

## Acceptability of Soya Bean Mix and Impact of Nutrition Education among Underweight Subjects

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### Abstract

Adolescence is the second last chance for growth in the life cycle. Prevalence of stunting and underweight was high in adolescents. The nutrition intervention program among school children imparts healthy eating practices and good food choices. Soya bean contains a good amount of vitamins and minerals and protein. It is called a complete protein. The study was carried out among adolescents and adults. Basic information, socio-economic information, anthropometry measurements, clinical examination, and dietary aspects were collected from 400 subjects. The developed soya bean mix with all variations was tested for its acceptability. The variation 5 scored high (21) and had good nutrient content when compared with other mixes. The protein content was 25.5 g, iron was 11 mg, 472 K.Cal, and cost was ₹8 per 100g of mix. The nutrition education was given for the underweight adolescents and the impact was assessed. There was a significant improvement in the nutrition knowledge, attitude and practice after imparting the nutrition education. It was significant at one percent level among boys and 5 percent level in girls. No significant difference among the control group. Nutrition education has a positive impact on improving Knowledge, attitude, and practice among underweight adolescents.

The aim of this study is to elicit the nutritional status of the adolescents and adults. Impart the nutrition education among underweight adolescents and to study the impact. The acceptability and nutrient content of the developed soya bean mix also analyzed.

**Key words:** Adolescent; Dietary habits; Education; Soya Bean; Underweight.

### Introduction

Adolescence is the second last chance for growth in the life cycle. This period is distinguished by rapid growth and development at all levels. The growth spurt for girls is approximately at 11-14 years and for boys at 13-16 years<sup>[1]</sup>. The nutritional status of early adolescence has a great influence on later life. The raise in nutritional needs and rapid physical growth during adolescents needs to develop healthy eating habits.<sup>[2]</sup> The food habits of this adolescent age group are influenced by peer groups, parents' food habits, and media advertisements. If sufficient motivation is received, they can adopt healthy eating habits which improve health status. The decreased intake of protein and calories results in protein-energy malnutrition.<sup>[3]</sup> Prevalence of stunting and underweight was high in adolescents. Lack of nutrient-rich food is due to the poor feeding practices by the family.<sup>[4]</sup> The nutrition intervention

program among school children imparts healthy eating practices and good food choices.<sup>[5]</sup> The knowledge about nutrition does not have any direct association but it can bring about changes in the intake and nutritional status.<sup>[6]</sup>

The soybeans contain 30 to 45% protein with a good source of all essential amino acids.<sup>[7]</sup> Consumption of a high amount of plant based protein diet directs to reduce muscle loss when compared with the lower consumption of plant protein diet.<sup>[8]</sup> Soybean has an excellent nutrient source rich in protein, oil, and other small molecules.<sup>[9]</sup> Soya bean consists of a good amount of protein and it supplies an adequate amount of different amino acids required for growth and development and so it is called complete protein and is more or less equivalent to animal protein.<sup>[10]</sup> The germination process increases the nutrient availability of soya bean.<sup>[11]</sup>

So this study was carried out to develop the soya bean mix for testing the acceptability and imparting nutrition education among the underweight subjects. The main objectives of the study are to elicit the dietary habits of the adolescents, Develop a mix from soya bean and determine the acceptability, Impart nutrition education and study the impact of nutrition education among underweight subjects.

### Materials and Methods

In the Coimbatore district, the adolescents (11-14 years) of 300 and adults (20-23 years) of 100 were selected as samples using the purposive sampling method. A preset questionnaire was used to collect the background information, socio-economic aspects, anthropometry measurements, clinical examination, and dietary (24-hour recall & food frequency) aspects. The underweight sub-samples using BMI classification by WHO (2007) and percentile classification by WHO (2010).

The standard soya bean mix contained only soya bean flour (100 g) and sugar (50 g) respectively. In variation 1 the soya bean flour was (80 g), jaggery was (50 g), groundnut was (10 g) and sesame seeds was (10 g) respectively. In variation 2 the soya bean flour was (60 g), jaggery was (50 g), groundnut was (20 g) and sesame seeds was (20 g) respectively. In variation 3 germinated soya bean flour was (100 g) and sugar (50 g) respectively. In variation 4 the germinated soya bean flour was (80 g), jaggery was (50 g), groundnut was (10 g) and sesame seeds was (10 g) respectively. In variation 5 the germinated soya bean flour was (60 g), jaggery was (50 g), groundnut was (20 g) and sesame seeds was (20 g) respectively. These ingredients were selected not only for their feasibility but also for their nutrient content.

