INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY

EFFECT OF AYURVEDIC INFANT FOOD SUPPLEMENT ON ANTHROPOMETRIC INDICES OF INFANTS

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ABSTRACT

"Kaumarbhrutya Tantra" is one amongst eight specialized branches of Ayurveda. It focuses on all aspects of nursing and healthy upbringing of new-borns, infants and children by holistic approach for better progeny and society. Various texts in Ayurveda have given formulas and foods for the development of the child. Complementary foods should be nutritious enough to fulfil the growing needs of the infant. In this study an Ayurvedic based infant formula was assessed for its effect on anthropometric indices in infants. Low birth weight children in the age group of 8-24 months were considered for the study. Infants in two groups were given the Ayurveda based product (AH) and a control commercial product daily in similar proportions to be consumed once along with usual foods. Anthropometric parameters viz; height, weight, head and chest circumference were measured initially and monthly for three months. Results of the study revealed that AH infant food compared favourably with the commercial baby food. The Ayurvedic formulation was found to be satisfactory with the advantage of being nutritionally sound and economically affordable.

KEY WORDS: Kaumarbhrutya Tantra, complementary food, nutritionally sound.

INTRODUCTION:

Nutritional requirement varies at every stage of life and hence timely feeding is considered as an important factor in the growth of child. First two years of the child is critical for nutritional intervention. Amongst these two years the main change is expected at 6 months of age when the child is shifted from exclusive breast feeding to a proper diet, called as 'weaning'. Complementary food along with breast milk is given to the child. Since the nutritional requirement of the child is not met only by breast milk, the complementary food should be nutritious enough to fulfil the growing needs of the infant.

Infants are born equipped to ingest nutrients but have to learn what to eat. This must occur early, because the mode of feeding evolves dramatically, from "tube" feeding in utero to eating family foods[1]. Optimal nutrition is important for good health and well-being throughout life. Infant growth is an extra ordinarily complex process involving dynamic changes in body weight, body compositions, energy expenditure and macronutrient intake[2].

Ayurveda is a holistic system of medical science and is the oldest healing science which is almost 5000 years old. Even today ayurvedic medicine maintains its holistic approach to health and treatment of diseases[3]. Kaumar Bhritya involves care child rearing and treating disease right from the time of conception up-to the age of maturity. It is a scientific method of dealing with childhood disease symptoms, their diagnosis and treatment.

It also involves protecting and maintaining good health of the child[4]. It was advised by all stalwarts of the age-old science that the shift from exclusive breast feed to food was needed after 6 months of life in an infant. For the purpose of the same they enumerated various norms and formulations to be used as complementary food not only to provide nourishment but to also cure disease if any[5].

The formulation used in this study is stated in "Ashtanghrudaya" which is one of the three main treatises of Ayurveda. It is a unique combination of popped rice (*laja*, "*DhanLahi*" in local language), sugar, priyal seeds, yashti madhu and shunthi[6]. It is specially recommended at the stage of dentition (development of teeth in infants). Also, it is recommended as a first weaning food for infants. Among all, popped rice is the main ingredient. It is a pre-digested food item and thus very easy to digest. It possesses *'Deepana'* (increases digestive power) and *'Balya'* (improves muscle strength) properties. It is a well recommended food during signs like vomiting and diarrhea. *Priyal* seeds act as a tonic for heart and in general strengthens the tissues. *Yashtimadhu* also known as muleti (licorice) is a dynamic herb which is 'Rasayana' (rejuvenating) in nature. Therapeutically used in cough, hoarseness of voice and emaciation. *Shunthi* (Dry Ginger) it is used as a 'taste maker'. It also possesses *'Deepana'* (increases digestive power) property.

India constitutes a large section of population which is in the lower economic band. This has its repercussion as the child remains malnourished due to non-optimum health of parents and less availability of resources during infant's growth[7]. This formulation provides the benefit of being economically affordable and readily available. Also, it is an irony that not many studies assessing the effects of these formulations are available in the mainstream data. It is necessary to mainstream the formulations of Ayurveda as proper supplementary food for the benefit of the community and the indigenous science. This study reviews the effect of the ayurvedic formulation on infants by assessing anthropometric changes in comparison to a control group maintained on commercial food.

MATERIAL & METHODS:

The study has an objective of checking the development through anthropometric measurements of children aged 8-20 months by giving them an ayurvedic product in comparison to a commercially marketed product. The formula of 100 gm AH infant food included popped rice 40gm, Priyal seeds (Buchanania lanzan Spreng) 10 gm, Yashti madhu (Glycyrrhiza glabra) 10 gm, Elaichi (Elettaria cardamomum) 5 gm, Shunthi (Zingiber officinale Roscoe) 5 gm, sugar 30gm (Tupkar P. and Vali S. (2020). Low birth weight or malnourished children satisfying the age group criteria, attending OPD of a health institute were selected by a physician and were randomly allocated to a control (Commercial food) and AH infant food group. Due consent was taken from the parents and the ethical committee. A total of 100 infants aged between 8 to 20 months, 50 in each of the two groups were taken up for the study.

