THE ROLE OF HEALTH EDUCATION IN REDUCING IRON DEFICIENCY ANEMIA IN YOUTH GIRLS: A SYSTEMATIC REVIEW

MOHAMMADMAHDI HAZAVEHEI, TAHEREETESAMIFARD, MOHAMMADEBRAHIM ADIBINEGAR

Department of Health Education and Promotion, Health Science Research Center, Faculty of Health, Hamadan University of Medical Sciences, Hamadan, Iran
E-mail: hazavehei@gmail.com, taherehealth@gmail.com, adibinegar@gmail.com

Abstract- Iron deficiency anemia is considered to be one of the greatest problems of the youth all over the world. Controlling the risk factors of this disease can reduce the burden and outcomes of this disease in higher level. In this regard, it is important to consider nutritional behaviors. This research aims to compare and analyze the educational intervention to prevent or reduce the risk factors of iron deficiency anemia based on methodology and use of models and theories of health education. Online search using Persian and English keywords from database of Iran Medex, SID, biomed central, PubMed and science direct from 1st of May to 15th of September 2014. Eleven studies were selected in this research which were divided into three categories of the effect of education on risk factor behaviors and physiology of iron deficiency anemia, the effect of education on physiological risk factors of iron deficiency anemia, and the effect of education on behavioral risk factors of iron deficiency. Totally, 3 studies were based on models and theories of health education and 8 studies did not use any model and theory. The results show that education based on theory and model of health education is of great effect on prevention from iron deficiency anemia. Also the duration of intervention activities, environmental change and use of methods interesting for the youth are of great importance inefficacy of education to prevent iron deficiency.

Keywords- anemia, iron deficiency anemia, adolescent, intervention, education, health education theories and models

I. INTRODUCTION

Anemia is one of the major health problems in the world (1), the most common form of which is iron deficiency anemia, which is responsible for about 50% of all cases in the world (2). According to the World Health Organization, more than 2 billion people worldwide are diagnosed with iron deficiency anemia (3) and one of the high-risk groups is the youth; (4) youth refers to the age group 10 to 19 years old (5), and unfortunately 25% of adolescent students in the world are suffering from iron deficiency anemia (6). The prevalence is 9% in the population in industrialized countries and in developing countries, between 29.2 to 79.6 per cent have been reported (1). The prevalence of iron deficiency anemia in adolescence can be seen in girls than in boys (4); This can be due to physical rapid growth and inadequate intake and absorption of iron due blood loss during menstruation (7).

Symptoms of iron deficiency anemia are more activity intolerance, palpitations, fatigue, and behavioral abnormalities. Some symptoms include pallor, fade conjunctiva and nail beds and palms, swelling of the tongue, lip sores, spoon nails and in severe cases chronic heart failure (7). This makes the work efficiency be reduced and thus there appears significant effect on the country's economic and social development (8).

World Health Organization considers iron deficiency anemia as a nutritional disorder (6) which in most cases, with the correct way of eating and living patterns, it is preventable and treatable (9). Four important strategies for the prevention of iron deficiency anemia include strengthening diet along with multiple instruction multiple, fortification of foods, iron supplements and public health practices (10).

Given the high prevalence of iron deficiency anemia in adolescent girls and significant symptoms that follow, control of health problems is of particular importance so that promoting the knowledge and awareness of the international community as a strategy to prevent is accepted (11), so adolescent girls are considered to be an important target group to be trained in order to reduce or prevent iron deficiency anemia iron and before they enter marriage and childbearing stage, they must have training to have a healthy pregnancy stage (12, 13).

Since iron deficiency anemia in adolescent girls increases the future mothers and their infants at risk for the disease as a public health problem that is widespread worldwide and Iran. This study aims to compare the studies of interventions based teaching methods that have used models of behavior change for the control or prevention of iron deficiency anemia in adolescent girls students. This systematic review seeks to answer the question whether health education programs are effective in the reduction or prevention of iron deficiency anemia among adolescent girls of students?

II. DETAILS EXPERIMENTAL

2.1. Materials and Procedures

In this systematic review, to identify intervention studies in which education was considered as a key intervention in reduction or prevention of iron
deficiency anemia, the electronic search of databases in Farsi and English was carried out from 1st of May to 15th of September 2014. These articles were searched from Persian databases including Iranian Journal of Medical Sciences (Iran Medex) and Scientific Information Database (SID) using keywords of anemia, iron deficiency anemia, teenagers, intervention, education, health education theories and models. English articles from databases, also, were searched from biomedcentral, PubMed and sciencedirect using the keywords of anemia, iron deficiency, adolescent, intervention, education, theory, model.