The soya bean was germinated, to remove the moisture content sun drying method was done. All the ingredients were dry roasted and powdered. The developed soya bean mix was tested for acceptability among the underweight adults. The selected mixes were analyzed for the nutrient contents and total plate count. The AOAC – 19<sup>TH</sup> edition was used to analyze the nutrient content and total plate count.

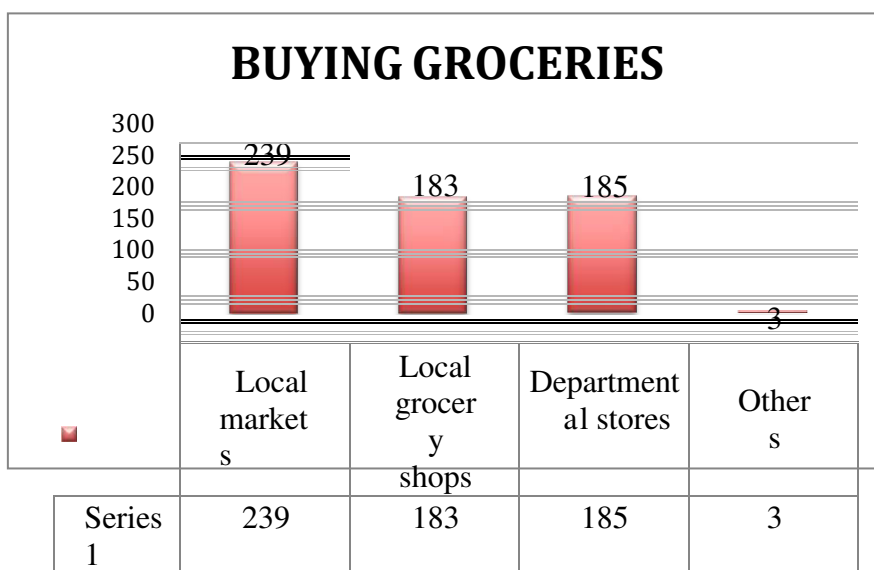
The underweight adolescents were selected as sub-samples for the nutrition education program. The nutrition education was given three days a week for ninety days and each session was about 40 minutes. The nutrition education sessions included basic five food groups, classification of nutrients and their role in the body, nutrients present in food groups, digestion and absorption, health status, and indicators, the importance of the adolescent stage, causes and risks of underweight, the foods to eat, food adulteration, food fortification, healthy versus junk foods, age group classification, and recommended dietary allowances for different age groups, nutrient deficiency, and deficiency disorders, various cooking methods and methods to retain nutrients were thought to the experimental group. Education tools like pamphlets, charts were developed and demonstration on protein-rich foods

was done to impart nutrition education. The Exhibition was put up. The pre and post test was conducted on Knowledge, attitude, and practice. Nutritional status of anthropometry, clinical examination and dietary aspects were assessed before and after the education program. The results were analyzed statistically to conclude the results.

**Results and Discussion**

In 400 subjects, 50 percent of adolescents were male and 25 percent of them were female and 25 percent of the adults were female. Family type resulted that 52.5 percent of the adolescents and 20.5 percent of the adults were from the nuclear family. The highest percent of 47.5 % adolescents belonged to 1-4 members and only 0.75 percent of adults were of more than 8 members in their family. Adolescents of 59.75 percent had one sibling and 0.5 percent of them had 4 siblings. Among adults, 16 percent of them had one sibling and 0.25 percent of them had 3, 4 and 6 siblings. In adolescents, 61.75 percent were of low-income group and 0.25 percent of them belonged to high-income group. In adults, 11.25 percent were below 10000, and 1.75 percent belonged to middle-income group. The average amount spent on food was 17.9 percent among adolescents whereas in adults it was 29.9 percent.

