A HEALTH EDUCATION PROGRAM BASED ON THE HEALTH BELIEF MODEL FOR PRIMARY SCHOOL STUDENTS REGARDING PREVENTION OF IRON DEFICIENCY ANEMIA

Sahar Sayed Abd El Ghafar Mohammed¹, Dr. Sahar Ahmad Shafik², Dr. Ons Said El-zayat³

¹Assistant Lecturer of community health nursing - Faculty of Nursing at beni suef University,
²Professor of Community Health Nursing - Faculty of Nursing, El Fayom University,
³Assistant Professor of Community Health Nursing - Faculty of Nursing, Helwan University.

ABSTRACT

Background: Iron deficiency anemia is a global health concern. It reflects the disturbance of the dynamic balance between production and destruction of erythrocytes and hemoglobin.

Aim: This study aims to evaluate the effect of a health education program based on the health belief model for primary schools students regarding prevention of iron deficiency anemia.

Study Design: A quasi-experimental study (pre and post test).

Setting: This study was conducted at three mixed primary schools were selected randomly in Beni suef governorate.

Sample: A multi stage random sample of 300 students.

Tools: Two tools were used for data collection: Tool I, students and their parent's demographic data, primary school student's knowledge about iron deficiency anemia and primary school students reported practices related to iron deficiency anemia. Tool II, Health belief model.

Results: 40% of primary school students had poor total knowledge about iron deficiency anemia before the program which improved to 67% of them had good total knowledge after the program, as well as 22.7% of them had unsatisfactory total reported practice before the program which improved to 71.3 % of them had satisfactory total reported practice after the program. Also, 67.7% of them gad negative health belief model before the program which improved to 83.3% of primary school students had positive health beliefs model after the program. Also, there are highly statistically significant relationships between total knowledge scores, reported practice scores, health belief model scores after the program.

Conclusion: The results of the study supported the hypothesis of the study which showed that, there was a marked improvement in primary school student's knowledge and reported practice about prevention of iron deficiency anemia after implementation of a health education program based on the health belief model. Also, there are highly statistically significant relationships between total knowledge scores, reported practice, health belief model after the program.

Recommendations: Continues educational programs for all primary school students to raise their awareness about prevention of iron deficiency anemia

Key words: Primary school student, Health belief model, Iron deficiency anemia.

I. INTRODUCTION

Iron-deficiency anemia (IDA) is defined as nutritional disorder in which there no mobilization of iron stores and which sings of compromised supply of iron to tissue including the erythron are noted. IDA decrease in the total
hemoglobin (Hb) levels caused by iron deficiency. IDA is the most common nutritional deficiency worldwide affecting mostly children's in developing countries and the major cause of morbidity and mortality [1]

Iron deficiency anemia is a problem of serious public health significance, given its impact on psychological and physical development, behavior, and work performance. It is the most prevalent nutritional problem in the world today, affecting more than 700 million persons. Iron deficiency occurs when an insufficient amount of iron is absorbed to meet the body's requirements. This insufficiency may be due to inadequate iron intake, reduced bioavailability of dietary iron, increased needs for iron and chronic blood loss [2]

Primary schools are schools in which students receive primary or elementary education from the age of about six to twelve years. Three general characteristics of primary school students parallel to trends in the area of intellectual, social and personality development. The major development is that the student thinking becoming more organized, more prepared and more logical. Therefore, the school age students at play will be more realistic and more rule oriented than was the preschool [3]

Globally, 50% of the anemia is assumed to be attributable to iron deficiency. Globally, iron deficiency ranks number 9 among 26 risk factors included in the Global Burden of Disease (GBD) 2000, and accounts for 841,000 deaths and 35,057,000 disability-adjusted life years lost. Africa and parts of Asia bear constitute 71% of the global mortality burden and 65% of the disability-adjusted life years lost. Whereas, North America bears constitute 1.4% of the global burden [4]

Once the body use up all the iron stores in the body and the body can’t absorb enough iron from food, body will begin to make fewer RBCs and they will contain less hemoglobin than they should. This leads to iron deficiency anemia, a common cause of anemia and the most common nutritional deficiency worldwide [5]

Iron deficiency anemia is caused by increase iron needs because of their rapid growth, sometimes it can be hard for them to get enough iron from their normal diet, decrease iron intake or absorption, blood loss. IDA may be caused not only by a deficiency of iron (or, less often, of other nutrients) but also, by other conditions. Congenital hemolytic diseases such as sickle-cell anemia and thalassaemia are also found in certain populations [6]

Signs and symptoms of iron deficiency anemia include, fatigue, malaise, poor appetite, apathy/depression, hypersensitivity to cold, weakness, irritability, dizziness, headache, tinnitus, shortness of breath, palpitations, chest pain, exercise intolerance, lack of strength and endurance with reduced ability to perform activities of daily living. [7]

The diagnosis of iron deficiency is made through Complete Blood Count. The CBC documents, the severity of the anemia. In chronic iron deficiency anemia, the cellular indices show a microcytic and hypo chromic erythropoietin—that is, both the mean corpuscular volume (MCV) and the mean corpuscular hemoglobin concentration (MCHC) have values below the normal range for the laboratory performing the test. Serum iron, total binding capacity and serum ferritin [2]

