Abstract
During adolescence, erratic eating patterns and wrong food habits take a toll on the health of adolescent girls. This has an impact on their haemoglobin levels. Decreased haemoglobin levels affect the working capacity and results in easy fatigue. Thus, there is a need to impart nutrition education to the adolescent girls. It is an effective tool for building good food habits and improving nutritional status. The purpose of this study was to improve the food habits, dietary choices and haemoglobin levels of adolescent girls by imparting nutrition education. The mildly anaemic adolescent girls were selected on the basis of their haemoglobin levels and were imparted nutrition education for three months. After 3 months, the haemoglobin levels were measured again. The results showed that the number of mildly anaemic adolescent girls was significantly less after imparting the nutrition education than it was before. The paired ‘t’ test was used and the difference in haemoglobin level was significant. The results proved that proper nutrition education is effective in increasing the levels of haemoglobin in adolescent girls.

1. INTRODUCTION
Adolescence is the period of transition between childhood and adulthood. The word ‘adolescence’ is derived from Latin word ‘adolescere’, which means ‘to grow up’. This is
Adolescence is a time of transition when habits are formed that persist into adult life. Good habits, such as exercise and a healthy diet, are likely to bring many benefits including improved performance in school.\textsuperscript{1} Intake of processed, high energy foods, high BMI and iron deficiency anaemia are some of the most prevalent risk factors of these years. Such factors pose risks for later-life non communicable diseases, which are responsible for two of every three deaths globally.\textsuperscript{2} Inadequate nutritional intake during adolescence can have serious consequences throughout the reproductive years and beyond. An undernourished girl is at the risk of developing complications during pregnancy and the chances of her giving birth to a low birth weight baby increases, thus perpetuating a vicious cycle of malnutrition and ill-health.

Almost one-fifth of the world’s population is adolescent girls and eighty four percent of this is in developing countries.\textsuperscript{3} According to UNICEF, India is a home to 243 million adolescents and a large number of these are anaemic- out of which fifty six percent are girls. Iron is essential for formation of haemoglobin in our body which in turn helps in carrying oxygen from lungs to the body organs and tissues and transports carbon dioxide back to lungs from organs and tissues. Iron deficiency leads to reduction in haemoglobin concentration i.e., there is less amount of iron in the body to make red blood cells and this condition is called anaemia. When there is low iron intake along with low iron absorption in the body, it leads to anaemia. This is the most common cause of anaemia but many other factors such as deficiency in folic acid, vitamin B12, vitamin A, or improper digestion or parasitic infections, low immunity can be possible causes of anaemia.

Anaemia is classified into three categories based on haemoglobin concentration in the body- mild anaemia (11-11.9g/dl), moderate anaemia (8-10.9g/dl) and severe anaemia (<8g/dl). The present study is focused on mild anaemia.

Anaemia is still one of India’s major public health problems, despite more than 37 years of iron and folic acid supplementation by the Government of India through the National Nutritional Anaemia Prophylaxis Programme (NNAP) launched in 1970. Some modifications of NNAP have been done to make it more effective and efficient, but the basic problem still remains. This may be due to the fact that supplementation during pregnancy may be too late for desirable birth outcomes.\textsuperscript{4} Evaluation studies of India’s nationwide and long-standing supplementation programme showed irregular supplies, non-compliance by the beneficiaries, poor counselling, etc. As such, the supplementation strategy has proved to be inadequate.\textsuperscript{5}

Adolescent girls are more prone to the effects of malnutrition and anaemia due to their erratic eating patterns, poor dietary habits and lack of nutritional knowledge.\textsuperscript{6} They are at greater physiological stress due to menstruation. This is where nutrition education comes into picture. It involves teaching the people about the importance of nutrition, providing educational materials that reinforce messages about healthy eating, teaching skills
essential for making dietary change, and providing information on how to sustain behaviour change.7 Nutrition education is equally important for girls as any other education because it helps in building a good nutritional status for the girl who would become a mother tomorrow. The knowledge acquired by her will not only be useful for her but also her family members and ultimately the society as it will be shared ahead. Thus, in the light of above mentioned background, the present study was carried out to see the effect of nutrition education on the haemoglobin level in the blood of the adolescent girls.

