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Efficacy of ashwagandha Sunnundalu as a nutritional supplement for Anganwadi (ICDS) children

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Abstract

Under nutrition is a type of malnutrition arises due to the intake of less food than what is required for proper growth, maintenance and development of the body. Ashwagandha has been used since ages for strengthening the immune system and protects the body from the on slaughter of disease and infection. Various studies indicate that this herb notably increases the white blood cells count and helps safeguard the body against cold and flu and other infections. Ashwagandha is known to exhibit energy boosting properties and rejuvenates the body, particularly after a persistent illness. These properties of Ashwagandha are beneficial to undernourished children who are also affected by repeated infections due to poor living conditions.

The ICDS as a nationwide program me provides a package of service for children. In implementation there are several short comings mostly related to gaps in input delivery which lead to problems in quality and acceptability of nutritional supplements. This creates a need to supplement and improve the nutritional status of children by making use of current knowledge and research evidence such as health foods, value added foods. Keeping the above facts in view a study was conducted on "Efficacy of Ashwagandha Sunnundalu as a Nutritional supplement for preschool age children". The sample comprised of Fifty five boys and Thirty five girls and the total sample size was Ninety. The sample were divided into three groups of which one is experimental group and two groups were control groups (1 and 2). Though the period of supplementation was only for a month (30 days) the trend in the experimental group is observable and measurable. The results of the study indicated that the Ashwagandha Sunnundalu is effective as a nutritional supplement and is also well accepted by the Anganwadi children.

Keywords: Malnutrition, Child nutrition, Nutritional supplement, ashwagandha snack, Nutritional intervention, ICDS children.

Introduction

Child nutritional status is an essential component of a country's overall human development. There is a growing consensus that poor nutritional status during childhood can have long lasting scarring consequences into adulthood both in terms of health and mortality and in terms of other measures of human capital such as schooling and productivity. Development is the functional advancement of different parts of the body and for proper function adequate amount of food is required. Under nutrition is a type of malnutrition arises due to the intake of less food than what is required for proper growth, maintenance and development of the body (Rao, Rajeev *et al.* 2004).

Nutritional status is a major determination of the health and well-being of children. Inadequate or poor diets and chronic illnesses are associated with poor nutrition among children. Infection causes under nutrition, because it reduces food intake but increases the body's need for nutrients. If a child does not eat much during illness and does not eat enough during recovery to regain the lost nutrients he/she becomes malnourished.

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Severe acute malnutrition is an important preventable and treatable cause of morbidity and mortality in children below five years of age in India. The concerned stakeholders are not in agreement about the role of product based medical nutrition therapy in management of children suffering from this condition and also children who are more prone to this condition (Sachdev, Umesh Kapil and Sheela Vir 2010) [6]. Mild-to-moderate malnutrition has been associated with an increased risk of childhood mortality. Treatment of malnutrition has largely been restricted to health education directed at increasing the calorie and protein content of a young child's diet. Severe malnutrition has been treated in a hospital setting. Ready to use high energy foods to be provided to the caregiver of a malnourished child has been a paradigm shift in the management of malnutrition (Azara Sneha Singh *et al.* 2010) [7].

Ashwagandha (*Withania Somnifera*) also known as Indian ginseng and as India winter cherry is an ancient plant, the roots of which have been employed in Indian traditional systems of medicine. The roots, leaves and fruits possess tremendous medicinal value. A famous ayurvedic rejuvenative botanical used in many tonics and formula. Ashwagandha is the best rejuvenative that helps maintain proper nourishment of the tissues, particularly muscle and bones, while supporting the proper function of the adrenals and reproductive system (Duke 1985).

Ashwagandha is a shrub that actually flourishes in India and North America. It has many other beneficial elements. Numerous modern studies also have found that ashwagandha is very effective in reducing inflammation, treating tumors, decreasing stress, increasing the mental activity, invigorating the body and as an antioxidant. Common name of Ashwagandha in English is Winter Cherry, in Telugu Pennerugadda and in Sanskrit Ashwagandha.

Ashwagandha has been used since ages for strengthening the immune system and protects the body from the on slaughter of disease and infection. Various studies indicate that this herb notably increases the white blood cells count and helps safeguard the body against cold and flu and other infections. It also has a mild sedative action on the central nervous system and is known to relax the smooth muscles. Ashwagandha is known to exhibit energy boosting properties and rejuvenates the body, particularly after a persistent illness. These properties of Ashwagandha are beneficial to undernourished children who are also affected by repeated infections due to poor living conditions.

