

Impact of Nutrition Counselling on Anthropometric and Biochemical Parameters of School Girls (7-9 Years)

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KEYWORDS Nutrition Counselling. Nutritional Status. Anthropometric Measurements. Biochemical Parameters

ABSTRACT Sixty girls of 7-9 years belonging to low socio economic group in Ludhiana were divided equally in control (C) and Experimental (E) groups. The Experimental group comprising of 30 girls and their mothers were imparted Nutrition Counselling (N.C.) twice a month for a period of four months. Assessment of nutritional status was done before and after imparting nutrition counselling. In case of anthropometric measurements: the mean height of subjects in C and E group was 116.1 and 117.1 cm at baseline and 116.2 and 117.9 cm after experimentation. Also, a significant increase in weight and MUAC was observed in E group after N.C. However all the anthropometric indices were lower than the standards. In case of biochemical parameters: the hemoglobin level of school girls was 9.47 and 9.6 g/dl in C and E group at baseline which significantly increased to 10.5g/dl in E group after N.C. All the haemopoietic indices revealed the occurrence of iron deficiency anaemia in both the groups before and after N.C. But the status of respondents in E group was comparatively better after N.C. when compared to before N.C. Thus nutrition counselling should be imparted for a longer duration and should be included in school curriculum.

INTRODUCTION

Nutrition plays a vital role as inadequate nutrition during childhood may lead to malnutrition, growth retardation, reduced work capacity and poor mental and social development (Awasthi and Kumar, 1999). The problem of malnutrition is of extraordinary significance and high percentage has been observed amongst girls in West Bengal and Punjab. Incidence of anaemia in developing countries is high and its prevalence is mostly attributed to iron deficiency and other nutritional deficiencies indicating more prevalence among the low income group. Nutrition Education is a sinequanon for bringing a permanent and favorable solution to the problem of malnutrition. Imparting nutrition education to mothers helps to improve the dietary status of the family as mother's concept about balanced diet and how to provide it, can be changed. With the improvement in nutrition knowledge of mothers, nutritional status of children also improves. Nutrition education also needs to be included in school curriculum as children are better able to retain nutrition knowledge gained at school level, when it is reinforced by favorable conditions in the home (Variyam et al., 1999). Keeping this in view, the present study was conducted to see the impact of nutrition counselling on anthropometry and biochemical parameters of school girls.

MATERIALS AND METHODS

For the present study sixty girls of 7-9 years belonging to low socio economic group were selected randomly from Government Senior Secondary School in Gobind Nagar, Ludhiana. They were divided into control and experimental group comprising of 30 girls each. Thirty girls along with their mothers were imparted nutrition counselling twice a month for a period of four months through lecture cum discussion method with the use of charts, posters and demonstrations. Interview cum questionnaire method was used for collecting background information of the subjects. Assessment of Nutritional Status was done before and after imparting nutrition education.

The anthropometric measurements (height, weight, mid upper arm circumference and triceps skin fold thickness) were recorded using techniques given by Jelliffe (1966). The blood samples of the subjects were analysed for haemoglobin by cyanmethaemoglobin method of Dacie and Lewis (1975), PCV by the method given by Raghuramulu et al. (1983) and MCHC was calculated ($Hb/PCV \times 100$).

Nutrition Counselling was imparted to 30 girls (7-9 years) and their mothers enrolled in Experimental group in three different batches according to the location of their houses. Nutrition Counselling was given regarding balanced diet, nutrients and their functions, anaemia, sprouting

and fermentation, cooking practices, food hygiene and sanitation. Data were analysed statistically. Mean and standard error of mean were calculated for each study variable. Comparison of anthropometric and biochemical parameters of the subjects in E group before and after nutrition counselling was done by applying paired 't' test of significance.

RESULTS AND DISCUSSION

The anthropometric parameters of school girls is presented in Table 1. The mean height of the respondents in C and E group at baseline was 116.1 and 117.1cm and after experimentation was 116.2 and 117.9 cm, respectively. The difference in average height of the subjects in E group before and after N.C. was statistically non-significant.

Respondents were classified into different grades of malnutrition on the basis of Waterlow's Classification of height for age. Table 2 indicates that at baseline 16.7% girls were in normal category in E group which increased to 20% after N.C. while there was no change in E group. However, percentage of respondents decreased in moderate and severe malnutrition category in C group after N.C. Thus after N.C. more respondents in E group sifted to normal and mild malnutrition category with none of the respondents in severe malnourished category. Dutta and Kumar (1997) also reported similar findings that in Uttar Pradesh, 20% primary school children were normal and remaining were suffering from different grades of malnutrition.

