IMPACT OF NUTRITION COUNSELLING ON ANTHROPOMETRIC PARAMETERS OF SCHOOL GIRLS (7-9 YEARS)

P.K. Chawla*, Sonika Sharma and R. Sachdeva
Department of Food and Nutrition, College of Home Science, Punjab Agricultural University, Ludhiana - 141 004, India

ABSTRACT
Sixty girls of 7-9 years belonging to low socio economic group in Ludhiana were divided equally into Control (C) and Experimental (E) groups. The experimental group comprising of 30 girls and their mothers were imparted nutrition counselling twice a month for a period of four months. Assessment of nutritional status was done before and after imparting nutrition counselling. The mean height of subjects in C and E group was 116.1 and 117.1 cm at base line and 116.2 and 117.9 cm after experimentation. The average weight of subjects in both the groups was 20.1 kg at baseline which significantly increased to 21.7 kg in E group after nutrition counselling. Also a significant increase in MUAC was observed in E group after nutrition counselling. However, all the indices were lower than the standards. 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 extra ordinary 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 sine-qua-non for bringing a permanent and favourable 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 favourable 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 of school girls.

MATERIAL AND METHODS
For the 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 Experimental (E) and Control (C) Group comprising of 30 girls each. Girls in Experimental Group 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. Anthropometric measurements like height, weight, Mid Upper Arm Circumference (MUAC) and Triceps Skin Fold Thickness (TSFT) of the school girls were recorded before and after nutrition counselling using the techniques given by Jelliffe (1966). Data was analyzed statistically. Mean and standard error were calculated for each

* Correspondent author.
variable. Comparison of anthropometric parameters of 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.

I. Height: The mean height of the respondents in C and E group at baseline was 116.1 and 117.1 cm 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 Nutrition Counselling (NC) was statistically non-significant. It is evident from Table 2 that height was 92.64 per cent of NCHS standards in E group at baseline that increased to 93.27 percent after N.C. These findings were supported by Sangha et al. (1999) who reported that mean height was 90 per cent of NCHS standards in primary school children in Ludhiana.

Respondents were classified into different grades of malnutrition on the basis of Waterlow's Classification of height for age. Table 3 indicates that at baseline 16.7 per cent girls were in normal category in group, which increased to 20 per cent after nutrition counselling while there was no change in C group. Also an increase in percentage of respondents having mild malnutrition was observed in E group after NC. However, percentage of respondents decreased in moderate and severe malnutrition category in E group after NC. Thus after NC, more respondents in E group shifted to normal and mild malnourished category with none of the respondents in severely malnourished category. Dutta and Kumar (1997) also reported similar findings that in Uttar Pradesh, 20 per cent primary school children were normal and remaining were suffering from different grades of malnutrition.

II. Weight: Table 4 shows that at baseline the mean weight of the respondents in C and E group was same i.e. 20.1 kg and after experimentation weight of girls in E group significantly (P<0.05) increased to 21.7 kg while in C group no significant change was observed. Both the groups were having less weight as compared to NCHS and ICAR standards. Weight of respondents in E group was 80.3 per cent of NCHS standards at baseline which increased to 86.7 per cent after NC.

Table 5 shows the distribution of respondents according to Gomez Classification of weight for age. At baseline 16.7 per cent and 23.3 per cent school girls in C and E group, respectively were in normal category which significantly increased to 33.3 per cent in E group after NC, while no significant change was observed in C group. After NC, the percentage of respondents in mild malnutrition category increased whereas and in moderate malnutrition category decreased. Similar to present findings 25 per cent girls of Kumaon hill were normal (Awasthi and Kumar, 1999) rest were suffering from different grades of malnutrition.

III. Mid Upper Arm Circumference (MUAC): Table 6 shows that mean 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 NC which were quite less than the Jelliffe (1966) standards of 18.43cm. A significant (P<0.05) increase in MUAC was observed in E group after NC. It is evident from Table 5 that MUAC of subjects in E group was 83.01 per cent of NCHS standards at baseline and increased to 85.72 per cent after NC. Similar findings were reported by Parvathi and Poorani (1991) and Awasthi and Kumar (1999). Chandna and Sehgal (1997) reported that anthropometric measurements were higher in children whose mothers had excellent and good nutrition.
### Table 1. Anthropometric profile of respondents

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Baseline</th>
<th>After experimentation</th>
<th>t-value (E group)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Experimental (n = 30)</td>
<td>Experimental (n = 30)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>116.1±3.78</td>
<td>117.1±3.91</td>
<td>116.2±3.93</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>20.1±2.23</td>
<td>20.1±1.90</td>
<td>20.6±2.14</td>
</tr>
<tr>
<td>Mid upper arm circumference MUAC (cm)</td>
<td>14.9±1.83</td>
<td>15.3±1.06</td>
<td>15.1±2.17</td>
</tr>
<tr>
<td>Triceps skin fold thickness (TSF) (mm)</td>
<td>6.35±0.83</td>
<td>6.24±0.72</td>
<td>6.51±0.71</td>
</tr>
</tbody>
</table>

Values are mean ± SE; * Significant P < 0.05.