**Figure 2: Buying of Groceries**



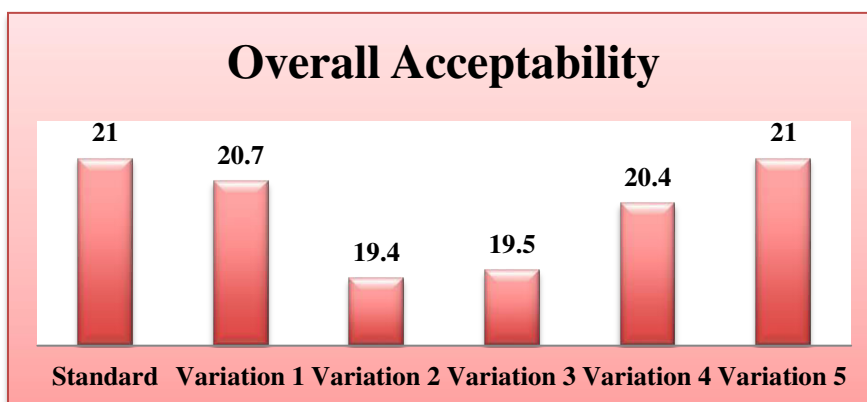
From the anthropometry measurements, 68 percent of the adolescents and 60 percent of the adults were underweight. None of the adolescents were obese, only two percent of the adults were obese. The mean height, weight and percentile of the adolescents were 144.8 cm, 36.9 kg, and 27 respectively. The mean height, weight, and Body Mass Index of the adults were 157.7 cm, 48.2 kg, and 19.3 respectively. The clinical examination proved that 45 out of 300 adolescents had poor vision and two of them had dry brittle hair. Two of the adolescents had dry, brittle hair. Clinical examination of adults showed that 11 out of 100 had poor vision. One of them had brittle hair. Both the adolescents and adults had a poor intake of nutrients when compared with the RDA except for fat. Their daily intake contained cereals, pulses, fats and oils, sugar, and milk products. The food items like chocolates, cold drinks, ice creams, and sugars were avoided by 0.3 percent of adolescents. The food frequency among adults revealed that three percent of them never consume green leafy vegetables, fried foods, chocolate, ice cream, and cold drinks.

Table 1: Nutritional Status

	Adolescent (%)	Adult (%)
Underweight	68	60
Normal	29.3	30
Overweight	2.7	8
Obesity	0	2

The acceptability of the developed soya bean mixes among underweight adults proved that variation 5 scored high (21) and had good nutrient content when compared with the other variations. The protein content was 25.5 g and iron was 11 mg with 472 K.Cal per 100 g of the mix. The cost was ₹8 per 100g of the mix. The total plate count was 38 cfu/ g which was within the specification level by FSSAI.

Figure 3: Acceptability of Soya Bean Mix



The nutrition education was imparted for the experimental group of underweight adolescents for 3 days in a week for 2 hours, 90 days. The t-tests proved that there was no difference in the anthropometry, clinical, and the dietary aspects after imparting the nutrition education. There was a significant improvement in the nutrition knowledge, attitude, and practice after imparting the nutrition education. In boys the attitude score was 15.10 in pretest and was 36.50 in post-test. The knowledge score was 14.55 and 40.09 respectively. Before nutrition education for practice, it was 14.86 and after imparting nutrition education it was 36.50. Thus it was significant at 1 percent level. No significant difference among the control group. For the girls, in knowledge, before it was 15.82 and after the nutrition education, the score was 26.82. The score for practice was 13.79 and after imparting nutrition education it was 25.71. During pre-test the score for attitude was 11.50 and was 22.70 after post-test respectively. Thus it was significant at 5 percent level. No change was observed in the control group.

Table 2: Knowledge, Aptitude and Practice scores for Experimental group of

**Underweight Adolescents (11-14 years)**

Details	Experimental Boys (N=50)		t value Before	Experimental Girls (N=50)		t value
	Before	After		Before	After	
Knowledge	14.55±5.63	40.09±6.43	0.000*	15.82±5.81	26.82±9.52	0.004**
Attitude	15.10±9.76	36.50±6.04	0.000*	11.50±5.74	22.70±10.31	0.027**
Practice	14.86±7.20	36.50±10.05	0.000*	13.79±7.32	25.71±12.60	0.010**

(\*p-value is <0.01. It is significant at one percent level. \*\*p-value is <0.05. It is significant at 5 percent level.)

The boys had the highest scores when compared with girls concerning knowledge, Attitude and Practice scores. Nutrition education program had a positive outcome in improving the knowledge, attitude and practice among underweight adolescents.

**Conclusion**

Many studies proved that well-designed intervention programs improved Knowledge, Attitude, and Practice. In this study, the prevalence of underweight was high among adolescents and adults with poor nutrient intake. The soya bean mix was tested for acceptability and it was found that the germinated flour with the incorporation of jaggery, groundnut and sesame seeds had the maximum overall acceptance. The nutritional education was imparted in this study to the underweight adolescents. Significant difference was not found with regard to anthropometry measurements, clinical signs and symptoms, and about mean nutrient intake among the subjects. This may be due to short period. Concerning knowledge, attitude and practice there was a significant difference among boys (at one % level) and girls (at 5 % level) after imparting nutrition education.

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