



Efficacy of 'Mudgamodak' As A Weaning Food In Infant Growth – A Randomized Controlled Clinical Study

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ABSTRACT

The aim and objective of this study was to evaluate the efficacy of Mudga Modak (Greengram dumpling) in infant growth as a weaning food. Infants were selected from attending kaumarabhritya O.P.D of K.L.E's Ayurveda Hospital Belgaum, Karnataka, India. Apparently healthy infants age between 7th to 12 months of weaning period were selected as per randomization chart. Each trial and control group containing 15 infants were included in the study. In trail group Mudga Modak (Green gram dumpling) given orally in dosage according to age criteria twice or trice daily by allowing breast milk. In control group along with breast milk, home-made food was advised. Infants were assessed from age of 7th months till the age of 12 months in various aspects of growth. Infants showed improvement in all aspects of growth. Weight gain in treated group was 55.31802% in trial group. Nutritional supplement Mudga Modak (Greengram dumpling) was found effective in accelerating growth during weaning period and it helped in preventing nutritional disorder and growth faltering.

KEYWORDS : Mudga Modak, Growth, weaning , Breast milk, Infant.

INTRODUCTION

The word weaning means accustoms or free from habit. It is process of accustom the baby to semisolid food. According to UNICEF 1984 weaning is defined as the systematic process of introduction of suitable food at right time in addition to mother milk in order to provide needed nutrients to the baby.¹ Breast feeding alone is sufficient for first 6 months of life, thereafter concentrated energy dense weaning foods are essential in order to maintain an adequate velocity of growth for the infant.²

Kashyapacharya has mentioned weaning under *Anna Prashana samskar*³. This takes place around 6 months of age. *Kashyapa* also says that *Agni* in children at this phase of weaning from breast milk to food is unstable probably this is the reason why children find difficulty in thriving⁴.

Weaning foods must be with desirable qualities like high in energy, easy to digest, low in bulk and viscosity and easy to prepare.⁵ Establishing of appropriate and quality weaning foods that assist in motor skills and motor development is important.

There is a need for complementary foods which are with optimum nutritional value and also economically sustainable. The cereals form the important part of diet in various parts of India. They form an important source of energy, iron, protein, in the Indian diet and also supply certain amount of fat.⁶ Hence the preparation with Mudga Modak (Greengram dumpling) ⁷ and other drugs like Ghruta (Ghee), Sharkara (Sugar) as mentioned by *Acharya Bhavaprakash* has been selected because it has will fulfill all nutritive aspects and it has properties like Hrudya , Balya (strength) and Santarpana.⁸

MATERIALS AND METHODS

Source of data

(A) Literary Data: Was collected from Samhitas (Classical texts), books, journals, internet, and other reliable sources.

(B) Drug Analysis Data: Was taken from CRF, KLE's BMK Ayurvedic Mahavidyalaya Belagavi.

(C) Clinical Data: Was collected from the Healthy infants are collected from Kaumarabhritya OPD KLE's BMK Ayurveda Hospital Belagavi.

Study Plan

Preclinical Steps

Ethical Clearance: Ethical clearance certificate was taken from the IEC. (Annexure IV)

(2) Drug Materials taken for the study include –Mudga and Plastic box were purchased from Belagavi local market. Ghrith, Sharkara were purchased from KLE'S Ayurvedic pharmacy. All The drug were Authenticated in CRF Analytical laboratory of KLE'S Shri BMK Ayurveda Mahavidyalaya, Shahapur, Belagavi.

(3) Drug authentication:

Samples of the collected drug were authenticated by the CRF of KLE'S BMK Ayurved Mahavidyalaya.

(4) Formulation:

Mudga Modak was used in this study.

Mudga Modak was prepared in GMP recognized KLE Ayurveda Pharmacy.

Method of preparation: All the procedures were carried out with hygiene.