2. MATERIALS AND METHODS

I. Selection of the subjects: This study was carried out on 30 adolescent girls of age range 16-17 years from a school in Meerut district of Uttar Pradesh. The sample was collected using the lottery method. The research design was before and after without any control or experimental group.

II. Blood and urine are the two easily available body fluids which are used in biochemical assessment of nutritional status.8 The haemoglobin level in the blood of the subjects was measured by the haemoglobin test. The respondents were classified on the basis of haemoglobin concentration in their blood according to WHO classification. Adolescent girls are considered anaemic if haemoglobin level is below 12.0g/dL. Anaemia is further classified into mild (11-11.9g/dL), moderate (8-10.9g/dL) and severe (<8g/dL). The respondents who were mildly anaemic (21) were chosen finally for this study.

III. Nutrition education: The nutrition education programme was conducted for three months (once a week). The contents of the programme were collected through various books and articles available. Different recipes of juices and smoothies such as beetroot juice were given in the form of a booklet. Pictorial presentations were given with lectures that included various dietary sources of iron, vitamin A, vitamin B12, vitamin C and folic acid. Basic information about iron deficiency anaemia was given and symptoms, causes and measures to cure it were taught. The dietary changes to be incorporated were also suggested. After every session, handouts related to it were distributed.

IV. Data Collection: The data was the haemoglobin level of the mildly anaemic respondents collected through above mentioned method, before and after the nutrition education was given.

V. Statistical analysis: The statistical analysis was carried out by using the paired ‘t’ test.

3. RESULTS AND DISCUSSIONS

The haemoglobin level test was conducted two times, before and after the nutrition education was imparted.
Table 1 - Distribution of respondents according to haemoglobin level in their blood before and after nutrition education

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Mildly Anaemic respondents (11-11.9 g/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before imparting Nutrition Education</td>
<td>21</td>
</tr>
<tr>
<td>After imparting Nutrition Education</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

It can be observed from table 1 that the number of mildly anaemic adolescent girls was 9 after the nutrition education programme, whereas, before imparting the nutrition education, it was 21. Thus, it can be inferred that the haemoglobin level of most of the respondents increased after nutrition intervention.

The girls realised the importance of a balanced diet and proper intake of iron, vitamin A, vitamin B12 and vitamin C, folic acid rich foods due to nutrition education. They constantly took the iron rich juices. This helped them to improve their haemoglobin level.

Table 2- Difference in means of Haemoglobin level in blood before and after nutrition education

<table>
<thead>
<tr>
<th>Mean Score of haemoglobin levels in blood</th>
<th>Difference between means</th>
<th>‘t’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Nutrition education</td>
<td>After Nutrition Education</td>
<td>0.57</td>
</tr>
<tr>
<td>11.50</td>
<td>12.07</td>
<td></td>
</tr>
</tbody>
</table>

* ‘t’ value significant at 0.01 level of probability.

According to table 2, the mean of the haemoglobin levels of girls after nutrition education was found to be higher than the mean of their haemoglobin levels before the nutrition education was imparted. The difference of the means was 0.57. Further, the paired ‘t’ test was applied to determine the significance of the nutrition education programme. The ‘t’ test value was 16.853 which was found to be statistically significant at 0.01 level of probability. Thus, it can be stated that nutrition education helped in improving the haemoglobin level in the blood of mildly anaemic adolescent girls.

4. CONCLUSIONS

The present study concludes that effective nutrition education can help in improving the haemoglobin level of the adolescent girls. It makes them aware about good food choices and dietary habits. Nutrition education must be made an integral part of the curriculum of school going adolescent girls. This will have positive impact as the girls will gain knowledge about nutrients which need to be incorporated in their diet during adolescence. As a result, they will become good decision makers about their food and will achieve good health and optimal nutritional status.
5. REFERENCES


TO CITE THIS PAPER

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