### Table 2. Mean height of the respondents as compared with NCHS (1987) and ICMR (1990) standards

<table>
<thead>
<tr>
<th>Height (cm±SE)</th>
<th>NCHS standards</th>
<th>% age</th>
<th>ICMR standards</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Control</td>
<td>116.1±3.73</td>
<td>91.85</td>
<td>90.95</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>117.1±3.91</td>
<td>116.2±3.93</td>
<td>117.9±3.83</td>
</tr>
<tr>
<td></td>
<td>After Experimentation</td>
<td>117.1±3.91</td>
<td>92.64</td>
<td>91.73</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>116.2±3.93</td>
<td>126.40</td>
<td>91.93</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>117.9±3.83</td>
<td>93.27</td>
<td>92.36</td>
</tr>
</tbody>
</table>

### Table 3. Distribution of subjects according to Waterlow's classification of height for age

<table>
<thead>
<tr>
<th>Height for age*</th>
<th>Per cent NCHS standards</th>
<th>Baseline</th>
<th>After experimentation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control (n =30)</td>
<td>Experimental (n =30)</td>
<td>Control (n =30)</td>
</tr>
<tr>
<td>Normal (&gt; 95%)</td>
<td>6</td>
<td>20.0</td>
<td>5</td>
</tr>
<tr>
<td>Mild malnutrition (Grade II) (90-95%)</td>
<td>14</td>
<td>46.7</td>
<td>16</td>
</tr>
<tr>
<td>Moderate malnutrition (Grade II) (85-90%)</td>
<td>9</td>
<td>30.0</td>
<td>7</td>
</tr>
<tr>
<td>Severe malnutrition (Grade III) (&lt;85%)</td>
<td>1</td>
<td>3.3</td>
<td>2</td>
</tr>
</tbody>
</table>


### Table 4. Mean weight of the respondents as compared with NCHS (1987) and ICMR (1990) standards

<table>
<thead>
<tr>
<th>Weight (kg±SE)</th>
<th>NCHS standards</th>
<th>% age</th>
<th>ICMR standards</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Control</td>
<td>20.1±2.23</td>
<td>80.3</td>
<td>75.2</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>20.6±2.14</td>
<td>25.03</td>
<td>82.3</td>
</tr>
<tr>
<td>After Experimentation</td>
<td>Control</td>
<td>20.6±2.14</td>
<td>82.3</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>21.7±2.37</td>
<td>86.7</td>
<td>81.2</td>
</tr>
</tbody>
</table>
Table 5. Distribution of subjects according to Gomez classification of weight for age

<table>
<thead>
<tr>
<th>Weight for age*</th>
<th>Baseline</th>
<th>After experimentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per cent NCHS standards</td>
<td>Control (n = 30)</td>
<td>Experimental (n = 30)</td>
</tr>
<tr>
<td>Normal (&gt; 90%)</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>Mild malnutrition (Grade I 75-90%)</td>
<td>16</td>
<td>53.3</td>
</tr>
<tr>
<td>Moderate malnutrition (Grade II 50-75%)</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td>Severe malnutrition (Grade III &lt; 50%)</td>
<td>1</td>
<td>3.3</td>
</tr>
</tbody>
</table>


Table 6. Mid upper arm circumference and triceps skinfold thickness as compared to Jelliffe (1966) standards

<table>
<thead>
<tr>
<th>Mid-upper arm circumference (cm)</th>
<th>Mean±SE</th>
<th>Jelliffe standards</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Control</td>
<td>14.9±1.83</td>
<td>80.80</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>15.3±1.06</td>
<td>83.01</td>
</tr>
<tr>
<td>After experimentation</td>
<td>Control</td>
<td>15.1±2.17</td>
<td>81.91</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>15.8±2.06</td>
<td>85.72</td>
</tr>
<tr>
<td>Triceps skin fold thickness (mm)</td>
<td>Baseline</td>
<td>Control</td>
<td>6.35±0.83</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>6.24±0.72</td>
<td>62.83</td>
</tr>
<tr>
<td>After experimentation</td>
<td>Control</td>
<td>6.51±0.71</td>
<td>65.55</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>6.57±1.18</td>
<td>66.17</td>
</tr>
</tbody>
</table>

knowledge level which were in accordance to present findings.

IV. Triceps Skin Fold Thickness (TSFT): The mean 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 6 that the TSFT was 62.83 and 66.17 per cent of Jelliffe standards in E group before and after NC, 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 persual of data clearly indicated that the anthropometric measurements of school girls were below the standards in both the groups. However, a significant increase in weight and MUAC was observed in E group after nutrition counselling. This was due to increased 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 nutrition counselling imparted to girls along with their mothers helped to improve the dietary status of school girls. With improvement in nutrition knowledge and dietary practices, anthropometric 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 need to impart concerted nutrition education to mothers to improve the nutritional status of family especially the children.

REFERENCES