The ICDS as a national wide program me provides a package of service for children. In implementation there are several short comings mostly related to gaps in input delivery which lead to problems in quality and acceptability of nutritional supplements. This creates a need to supplement and improve the nutritional status of children by making use of current knowledge and research evidence such as health foods, value added foods. Keeping the above facts in view a study was conducted on "Efficacy of Ashwagandha Sunnundalu as a Nutritional supplement for preschool age children".

Methodology

An effort was made to study the Efficacy of Ashwagandha Sunnundalu as a Nutritional supplement for Preschool Age Children. All the preschool children aged between 3-5 years attending two Anganwadi centres in Tirupati Rural Mandal

were selected based on CDPO's report on the low performance of Anganwadi centres. The sample comprised of Fifty five boys and Thirty five girls and the total sample size was Ninety. The sample were divided into three groups of which one is experimental group and two groups were control groups (1 and 2).

The independent variables included in the present study were Age, Sex, Education, Occupation of mother and father, Monthly income of mother and father, Type of family, Size of the family. The dependent variables were Height, Weight, Mid Upper Arm Circumference, Dietary intake.

The tools used for the measurement of variables under the study were as follows

A questionnaire was developed to collect personal and family profile of the sample, the information on food likes and dislikes, food habits and dietary pattern.

The nutritional status of preschool age children was assessed through Anthropometric measurements; height, weight and Mid Upper Arm Circumference and dietary intake (24 hour recall method). A Stadiometer was used to measure the height of the subjects, the heights of the children were taken before and after nutritional supplementation. A Salter spring balance was used to measure the weight of the children. This reading was taken while the child is calm and not moving. The weight was measured in kilograms. The weights were taken before and after nutritional supplementation. The measurement of the left upper arm at its mid-point was taken. The arm was allowed to hang freely and the measuring tape was placed around the middle portion of the left upper arm. Reading was recorded up to the last decimal unit in centimeters. The MUAC of children was taken before and after nutritional supplementation.

The dietary intake of the sample was collected using 24 hour recall method and a set of standardized vessels. The local recipes commonly used in day to day menu were collected and standardized using a set of commonly used serving equipment such as stainless steel glasses, bowls, katories, cups and spoons. The samples previous day intake was collected using ICMR's 24 hour recall method and validated with the information given by their mothers. Nutritive value of the samples' diet was calculated and compared with the Recommended Daily Allowance (RDA) using Nutritive values of Indian foods (ICMR-2000). The difference between the actual dietary intake and the RDA for each child was recorded.

The Sunnundalu recipe was prepared with three variations. That is using very fine, fine, and coarsely roasted black gram dhal powder and grated and finally powdered jaggery. The raw ingredients and their quantities used were the same in all the three recipes. The recipe is standardized and the product was evaluated for the following attributes: Appearance, flavor, texture, consistency, taste, general acceptability by a panel of ten experts and ten Anganwadi workers.

The Sunnundalu with Ashwagandha was prepared once in a week and were stored in cardboard boxes separately for each day. The supplementation was given to thirty children of experimental group around eleven "o" clock instead of their regular supplement. Thus the nutritional supplementation was given for thirty days that is from 21st February, 2010 to 21st March 2010.

All experimental group and one control group children were given de-worming medicines (Albendazol suspension) one week before the nutritional supplementation. The data

gathered on the research topic “efficacy of Ashwagandha Sunnundalu as a nutritional supplement for preschool age children” was tabulated, analyzed, interpreted, discussed and presented.

Results and Discussion

The data gathered was analyzed, tabulated and discussed as follows

Personal and family profile of the sample

1. Majority of the children belonged to the age group of 3-4 years.
2. Among the mothers a good percentage (36 percent) had high school education, followed by illiterates (30 percent) and primary school education (28 percent) only a small percentage (6 percent) had college/ Technical/ Professional education. Among the fathers, majority (54 percent) had high school education, followed by college./ Technical/ Professional education (31 percent) only.
3. A good percentage of mothers (43 percent) were daily wage earners, followed by self-employed (44 percent) and private employed (13 percent). Among the fathers, majority (52 percent) were private employed, followed by daily wage earner (31 percent) and self-employed (16 percent). Only a small percentage of (4 percent) were Govt. employees.
4. Majority of mothers (62 percent) had monthly income of less than Rs.3000/-, followed by (38 percent) having an income of Rs.3001/- to 6000/- per month. Among the fathers (49 percent) had monthly income of less than Rs. 3000/-, followed by (40 percent) having a monthly income of Rs. 3001/- to 6000/- and (11 percent) had monthly income of Rs. 6001/- to 9000/-. Studies on women self-help groups reveal that the income earned by the women used for family nutrition and development.
5. Majority of children (69 percent) are from nuclear families followed by extended families (20 percent) and a 6 percent of children were from single parent families; only 5 percent were from joint family.
6. Majority of the children come from family size of 4 – 6 members, followed by family size of less than 3 members (28 percent); only a small percentage of children come from family size of 7 to 9 members (13 percent) and 5 members families (5 percent).