2.2. Inclusion criteria

Interventional studies in which education is their main intervention; the target group is teenage girls student and studies were conducted between January 2004 and September 2014. The reason to choose this point in time is the dramatic increase in nutritional behavior leading to iron deficiency anemia especially in adolescents around the world.

2.3. Exclusion criteria

Descriptive, qualitative studies in which non-educational intervention has been done. To determine the quality of articles, according to the inclusion criteria and the studies plan, authors reviewed articles and eliminated papers which were not of sufficient quality according to the study aim.

A summary of the features of the studies reviewed were entered in the tables that were designed by the researchers. The details of tables include: The place of study, the writer responsible, the beginning and end of the study, study aim, target group, the sample size, the theory / model, variables, method of intervention and results of intervention.

III. RESULTS AND DISCUSSION

3.1. Results

Of the 2,378 articles in English and Persian, after removal of a large number of articles based on titles and abstracts, 59 articles were selected for study purposes; of these, 38 articles were excluded because of inappropriate target group and the remaining 21 articles were examined more closely. 10 articles were removed because they were based on non-educational intervention, and finally 11 (3 English articles and 8 Persian articles) were included in this review study (see Figure 1).

In this study, the articles of the review study were divided into two broad categories: A- studies of educational interventions without the use of theories and models of health education (19,15,12,17,23,21,24). B- Studies in which the theories and models were considered to be basis of health education intervention (16,20 and 22). Totally, a pre- and post-study (15), two quasi-experimental studies (12, 18) and 8 case-control studies were conducted.

In three studies of selected papers in this review, of behavioral and physiological risk factors (Table 1) in three studies of selected papers in this review, only physiological risk factors (Table 2), and in only 5 of behavioral risk factors (Table 3) were investigated. Behavioral risk factors examined in this study, were feeding behavior prevention from iron deficiency anemia and taking iron pills. Physiological risk factors include: Blood hemoglobin, serum ferritin value, hematocrit, serum transferrin saturation percentage, zinc, red blood cell count, serum iron, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, and iron binding capacity, knowledge, attitudes and beliefs were examined in some studies.

3.2. Discussion

3.2.1. Behavioral and physiological risk factors:

Three articles examined assessment of the impact of training on behavioral and physiological risk factors simultaneously.

A study by Halimatou Alaofe et al. was carried out in southern Benin (West Africa country) quasi-experimentally in a boarding school with 64 girls aged 12 to 17 years old diagnosed with mild iron deficiency anemia. Nutritional performance with 24-hour dietary recalls of food and nutritional knowledge were measured using a questionnaire based on standard questionnaire of Guptill et al (14). The energy and food intake, body mass index, malaria and intestinal parasitic infections and blood parameters such as hemoglobin, serum ferritin, serum iron, total iron binding capacity (TIBC), before and 26 weeks after intervention in both intervention and control groups were also studied.

In this study, interventions include: a) holding 4 training sessions, once a week for 60 minutes each time, in which the educational content was developed experimentally in a boarding school with 64 girls aged 12 to 17 years old diagnosed with mild iron deficiency anemia. Nutritional performance with 24-hour dietary recalls of food and nutritional knowledge were measured using a questionnaire based on standard questionnaire of Guptill et al (14). The energy and food intake, body mass index, malaria and intestinal parasitic infections and blood parameters such as hemoglobin, serum ferritin, serum iron, total iron binding capacity (TIBC), before and 26 weeks after intervention in both intervention and control groups were also studied.

Common nutritional problems and identification of inexpensive local foods rich in iron and vitamin C. At the end of each training session to evaluate the understanding of the nutritional concepts in intervention group, by dividing them into groups of 4 or 5, the subjects were tested. At the end of the test,
a group discussion was held and to motivate groups, small gifts were given to them.

b) Changes in the school cafeteria food menu from 4 to 26 weeks for 22 weeks of intervention to increase iron intake through food for lunch and dinner.

Experimental results indicate a significant improvement in all parameters, except in some hematologic indices such as serum iron, total iron binding capacity and transferrin saturation (15). In this study, education type, education duration and follow-up are expressed carefully and quite detailed. Results show that the multiple nutritional interventions such as education and environmental changes such as changes in menu of schools buffet and restaurants, with long-term follow-up are very effective in reducing iron deficiency anemia in adolescents, but we need education with theoretical framework to have the effect on blood indices.