1. Sufficient quantity of Mudga was taken and made into fine powder.
 2. Paste was prepared.
 3. ½ part of Ghrut is taken in container and heated on low flame.
 4. Paste of Mudga was rubbed on sieve into the hot ghee and fried it.
 5. After frying take out and keep it for cooling for 10-15min.
 6. Paka was prepared by using 4 Prt of sugar and 1 part of water on low flame
 7. Granuls of fried Mudga was added into Paka and mixed well.
 8. Modak were rolled when Paka was still warm.
- After complete drying they were stored in air tight container on each fallow up fresh Mudga Modak is prepared.

(5) Quality Assurance:

Samples of the prepared Mudga Modak was sent for required self life analysis with MLT in CRF of KLE's BMK Ayurved Mahavidyalaya (Annexure VII).

Mudga Modak retains its potency for 15 – 20 days if protected from moisture and fungi hence packaging in airtight moisture proof plastic box was done and the Mudga Modak was used within 15 days after production.

Analytical study

The total ash was found to be 0.927% W/W and loss on drying is 2.013%

TABLE 11 SHOWING ANALYTICAL DATA OF MUDGA MODAK.

PARAMETER	RESULT
LOSS ON DRYING	2.013%
TOTAL ASH VALUE	0.927%

Analysis of nutritive value

Nutritional analysis done in food hygienic and health laboratory Pune (Annexure VIII)

TABLE 12 SHOWING NUTRETIVE VALUE OF MUDGA MODAK

Nutritional analyses: - /1oog

PARAMETER	RESULT	Test method
Protein	6.4g	Is 7219-1973
Fat	25.89g	By DGHS Manual 3
Carbohydrate	62.46g	By difference
Total energy	493.79g	By calculation
Sugar	30.0g	By DGHS Manual 3

(6) Packaging:

Identical packing of Mudga Modak was done with proper in a air tight container accordance with age criteria and Randomization.

Packaging material used was sterile airtight polythene damp-proof packet and polythene box.

Each box contains Mudga Modak according to age criteria packing done.

Clinical study

Study design

Type of Study Design: Randomized clinical trial.

Study Site: KLE's BMK Ayurvedic Hospital.

Study Period: 18 months

Subject Eligibility

Inclusion Criteria:

- The Infants of either sex of age 7-12 months
- Clinically stable Infants

Exclusion criteria:

- Infants having life threatening congenital anomalies
- Known cases of acute or chronic infectious, metabolic, CP, Koch's, AIDS

Study Methodology:

The children's of OPD of BMK Ayurvedic Hospital were screened done on the basis of assessment criteria.

After taking into consideration of the Inclusion and Exclusion criteria, in formed written consent was taken from parents.

The cases were equally distributed into Group A & B Group B by using

S. No	Parameter	Group	P value	BT	F1	F2	AT
				Mean ± SD			
1	Height	A	0.2972	68.32 ±1.756	68.32±1.756	68.33±1.725	68.34±1.725
		B	> 0.9999	68.32±4.344	68.32±4.344	68.33±4.295	68.34±4.295
2	Weight	A	< 0.0001	7.450** ±7.450	7.671** ±7.671	7.821** ±7.821	7.929** ± 7.929
		B	< 0.0001	7.578***±0.2989	7.781***±0.3028	8.006***±0.3116	8.275*** ±0.3367
3	Chest circumference	A	0.1156	43.66 ±1.756	43.66 ±1.756	43.68 ±1.757	43.69 ±1.757
		B	0.2082	43.92 ±1.756	43.92 ±1.756	43.93±42.93	43.95 ±42.95
4	Head circumference	A	0.3851	43.43±1.756	43.43±1.756	43.44±1.791	43.48±1.790
		B	0.1365	43.73±1.775	43.73±1.775	43.76±1.775	43.76±1.790

Randomization method.