Table 1 shows that at baseline the mean weight of the respondents in C and E group

Table 1: Anthropometric profile of respondents

Parameters	Baseline		After Experimentation		t-value (E group)
	Control (n=30)	Experimental (n=30)	Control (n=30)	Experimental (n=30)	
Height (cm)	116.1±3.78	117.1±3.91	116.2±3.93	117.9±3.83	1.63
Weight(kg)	20.1±2.23	20.1±1.90	20.6±2.14	21.7±2.37	2.3*
Mid upper arm circumference MUAC(cm)	14.9±1.83	15.3±1.06	15.1±2.17	15.8±2.06	1.83*
Triceps skinfold thickness(TSF) (mm)	6.35±0.83	6.24±0.72	6.51±0.71	6.57±1.18	1.56

Values are mean ± SE

* Significant P<0.05

Table 2: Distribution of subjects according to Waterlow's classification of height for age

Height for age*Percent NCHS standards	Baseline				After experimentation			
	Control (n=30)		Experimental (n=30)		Control (n=30)		Experimental (n=30)	
	n	%	n	%	n	%	n	%
Normal (>95%)	6	20.0	5	16.7	6	20.0	6	20.0
Mild malnutrition(grade I) (90-95%)	14	46.7	16	53.3	15	50.0	19	63.3
Moderate malnutrition(grade II) (85-90%)	9	30.0	7	23.3	8	26.7	5	16.7
Severe malnutrition(grade III) (< 85%)	1	3.3	2	6.7	1	3.3	-	-

*Gibson (1990)

Table 3: Distribution of subjects according to Waterlow's classification of weight for age

Weight for age*Percent NCHS standards	Baseline				After experimentation			
	Control (n=30)		Experimental (n=30)		Control (n=30)		Experimental (n=30)	
	n	%	n	%	n	%	n	%
Normal (>90%)	5	16.7	7	23.3	6	20	10	33.3
Mild malnutrition(grade I) (75-90%)	16	53.3	17	56.7	15	50	18	60.0
Moderate malnutrition(grade II) (60-75%)	8	26.7	6	20.0	9	30	2	6.7
Severe malnutrition(grade III) (< 60%)	1	3.3	-	-	-	-	-	-

* Gibson (1990)

was same i.e. 20.1kg and after experimentation weight of girls in E group significantly ($p<0.05$) increased to 21.7kg while in C group no significant change was observed. Table 3 shows the distribution of respondents according to Gomez Classification of weight for age. At baseline 16.7% and 23.3% school girls in C and E group, respectively were in normal category which significantly increased to 33.3% in E group after N.C., while no significant change was observed in C group. After N.C., the percentage of respondents in mild malnutrition category increased whereas, in moderate malnutrition category decreased. Similar to present finding 25% girls of Kumaon hill were normal (Awasthi and Kumar, 1999), rest were suffering from different grades of malnutrition.

Table 4 shows that MUAC of school girls in C and E group was 14.9 and 15.3 cm at baseline and the corresponding values were 15.1 and 15.8 cm after N.C. which was less than Jelliffe (1966) standards of 18.43cm. A significant ($p<0.05$) increase in MUAC was observed in E group after N.C. Similar findings were reported by Parvathi

Table 4: Mid upper arm circumference and triceps skinfold thickness as compared to Jelliffe (1966) standards

Parameters	Mean ±SE	Jelliffe Standards	Per- centage
<i>Mid Upper Arm Circumference(cm)</i>			
Baseline			
Control	14.9±1.83	18.43	80.80
Experimental	15.3±1.06		83.01
After Experimentation			
Control	15.1±2.17		81.91
Experimental	15.8±2.06		85.72
<i>Triceps Skin Fold Thickness (mm)</i>			
Baseline			
Control	6.35±0.83	9.93	63.94
Experimental	6.24±0.72		62.83
After Experimentation			
Control	6.51±0.71		65.55
Experimental	6.57±1.18		66.17

Table 5: Haematological profile of respondents

Profile	Baseline		After experimentation		Standard	t-value (E group)
	Control n = 30	Experimental n =30	Control n = 30	Experimental =30		
Haemoglobin(g/dl)	9.47±0.73	9.6±0.58	9.55±1.23	10.5±1.18	12-16+	1.92*
PCV(%age)	29.5±0.89	29.2±1.98	29.3±1.94	31.7±2.86	36-47++	2.26*
MCHC(%age)	31.9±1.23	32.5±1.07	32.3±1.43	33.3±1.33	33-38+	2.29*

Values are mean ± SE

+ Harper (1965)

++ Davidson and Passmore (1987)

* Significant $p<0.05$

and Poorani(1991) and Awasthi and Kumar (1999). Chandna and Sehgal (1995) reported that anthropometric measurements were higher in children whose mothers had excellent and good nutrition knowledge level which were in accordance to present findings.