The Ayurvedic group of infants were given the formulated infant food (AH). The control group was advised to feed commercially available baby food. The feed for both the groups was to be given daily once in 24 hours with 20 gms of product in 50 ml cow's milk. Routine food was to be continued as per the demand of the child. The trial was conducted for three months. Anthropometric measurements viz; height, weight, head and chest circumference were taken

initially and at the end of each month until a period of three months. Means, standard deviation was derived from the data. The mean initial and final height and weight of the infants with mean ages 12 and 24 months were compared with ICMR standards to assess their growth. The mean changes in anthropometric indices in control and AH groups were analyzed statistically by applying paired comparison test.

RESULT & DISCUSSION:

Low birth weight or malnourishment has many adverse consequences; however, it can be taken care of if there is good postnatal compensatory, or catch-up, growth[9]. Anthropometric values are simple, practicable, quick and reliable indicator for predicting low birth weight newborns in the community and can be easily measured[10].

Table 1 presents mean height and weight of the subjects in the control and experimental group as compared to ICMR standards.

Observation from the table reveals that infants in both the groups at all ages have initially low body weights and height as well as finally at the end of three months as compared to ICMR standards. The infants in this study started with initial low birth weights and height and hence could not match the standards laid down by ICMR. A marginal increase in mean weight was observed in the control group of infants in the age category of 12 months (Initial 7.32kg; final7.34 kg) Surprisingly a decrease in the final mean weight (8.4kg) from initial weight (8.5 kg) was observed in the 24-month age the control group. The mean initial and final heights of infants in control group at both ages was below ICMR standards.

The mean initial and final weight of infants in AH group was much below the ICMR standard weight at 12 months (initial 6.73kg; final 7.91kg) and at 24 months (initial 6.84 kg and final 8.23kg). Nevertheless, a mean weight increment was observed from initial to final stage of the experiment at both 12 and 24 months of age in this group as evident from the values presented in table 1. The mean initial and final height of infants at both ages were below ICMR standards. However, an increase in mean final height is noted from initial height at both ages; 12 and 24 months. The results thus show that the AH infant food had a potential to promote growth.

Table 2 presents the mean anthropometric data of infants in the control group and on Ayurvedic formulation.

The mean age of infants in the control group was10.5. The mean height of infants in control group was 71.88 cms +_2.967. The mean increase in height after three months was 72.84 +_ 3.10 which was found to be statistically significant (P= 0.000). The mean initial weight was 8.05 kg +_ 1.145 and the final weight was 7.94 kg +-1.202. It was surprising to note a decrease in mean weight of infants in this group. The decrease in weight was however found to be insignificant (p= o.175). Head circumference which was 43.69 cms +_2.3 92 initially increased marginally but significantly (p=0.02) to 43.762cms +_ 2.398. The chest circumference of infants showed a significant increase (p=0.000) from 42.946 cms +-2.140 43.410 cms +_2.250.

Ruel and Menon highlighted strong and significant associations between child-feeding practices and height-for-age index of the child. This suggests that proper nutrition is needed to initiate change in the infant especially with low birth weights.

The mean age of infants in the AH group was13. The initial and final heights of infants in AH group was 70.91cms +_6.05 and 73.57cms +_6.84 respectively. Infants in AH group reflected an increase in height by 2.7 cms as against 0.96 cms in the infants in control group. The mean increase in height of the infants in AH group was found to be statistically significant (p=0.000).

The mean initial weight of infants was 6.82kg +_7.55 and mean final weight showed a significant (p=0.000) increase to 8.18 kg +_ 8.47. The mean increase in weight was 1.36 kg in infants in AH group.

A significant (p=0.000) increase in head circumference from an initial of 43.32 cms +_ 1.82 to 43.860 +_1.78 was observed. Similarly, the chest circumference was found to show a significant (p=0.000) increase from 42.35 cms +_ 1.92 to 43.72 cms +_ 1.92 being initial and final values respectively.

In a study intervention based on home-based grain product, there was improvement of children's dietary diversity, as well as mean intake of energy and selected nutrients, compared with children in the control group but changes in height and weight did not differ between the two groups[12]. This suggests that there is extra need of growth enhancing factors with normal dietary products.