Table no 13 showing no sample size, intervention and duration of study

Group	Sample size	Intervention	Duration
A (control group)	15	Home based food as permitted by their social acceptance as being currently practiced Along with breast Feeding is ontinued.	45 days
B (Experimental group)	15	Mudga Modaka along With breast feeding Continuing with foods as being practiced at home.	45days

OBSERVATIONS

9 patients were male whereas the other 21 were female.29 the subjects were from Hindu community and one subject belongs to Christian. Mode of delivery wise distribution showed there were 14 subjects from the control group and 11 from the trial group who were through NVD and there were 2 subjects from the control group and 3 from the trial group who were delivered through LSCS. Birth weight wise distribution there were 3 subjects from the control group (1500-2500) and 3 from the trial group (1500-2500) and were 8 subjects from the control group (2500-3000) and 11 from the trial group (2500-3000kg).

There were 5 subjects from the control group (3000-3500) and 2 from the trial group (1500-2500). Distribution on the base diet there were 11subjects from the control group and 14 from the trial group who had taking vegetarian diet. There were 3 subjects from the control group and 2 from the trial group who had taking mixed diet. Distribution on base of Type of weaning food 22 (13 related to control and 9 subjects related to trial group) subjects related to home based food and 8 subjects (5 are related to control group and 3 are related to trial) are taking formula feed. Mode of vaccination wise distribution there were 13 subjects from the control group and 11 from the trial group who had taken Regular vaccination. There were 3 subjects from the control group and 3 from the trial group who had taken Irregular vaccination.

RESULTS

The initial mean weight of the infants before starting of the nutritional supplement was 7.450*** kg & 7.578***Kg for the control & trial groups respectively. After completion of the intervention the mean height was 7.929**kg & 8.275***kg for Control and trial groups respectively. On applying 'f' test to these values the results showed that weight gain was significant with p value <0.001 with gain in weight 6.041% in control Group and 8.42% in trial Group.

There are no statistical changes seen in Head, Chest, Arm circumference and Height. But clinically some changes seen.

5	Arm circumference	A	0.1882	12.64±1.122	12.64±1.122	12.64±1.146	12.65±1.149
		B	0.1639	13.84±0.7211	13.84±0.7211	13.86±0.7248	13.86±0.7248

HEIGHT

The initial mean height of the infants before starting of the nutritional supplement was 68.32 & 68.32cm for the control & trial groups respectively. After completion of the intervention the mean height was 68.33 and 68.34 for Control and trial groups respectively.

'f' test to these values the results showed that there not significant in increasing height with p value 0.2972 and >0.999.

WEIGHT

The initial mean weight of the infants before starting of the nutritional supplement was 7.450**kg & 7.578***Kg for the control & trial groups respectively.

After completion of the intervention the mean height was 7.929**kg & 8.275***kg for Control and trial groups respectively.

On applying pooled 'f' test to these values the results showed that weight gain was significant with p value <0.001 with gain in weight 6.041% in control Group and 8.42% in trial Group.

CHEST CIRCUMFERENCE

The initial mean chest circumference of the infants before starting of the nutritional supplement was 43.66cm and 43.69cm for the control & trial groups respectively. After completion of the intervention the mean height was 43.92 cm and 43.95 cm respectively for Control and trial groups respectively.

On applying pooled 'f' test to these values the results showed that weight gain was no significant with p value 0.1156 and 0.2082 respectively with no gain in chest circumference

DISCUSSION

Acharya Bhavaprakash has mentioned the use of Mudga or Mukta Modak it contain Mudga, Ghruta, Sharkara it has properties of Balya, Bhrumaniya and chakshush.

In this study there was weight gain due to property of Balya, and Bhrumana but there is no changes in other parameter Height, Head circumference, Chest circumference, because there is slightly changes seen but it is difficult to assess. To get changes in these parameter it take more days.

CONCLUSION

The given nutritional supplement was highly appreciated by the parents, as the acceptance of product by the infant was very good and no untoward effects were reported. Mudga Modak showed better palatability than routine food in the control group. The overall result shows that the nutritional supplement in the form of

Mudga Modak as a weaning food was effective in accelerating weight gain of the child. This may be because it contain Mudga it is rich in protein and it all so contain Ghruta and Sharkar these are rich in essential fatty acids and calories necessary for growth of body and brain. They compensate the gap between the required and provided nutrition.

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