Shakuri and his colleagues conducted a study in Iran in which the nutritional performance of behavioral risk factors and Hemoglobin, Hematocrit and serum ferritin levels of physiological risk factors were examined. This study was conducted using the PRECEDE model based on which the enabling factors (sit in a circle in education class in order to communicate better) and reinforcing factors (group discussion), along with predisposing factors such as knowledge and attitudes were studied.

Study results showed that hemoglobin and hematocrit in the intervention group, compared to pre-training, had no significant increase but other factors increased significantly (16). In this study, quality of teaching, teaching duration and follow-up were expressed accurately and education based on a theoretical framework can be effective in order to achieve the desired results in reducing risk factors for iron deficiency anemia, but for the effect on blood indices such as hemoglobin and hematocrit, we require long-term training, environmental changes and longer follow-up.

In another study conducted in Iran by ShakeriNejad et al., Hemoglobin, transferrin saturation, serum ferritin, cognitive function and feeding behavior as well as knowledge and attitudes of middle school students were investigated. In this study, children with iron deficiency anemia were randomly divided.

Table 1: Recent studies on the impact of education on behavioral and physiological risk factors of iron deficiency anemia in students' adolescent girls:

<table>
<thead>
<tr>
<th>Location of study</th>
<th>Year of Conducting Study</th>
<th>The start and end of the study (days)</th>
<th>The purpose of the study</th>
<th>Sample size</th>
<th>Time needed</th>
<th>Measured variables</th>
<th>Intervention methods</th>
<th>The results of intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tehran, Iran</td>
<td>2010</td>
<td>12-17 year-old female students in boarding school</td>
<td>Education in order to improve iron deficiency anemia (pre-experimental)</td>
<td>68 participants</td>
<td>Education class in order to communicate better</td>
<td>Hemoglobin, Hematocrit, serum ferritin, total iron binding capacity and transferrin saturation</td>
<td>1) Building 4 sessions over a week for an hour and a half in the form of educational classes. 2) Role playing based on enabling, empowering and reinforcing factors. 3) Improving the knowledge of iron and iron deficiency anemia. 4) Treatment of iron and iron deficiency anemia. 5) Blood tests at the end of week 14 of intervention.</td>
<td>Creating a significant statistical difference in the average score of intervention group in the end of week 14 intervention (12 vs. 17.9) Improving a significant statistical difference in the average score of intervention group in the end of week 14 intervention (12 vs. 17.9) Improving a significant statistical difference in the average score of intervention group in the end of week 14 intervention (12 vs. 17.9) Improving a significant statistical difference in the average score of intervention group in the end of week 14 intervention (12 vs. 17.9) Improving a significant statistical difference in the average score of intervention group in the end of week 14 intervention (12 vs. 17.9)</td>
</tr>
</tbody>
</table>


54
The Role Of Health Education In Reducing Iron Deficiency Anemia In Youth Girls: A Systematic Review

Table 2: studies on the impact of education on the physiological risk factors of iron deficiency anemia in adolescent girl students

<table>
<thead>
<tr>
<th>Location of study</th>
<th>Name of Corresponding Author</th>
<th>The purpose of the study</th>
<th>Target group</th>
<th>Sample size</th>
<th>Type of study</th>
<th>Intervention variables</th>
<th>The results of intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>India (Bombay)</td>
<td>Sengodabali</td>
<td>Determining the effect of health education program based on铸铁 taboo model, stimulate and develop good behavior in effective income, low ferritin concentrations, and control</td>
<td>High school students</td>
<td>35 participants in each group</td>
<td>Pretest-Posttest</td>
<td>Performance, usage structure of PRECEDE model, publishing books, promoting health attitude, maintaining agents (group discussions, breaking barriers)</td>
<td>A significant increase in weight and hemoglobin concentrations from 11.39 to 11.79 g/dl/predicates. A significant statistical difference in hemoglobin levels after intervention from 11.46 to 11.88 mg/dl/predicates. A significant increase in iron intake from 25 mg/day to 30 mg/day/predicates. A significant increase in iron intake from 25 mg/day to 30 mg/day/predicates.</td>
</tr>
</tbody>
</table>
The Role Of Health Education In Reducing Iron Deficiency Anemia In Youth Girls: A Systematic Review