Ayurvedic herbs are not only good source of energy but also constitute various pharmaceutical properties which result in enhancement of growth. In this study significant height and weight increase from initial too final at the end of three months has been found in the AH group as compared to the control group. Yashti madhu a component of the formula is said to be a potent antioxidant or rasayan this helps it to develop body tissue at a greater rate. Further a study suggested that hair growth stimulatory action was potent in yashti madhu then the control group. This can be a reason why height must have increased in the children by the result of good bone development[12].

The formulation used in this study is called as 'Preenan modak' this implies that it is nutritive to the infant[14].Tupkar P. and Vali S. (2020) in their study on evaluation of Ayurvedic herb formulation as a potential weaning food stated that. the energy content of control baby food and AH differed (420 kcals and 387.70 kcals respectively). The protein content of AH was 18.1g/100g against a lower protein value of control infant food found to be 15g/100g.Cabohydrate content also differed with AH showing marginally higher values (71.02g/100g) than the control infant food (69.8g/100g).However the calcium and iron content of AH was fairly high (Calcium 885.84mg and iron 12.76mg per 100g) than control (400 mgs and 7.00mg per 100g). It was concluded that AH infant food was nutritive and cost economic than the commercial baby food.

The present study had incorporated this formulation in the diets of infants for a period of three months. This may perhaps one of the reasons that the infants on AH in the study showed a better increase in all anthropometric measurements in comparison with the control group.

A study pointed out that there is high correlation of weight and chest circumference of an infant with low birth weight[15]. Increase in chest circumference of infants in Ayurvedic group may point out to the fact that in the future there may be weight gain in the child. Increase in head

circumference was also noted in the infants on AH. This may probably reflect on the promotive action of the components of the food given to the infants on bone metabolism.

Overall, apart from improvement in anthropometric measurements there may be other benefits of the formulation also like priyal is nutritive, cardiotonic, astringent to the bowels, and is used in skin diseases, gleet and urinary concretions. Shunthi is used as a medicine for cough, cold, fever, vomiting and diarrhea. Yashti madhu provides strength, increases complexion, is aphrodisiac, and beneficial to eyes[16]. It is postulated that apart from nutritive benefits, this formulation is expected to give various other benefits to the child which must be studied with further research.

CONCLUSION:

Improvement in anthropometric indices reflect that the Ayurvedic formulation was found to be nutritionally potent and biochemically safe. The results were found to be satisfactory for the Ayurvedic formulation with the advantage of being economically affordable and available to the masses.

ACKNOWLEDGEMENT:

We acknowledge the guidance received from Dr Swati Gadgil, Professor (Rasshatra) BVDU college of Ayurved, Pune for formulation of Ayurvedic products, Dr Rahul Gujarathi (Paediatrician) and the assistance received for statistical analysis of data from Dr Rekha Sharma, Associate Professor, UGC- Human Resource Development Centre, RTMNU, Nagpur (MS).

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Table 1 Mean height, weight for subjects in comparison with ICMR standards

Sr no.	Age Group	ICMR		Control (N=50)				AH (N=50)			
				Initial		Final		Initial		Final	
		Weight (kg)	Height (cm)	Weight (kg)	Height (cm)	Weight (kg)	Height (cm)	Weight (kg)	Height (cm)	Weight (kg)	Height (cm)
1	12 months	9.85	75.55	7.32	71.08	7.34	71.68	6.73	70.85	7.91	73.78
2	24 months	12.05	85.05	8.5	72.46	8.4	73.68	6.84	70.91	8.23	73.54

Parameters		Mean	N	Std. Deviation	t	df	Sig. (2-tailed)
Control group							
Pair 1	Height Initial	71.882	50	2.9676	-9.466	49	.000
	Height Final	72.842	50	3.1090			
Pair 2	Weight Initial	8.054	50	1.1454	1.376	49	.175
	Weight Final	7.948	50	1.2029			
Pair 3	Head Circumference Initial	43.690	50	2.3924	-3.252	49	.002
	Head Circumference Final	43.762	50	2.3980			
Pair 4	Chest Circumference Initial	42.946	50	2.1405	-8.598	49	.000
	Chest Circumference Final	43.410	50	2.2508			
AH group							
Pair 1	Height Initial	70.910	50	6.0573	-8.985	49	.000
	Height Final	73.570	50	6.8467			
Pair 2	Weight Initial	6.82646	50	.755888	-17.726	49	.000
	Weight Final	8.18726	50	.847508			
Pair 3	Head Circumference Initial	43.320	50	1.8288	-6.878	49	.000
	Head Circumference Final	43.860	50	1.7860			
Pair 4	Chest Circumference Initial	42.354	50	1.9253	-10.844	49	.000
	Chest Circumference Final	43.7296	50	1.92529			

Table 2 Mean Anthropometric Measurement of Infants with Statistical Interpretation