The mean Triceps Skin fold Thickness (TSFT) in C and E group was 6.35 and 6.24 mm at baseline and 6.51 and 6.57 mm after experimentation, indicating no significant change in E group. It is evident from table 4 that TSFT was 62.83 and 66.17% of Jelliffe standards in E group before and after N.C. respectively. Rao et al. (1993) reported TSFT of 6.5 mm among primary school children in Maharashtra which was in accordance with the present study.

The perusal of data clearly indicated that the anthropometric measurements of school girls were lower than the standards in both the groups. However, a significant increase in weight and MUAC was observed in E group after N.C.

The haematological profile of respondents in both the groups is given in Table 5. The haemoglobin level of the respondents in C and E group was 9.47 and 9.6g/dl at baseline and 9.55 and 10.5g/dl after experimentation. A significant ($p<0.05$) increase was observed in haemoglobin level of the respondents in E group after nutrition counselling. However, the respondents in both the groups had Hb level less than the normal level of 12g/dl (WHO, 1972)

The respondents were classified according to NIN (1986) classification which is given in Table 6. According to NIN classification, 3.3 % of the respondents in both the groups were severely anaemic at baseline however, none was in this category after experimentation. The percentage of the subjects in E group also decreased in moderate anaemic category after N.C. i.e. from 46.7 to 30 percent. However the number of respondents in E group increased in mild and marginal anaemic category after N.C. Similar results were reported by Mittal (1999).

Table 6: Classification of respondents based on their haemoglobin levels according to NIN (1986)

Haemoglobin(g/dl) NIN (1986)	Baseline				After experimentation			
	Control n = 30		Experimental n = 30		Control n = 30		Experimental n = 30	
	n	%	n	%	n	%	n	%
Severe anaemic(< 8)	1	3.3	1	3.3	-	-	-	-
Moderate anaemic(8.0-10.0)	17	56.7	14	46.7	16	53.3	9	30.0
Mild anaemic(10.0-11.0)	10	33.3	10	33.3	11	36.7	14	46.7
Marginal anaemic(11.0-12.0)	2	6.7	5	16.7	3	10.0	7	23.3
Non anaemic(≥ 12.0)	-	-	-	-	-	-	-	-

Patwarthan and Ubgade (1991) reported that Hb level ranged between 6.3 to 9.8g/dl in school children in Nagpur. Similar results were reported by Sarwate and Sharma (1993) as they found that 77 percent school children in Indore were anaemic.

The mean PCV values among respondents in C and E group at baseline was 29.5 and 29.2 percent however, after N.C. the PCV values significantly increased in E group to 31.7%. Similar results were reported by Mittal (1999) in 7-9 years girls of Ludhiana with mean PCV of 30.83 percent. On the contrary, higher value of PCV was reported by Kaur (1993) in the rural girls in Punjab.

The MCHC of the subjects in C and E group at baseline was 31.9 and 32.5 percent whereas it increased to 32.3 and 33.3 percent after experimentation. It was observed that MCHC value was below the normal range for both the groups at baseline, however after N.C. the MCHC value was within the normal range in E group. These findings were in line with Mittal (1999).

Thus, the lower values of Hb, PCV and MCHC indicated the prevalence of anaemia among the subjects in both the groups. However, the prevalence of anaemia was reduced in E group after N.C. as compared to before N.C.

Thus, with an increase in food and nutrient intake and also due to adoption of desirable nutritional practices like use of sprouted grains and other nutritious foods like milk and pulses by subjects in E group. Thus N.C. imparted to girls along with their mothers helped to improve the dietary status of school girls. With an improvement in nutrition knowledge and dietary practices, anthropometric and biochemical profile of girls improved.

RECOMMENDATIONS

Nutrition education should be included in

primary school curriculum as learning to know “what to eat and why” is an essential aspect of child’s education. Further, there is a need to impart concerted nutrition education to mothers to improve the nutritional status of family especially children.

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