	10	33.33
20,001–30,000	11	36.67	11	36.67
30,001 and above	6	20	6	20

Post-test hemoglobin mean score of the experimental group was 12.0967 and the control group 10.7933. Independent sample *t*-test value was 4.7703 which was more than table value 1.96. Body weight mean score between the experimental group was 15.4833 and the control group 14.1767. Independent sample *t*-test was 4.8556 which was more than table value 1.96. Hence, it proved that nutritious laddu is effective in improving hemoglobin level and body weight in the experimental group than the control group. Hence, there was differentiation in post-test hemoglobin level and body weight between the experimental group and control group.

Discussion

In this study, nutritious laddu was effective in improving hemoglobin level and body weight of preschool children. Interventional study was conducted on all undernourished children in the selected Anganwadi Karad, Maharashtra. The intervention was used two Krishna laddus per day for 3 months for children above 1 year of age. Krishna laddus were prepared using various food items available locally. The ingredients of laddu are soybean, ragi, chana dal, groundnut, jaggery, and groundnut oil. A total of 120 children of age group between 6 months and 5 years were surveyed from to Anganwadies and data were analyzed. Undernutrition was observed more common among female than male, but this difference was not found to be statistically significant ($P > 0.05$). Grade 1st protein energy malnutrition was more common; however, severe acute malnutrition was noted 13.7% of undernourished children. Out of 58 undernourished children, 50 children were among 12–60 months age group who have given two Krishna laddus/day for 3 months and analyzed after 3 months. A total of 84% of children showed more than average improvement in weight gain (> 500 g/3 months) after Krishna laddu supplementation.[8]

A true experimental study was conducted in rural area of Pedaparimi village, Guntur district, Andhra Pradesh. This study was to assess the effectiveness of Krishna Poshak mix on nutritional status of rural Anganwadi children by monitoring the anthropometric measurements for 6 weeks. Sample size was 25 preschooler children for experimental and 25 for control with total 50 subjects selected by simple random sampling technique (lottery method). The result of the study was Krishna Poshak Mix laddus was effective in improving nutritional status of preschooler children. Result shows that initial assessment of weight score i.e., 12.72 and upper midarm circumference was 13.16 in experimental group and in control group mean score of weight score i.e., 12.01 and upper mid arm circumference score i.e., 12.91. After 6 week assessment, In experimental group weight score has increased i.e., 13.31 with '*t*' value 29 and arm circumference score i.e., 13.60 with '*t*'value 17.4 and in control group, weight score i.e. 12.04 and with '*t*' value 0.54 and upper mid arm circumference score i.e., 12.91 with'*t*' value 1 which shows that statistically significance $P < 0.05$.[9]

Table 2: Significant difference in pre-test and post-test hemoglobin level (value) and body weight of preschool children (3–6 years)

Group	Experimental group *n*=30				Control group *n*=30			
	Hemoglobin level (value)		Body weight		Hemoglobin level (value)		Body weight	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Mean	10.80	12.09	14.11	15.48	11.03	10.79	14.27	14.17
SD	0.8572	0.8319	0.7729	1.1101	1.352	1.2439	0.8385	0.9694
Paired "*t*" value	11.669*		9.601*		–3.870		–0.859	
	df=29		df=29		df=29		df=29	
Table value	2.46		2.46		2.46		2.46	
P value	Highly significant**		Highly significant**		Not significant		Not significant	

Table 3: Differentiation in pre-test and post-test hemoglobin level (value) and body weight of preschool children (3–6 years) between the experimental and control groups

Group	Pre-test			
Hemoglobin level (value)	Mean	SD	Independent "*t*" test value	Table value
Experimental group (*n*=30)	10.8033	0.8571	–0.78867	1.96
Control group (*n*=30)	11.0333	1.35222	df=58	
Body weight				
Experimental group (*n*=30)	14.11	0.77297	–0.8005	1.96
Control group (*n*=30)	14.2767	0.83859	df=58	
Group	**Post-test**			
Hemoglobin level (value)	**Mean**	**SD**	**Independent "*t*" test value**	**Table value**
Experimental group (*n*=30)	12.0967	0.8319	4.7703*	1.96
Control group (*n*=30)	10.7933	1.244	df=58	
Body weight				
Experimental group (*n*=30)	15.4833	1.1107	4.8556*	1.96
Control group (*n*=30)	14.1767	0.96942	df=58	

*At the level of 0.05 level significant

Experimental study was conducted to assess the effectiveness of providing Hyderabad mix in improving the weight of children 3–5 years with mild malnutrition. A total of 60 samples selected for intervention group 30 were providing with Hyderabad mix for a period of 2 months and the control group was not given any intervention. A structured questionnaire was used to collect the demographic data and anthropometric measurement was compared with the WHO standard values. The study result showed an improvement in weight of majority of samples 70.8%. The researchers conclude that the Hyderabad mix will be effective in improving the weight of children with malnutrition.[10] The study concluded that nutritious laddu was effective in improving hemoglobin level and body weight of preschool children. The finding of this study shows that the mean of hemoglobin level and body weight was significantly effective in the experimental group than the control group.

Conclusion

This study concluded that nutritious laddu plays an important role in improving the post-interventional hemoglobin level (value) and body weight of preschool children among selected Anganwadi.

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