Table 3: Studies on the impact of education on behavioral risk factors of iron deficiency anemia in adolescent girl students

<table>
<thead>
<tr>
<th>Reference</th>
<th>Name of Corresponding Author</th>
<th>The main aim of the study</th>
<th>The target population of the study</th>
<th>Target group</th>
<th>Intervention Method</th>
<th>The results of intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (Faget)</td>
<td>N. B. &amp; E. D.</td>
<td>Examining the effect of education on knowledge, attitude, and practice of female students in乖乖女</td>
<td>Middle School</td>
<td>Health Beliefs</td>
<td>Behavioral,</td>
<td>A significant statistical difference of iron deficiency score between the two groups 6 weeks after intervention.</td>
</tr>
<tr>
<td>Iron (Fagat)</td>
<td>N. B. &amp; E. D.</td>
<td>Examining the effect of education on knowledge, attitude, and practice of female students in乖乖女</td>
<td>Middle School</td>
<td>Health Beliefs</td>
<td>Behavioral,</td>
<td>A significant statistical difference of iron deficiency score between the two groups 6 weeks after intervention.</td>
</tr>
<tr>
<td>Iron (Fagat)</td>
<td>N. B. &amp; E. D.</td>
<td>Examining the effect of education on knowledge, attitude, and practice of female students in乖乖女</td>
<td>Middle School</td>
<td>Health Beliefs</td>
<td>Behavioral,</td>
<td>A significant statistical difference of iron deficiency score between the two groups 6 weeks after intervention.</td>
</tr>
</tbody>
</table>

The Role Of Health Education In Reducing Iron Deficiency Anemia In Youth Girls: A Systematic Review

intotwo groups, control and intervention groups and nutrition education was provided for intervention group. The results showed that all the factors studied in the intervention had significant improvement (17). In this study, the method of teaching, teaching duration and follow-up were accurately stated; These results may suggest that the use of instructional practices interesting for teenagers like group discussion alongside other methods can produce better results even at physiological risk factors level.

3.2.2. Physiological risk factors:
ManjeetKaur et al. at Amritsar, India, conducted a study on 50 adolescent girls aged 17 to 19 as before and after test In order to reduce the effect of diet on iron deficiency anemia in adolescent girls. Classroom lectures for nutrition and good eating habits, increasing the number of meals, consumption of foods containing vitamin C along with foods containing iron were held and 12 months later blood factors such as hemoglobin, hematocrit, serum iron, red blood cell count, the mean erythrocyte volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration were measured in the same group and were compared with those of pre-intervention. The results showed that among the blood parameters studied, only hemoglobin, hematocrit and red blood cell count increases were statistically significant (18). In this study, the method and duration of training were unknown and lack of a significant increase in the average volume of red blood cells, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration group in the target group is that 86 percent, 72 percent and 90 percent of students surveyed had a normal average volume of red blood cells, Mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration at the beginning of the study, respectively.

In Fallahi et al.’s study in Iran which was carried out on 68 high school students diagnosed with Iron deficiency anemia in before and after test, awareness and attitude, along with indicators such as blood hemoglobin, Ferritin and zinc in four months immediately before and at the end of training interventions that were held 3 times a week were studied. It was found that the mean score of attitude of the target group was not significantly increased compared to pre-training but other factors examined were significantly improved (12).

In this study, the training, duration of training were specifically mentioned but it appears lack of
significant change in students' attitude is to change the attitude, education and long-term follow-up and modern methods of teaching interesting for the youth rather than speech are required. There was a study by JyotiSajja and colleagues in India in the intervention and control on female adolescents aged 13 to 16 years diagnosed with iron deficiency anemia. Knowledge and hemoglobin before and 3 months after intervention were studied. In this study, the intervention group was divided into two groups, one group as the interface was trained three days a week by trained nutritionists, then this group transferred training one day a week to intervention group. Experimental results indicated a significant increase in awareness and the level of hemoglobin in the intervention group (19). In this study, education, education duration and follow-up were accurately expressed; the result proves that in adolescence due to the influence of friends, peer to peer health education can have a successful outcome in health education.

3.2.3. Behavioral risk factors:
Rezapour and colleagues in a study conducted on 600 students of the third grade investigated the nutritional function of behavioral risk factors. Also, in this study utilizing a model of health belief model, its structures, including perceived sensitivity, perceived severity, guide to action, perceived barriers and perceived benefits in addition to knowledge and attitudes were studied. The results showed that at 6 weeks after intervention at a session organized for the intervention group, perceived benefits and barriers in the two groups showed no significant statistical difference but in other factors, the differences were statistically significant (20).