Sensory Evaluation of Ashwagandha Sunnundalu

Sunnundalu is a traditional sweet of Andhra Pradesh prepared from roasted black gram dhal, sugar powder/jaggery and ghee. The Sunnundalu is described as a health food beneficial in strengthening the back and improving general health. This popular snack of Andhra Pradesh was chosen to incorporate Ashwagandha powder; a herbal immune booster and rejuvenative.

The Sunnundalu was prepared using three recipes and standardized. The product was served to two panels of ten judges; one panel of experts another panel of Anganwadi workers and evaluated on a ten point scale using sensory evaluation card for six attributes. The ratings of the judges were pooled tabulated and discussed in table 1.

Table 1: The mean scores of sensory evaluation ratings for the three products (Ashwagandha Sunnundalu) of Nutritional supplement

S. No.	Attribute	Mean Score		
		Product – 1	Product – 2	Product – 3
1	Appearance	6.9	8.6	7.9
2	Taste	7.9	8.9	7.9
3	Texture	6.6	7.9	6.6
4	Flavor	6.8	7.9	6.9
5	Constituency	5.7	7.9	6.6
6	General acceptability	7.9	8.9	7.9
Total Score		41.8	50.1	43.8

From the table 1 it is clear that the product-2 of Ashwagandha Sunnundalu is well accepted when compared to product-1 and product-3. Hence the recipe of product-2 was selected for preparation as nutritional supplement. It was observed that the panel of experts and the panel of Anganwadi workers varied in their ratings for the attributes, their mean scores were high for the product-2 when compared to product-1 and product-3.

Nutritional status of the sample before the nutritional supplementation

Supplementary nutrition is one of the services delivered through the ICDS programme to children below 6 years of age and to nursing and expectant mothers from low income families. Supplementary nutrition will be given for 300 days in a year, for all the children attending Anganwadi centres. The nutritional supplements are to provide 300 calories and 10gms of protein per child. For malnourished children (Therapeutic food) to the extent of 600 calories and 20gms of protein is provided. The supplementary nutrition aims at providing food to improve the nutritional status of Anganwadi children and the growth monitoring is done by Anganwadi workers (Vimala 2004) [3].

a) Weight, Height and mid upper arm circumference of children

Weight, height and Mid Upper Arm Circumference (MUAC) have come to be considered as the most sensitive parameters for assessing nutritional status of children under the age of six years. Several methods have been suggested for the classification of nutritional status based on those measurements. The heights and weights can be expressed in a number of ways in relation to reference data. These included; (a) by the use of mean and standard deviation values and (b) by a calculating percentages of the median value of reference population which is assigned as 100 percent.

The weight and height of each child is compared with the corresponding National centre for Health Statistics (NCHS) medium values. Based on the difference between the actual height and weight and the corresponding NCHS values the sample were classified as normal, below normal. Similarly the mid upper arm circumference (MUAC) measurement of each child is compared with that of standard values and the children were classified as normal (above 13.5cm) and below normal (less than 13.5cm).

Majority of children in controlled group 1 and 2 and experimental group were below normal with regard to their weight for age, height for age and mid upper arm circumference.

b) Dietary nutrient intake

The dietary nutrient intake of each child was assessed using ICMRs 24 hour recall method in which the child recalled food eaten, the quantities and the time of meal. As the children may not be able to give complete details with regard to the name of the food item and its preparation, the

information was validated with their mothers. The dietary intake was collected using a set of standardized vessels. The dietary intake of each child is tabulated and nutritive values were calculated for the raw equivalents of each food item. Thus the dietary nutrient intake of each child was calculated and compared with the Recommended Dietary Allowance (RDA) using Nutritive values of Indian foods (ICMR 2000). Based on the difference between the actual dietary nutrient intake and the Recommended Dietary Allowance (RDA) the children's dietary intake was classified as adequate and inadequate as shown in table-2.