In this study, quality of teaching, teaching duration and follow-up are expressed and the results show that the education based on the theoretical framework is effective in order to achieve the desired results in reducing risk factors for iron deficiency anemia but to make an impact on the perceived benefits and barriers, especially in the adolescent population, the need for longer training is necessary which in this study was not realized.

In a study by KhodayariZarnaq and colleagues conducted on 300 high school students in the intervention and control format in Iran, performance of nutrition, knowledge and attitude 1.5 months after intervention were compared again. Three teaching sessions, each lasting 60 minutes for the intervention group were held. Results indicate significant differences between intervention and control groups in all parameters evaluated after the intervention (21). In this study, the method and time of teaching and follow-up period are specifically mentioned and it appears, due to the high volume of samples and the use of leaflets and pamphlets in addition to lectures, significantly good results are obtained; however, if the training is done with a theoretical framework, results are expected to be more efficient. A study by TabarEsfahani et al. In intervention and control format was carried out on 130 girl students of middle school. In this study, the nutritional function and structures of models s PRECEDE including predisposing factors (such as knowledge and attitudes), Enabling factors (education classes, participating in educational programs and educational resources) and reinforcing factors (encouraging teachers to attend training classes, encouraging families to eat foods containing iron) were studied. Training in the form of lectures, group discussions and question and answer sessions, each lasting 60 minutes at 3 was done using the PRECEDE model. The results demonstrated that knowledge and attitude (predisposing factors) and nutritional functions immediately and 3 months after the educational intervention in the intervention group had a statistically significant increase. Enabling and reinforcing factors 3 months after the intervention had a statistically significant increase (22).

In this research, teaching method and time are accurately listed, and follow-up time is right. The results of this study suggest that the use of a theoretical framework for teaching and nutritional performance improvement for the prevention of iron deficiency anemia may lead to better results.

Mash'oufi and colleagues did a study on 600 female secondary school students in the control and intervention. In this intervention, nursing experts held a session in lecturing and discussion and the distribution of pamphlets for the intervention group. Nutritional knowledge and attitudes of the target group before and 8 weeks after Intervention were compared. The results showed that none of the factors examined in this study in the intervention group had a significant increase after the follow-up period (23).

Some reasons for not reaching their objectives of this study include lack of time or number of training sessions, inadequate training place and lack of motivation to learn in classrooms while using new methods of informing and education with a theoretical framework can overcome these problems. In Iran, Hosseini and colleagues had a study conducted by interventional and control over 600 secondary school student girls. In this study, along with the nutritional knowledge and attitudes before and .5 months after the intervention, nutritional function was investigated. Training class in 3 sessions for modification of dietary patterns and increase of the overall bioavailability of iron intake in the form of lectures and group discussions, together with the distribution of pamphlets and publications was held. Based on the results of the study, all factors studied in 1.5 months after training in both intervention and
control groups had statistically significant differences (24).

In this research, teaching and training time are accurately listed, follow-up time is appropriate, but the curriculum of every meeting is not clear. Favorable results of this study can be influenced by the teaching methods appropriate to the target age group i.e the group discussion in addition to lectures.

CONCLUSION

Teaching teenage girls who are at risk for iron-deficiency anemia is a very powerful tool for reducing risk factors and prevention the disease. According to studies performed in this regard:

1. Long-term training with environmental changes is required for improving blood indices in patients with iron-deficiency anemia.

2. Another thing that came from this review is that the use of theoretical frameworks and models of health education as a means to reduce the risk of behavioral and physiological factors can be effective in achieving better results.

3. A training module can influence learning more.

4. Attention to the characteristics of the audience will be effective in providing training on how to use their favorite ways with a positive impact on raising awareness, changing behavior and improving the blood indices.

In general, it can be said that health education is effective to reduce the risk of iron deficiency anemia in adolescents.

ACKNOWLEDGMENTS

This article is a part of the PhD thesis of health education and health promotion supported by Hamadan University of Medical Sciences. We would like to thank Deputy of Research of Hamadan University of Medical Sciences for support of this study.

REFERENCES


The Role Of Health Education In Reducing Iron Deficiency Anemia In Youth Girls: A Systematic Review