Table 2: Distribution of children according to their dietary nutritive intake before the nutritional supplementation

S. No.	Sample	Energy (K. Cal)		Protein (g)		Fat (g)		Vit. A (μ g)		Iron (mg)		Folic acid (mg)		Calcium (mg)		Phosphorus (mg)	
		A %	IA %	A %	IA %	A %	IA %	A %	IA %	A %	IA %	A %	IA %	A %	IA %	A %	IA %
1	Control 1	40	60	30	70	46	54	30	70	27	73	31	69	27	73	24	76
2	Control 2	37	63	34	66	50	50	27	73	24	76	29	71	24	76	24	76
3	Experimental group	44	56	30	70	44	56	30	70	24	76	33	67	24	76	24	76

A: Adequate; IA: In-Adequate; %: Percentage of sample

The table 2 shows that majority of the children had inadequate dietary nutrient intakes of energy, Protein, fat, vitamin A, iron, folic acid, calcium, phosphorus.

Effect of nutritional supplementation on nutritional status of Anganwadi children

In order to study the effect of nutritional supplementation (Ashwagandha Sunnundalu) on the experimental group, the anthropometric measurements of children were taken before and after the experiment.

a) Differences in Weight, Height and Mid Upper Arm Circumference (MUAC) of experimental group children before and after Nutritional Intervention.

The difference between the mean weights, heights and Mid Upper Arm Circumference of experimental group children before and after the experiment was calculated to study the statistically significant difference between the measurements before and after the nutritional intervention.

There was significant difference in weight, height and mid upper arm circumference of children at 0.01 level and at 0.05 level respectively. It indicates that there is an increase in height and weight, Mid Upper Arm Circumference of experimental group children after the deworming and supplementation of Ashwagandha Sunnundalu.

Paired Samples

Correlation is computed to study the correlation between the weights, heights and mid upper arm circumference of experimental group children before and after the nutritional supplementation.

There was significant correlation at 0.01 and 0.05 level between the weights, heights and mid upper arm circumference values of children before and after the experiment indicating the effect of nutrition supplementation.

Difference in weight, height and MUAC of control group-1 children

Anthropometric measurements of children of control group 1 (Who were not given any supplementation or deworming) before and after the nutritional supplementation programme

was taken. The mean, standard deviation, 't' test and correlation was calculated for their weights, heights, mid upper arm circumference values, taken before and after experiment.

There was no significant difference between the weight, height and mid upper arm circumference values of control group-1 children before and after thirty days (i.e. period of nutritional supplementation for experimental group). This may be attributed to lack of deworming and nutritional supplementation.

There was significant correlation at 0.01 level between the weight, height and MUAC values of children of control group before and after the experiment. Growth and development continues to occur in children irrespective of nutritional supplementation but the rate at which the growth and development takes place depends on good nutrition and health. The significant correlation in the weights, heights and mid upper arm circumference values of control group-1 children before and after one month (30 days) may be attributed to this growth and development.

Differences in weight, height and mid upper arm circumferences of control group-2 children before and after deworming

The control group-2 children of the study received only deworming (prior to the experiment for the experimental group children) their weights, heights, mid upper arm circumference was measured before and after one month. Using those values mean, standard deviation, 't' test and correlation were computed to study the difference and also the relationship between the anthropometric measurements before and after deworming.

Significant difference at 0.001 level was found for weight, height and mid upper arm circumference values of control group-2 children. No significant difference was found in the heights of children of control group-2. Studies on nutritional status indicate that weight reflects current nutrition status, height reflects prolonged nutrition. The children of control group-2 could not show significant increase in height even after deworming may be attributed to inadequate dietary intake.

From the table 5 it is clear that the children of experimental group, control group 1 and control group 2 did not differ significantly between the groups and within the groups with regard to their weights, heights and mid upper arm circumference value before the experiment.

The children differed significantly between groups and within groups with regard to their weights after the experiment at 0.01 level with regard to their heights and mid upper arm circumference after the experiment at 0.05 level.

Conclusion

The present allows to conclude that the nutritional supplement Ashwagandha Sunnundalu contributes to increase in weight, height and mid upper arm circumference, when administered after de worming. Though the period of supplementation was only for a month (30 days) the trend in the experimental group is observable and measurable. The results of the study indicated that the Ashwagandha Sunnundalu is effective as a nutritional supplement and is also well accepted by the Anganwadi children. The need to supplement and improve the nutritional status of children was proved by this study. Making use of this research evidence the Health foods and Value added foods may be produced using Ashwagandha.

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