Low serum iron and ferritin levels with an elevated Total Iron Binding Capacity (TIBC) are diagnostic of iron deficiency, while a low serum ferritin is virtually diagnostic of iron deficiency, a normal serum ferritin can be seen in patients who are deficient in iron and have coexistent diseases (eg, hepatitis or anemia of chronic disorders); these test findings are useful in distinguishing iron deficiency anemia from other microcytic anemia [8]

Health Belief Model (HBM) is a social psychological health behavior change model developed to explain and predict health-related behaviors, particularly in regard to the uptake of health services. The HBM was developed in the 1950s by social psychologists at the United State. The HBM suggests that people's beliefs about health problems, perceived benefits of action and barriers to action. A stimulus, or cue to action, must also be present in order to trigger the health-promoting behavior [9]

The health belief model is a tool developed to explain patient’s behavior in the face of an illness or the risk of falling ill. It was developed in the 1950s and considers that positive factors increase pro-health behaviors while negative factors decrease or inhibit them Health Belief Model (HBM) was one of the earliest behavior change models to explain human health decision-making and subsequent behavior. Over the next few years this theory
was modified to help predict whether people will take action to prevent, screen for, and control illness. The HBM has been used extensively to determine the relationships between health beliefs and health behaviors [10].

Iron deficiency anemia is a serious health problem which have negative consequences on the students such as major complications on intellectual performances, behavioral disturbance, damage immune mechanism as well as impaired ability to concentration which lead to reduce academic achievement [11].

Strategies for the prevention of IDA in students should be directed toward ensuring adequate iron status, eat suitable amount of foods containing iron as well as more fruits and vegetables, increase amount of a food as well as fruits contains vitamin c and finally provision of adequate iron through supplements or iron-rich foods [12].

The treatment of IDA depends mainly on oral iron supplements, which are desirable as a first-line therapy. The most commonly used preparations are ferrous fumarate and ferrous gluconate. The main side effects are gastrointestinal disturbances. Treatment should be continued for at least 3 months and best taken on an empty stomach [13].

The school health nurse play an important role as they are able to provide clear instructions about prevention of iron deficiency anemia through increasing primary school students knowledge about meaning of iron deficiency anemia, causes, risk factors, diagnosis, complications and prevention of iron deficiency anemia as importance of vitamin C that improve absorption of iron as well as avoid calcium that decrease absorption of iron. The school health nurse is a link between school personnel, family, health care professional and the community [14].

1.1 Significance of the Study

In Egypt, studies have indicated that anemia is a major public health problem among children, especially school students. Iron deficiency anemia found to be the most common cause of anemia among Egyptian students of low socioeconomic standard affecting 43% of them. In Qena governorate, the prevalence of IDA was 12% among students in the age group of 6-11 years. Recent studies have shown that iron deficiency may be associated with both hematologic and non hematologic adverse effects, which may be irreversible [15].

According to a UNICEF report, more than two billion individuals have anemia worldwide and most of them have IDA, especially in underdeveloped and developing countries, where 40-50% of students are iron deficient compared with 6-20% in developed countries [16].

Iron deficiency is considered to be one of most prevalent forms of malnutrition which had serious complications on student's life. So, this study was done to evaluate the effect of a health education program based on the health belief model for primary school students regarding prevention of iron deficiency anemia.

1.2 Aim of the study

This study aims to evaluate the effect of a health education program based on the health belief model for primary schools students regarding prevention of iron deficiency anemia through:

1- Assessing primary schools student's knowledge and practice regarding iron deficiency anemia.

2-Planning and implementing a health education program based on the health belief model regarding to students needs.

3- Evaluating the effect of a health education program based on the health belief model regarding to iron deficiency anemia.

1.3 Research Hypothesis:

A health education program based on the health belief model will improve primary schools student's knowledge and practice regarding iron deficiency anemia.

II. SUBJECTS AND METHODS

2.1 Research design:

A quasi-experimental study was applied to achieve the aim of the current study.
2.2 Research setting:
This study was conducted at three mixed primary schools were selected randomly in beni suef governorate. (Hassan Ismeal, Elshrouk and Elhaddetha ), the three schools was located at beni suef governorate , each school had 4 glasses from six grade students and the total number of students in each glass were 48-50 student.

2.3Subjects:
The subjects of the existing study were 300 students who were randomly selected A multi stage random sample technique was used for selection of primary school students.

2.4 Sampling technique:
A multi stage random sample technique was used for selection of the primary school students. First stage, Total number of governmental primary school students at beni suef is six schools, three schools will be chosen randomly for conduct this study. Second stage, two classes from six grades will be selected randomly from each school. Third stage, all school students in selected classrooms will be included in the study (300) student.

2.5 Tools of data collection
The tools of this study were collect by using two tools:

1st tool A: structural interviewing questionnaire: Was used in this study developed by the researchers after reviewing of national and international related literature. It will contain the following parts:

Part I: concerned with students and their parents demographic data related to variables such as students age, gender, father age, mother age, father education, mother education, father occupation, mother occupation, place of residence and family income.

Part II: Concerned with primary school students knowledge about iron deficiency anemia as meaning, causes, vulnerable group, signs and symptoms, diagnosis, complications, treatment and prevention of iron deficiency anemia. This part was used before and after health educational program to evaluate the effect of the program.

Scoring system:
Knowledge of students regarding iron deficiency anemia was classified as correct answer was scored 1 and incorrect answer was scored zero.

Total knowledge was classified as follows:
- Good > 75%.
- Average 50 - < 75 %.
- Poor < 50 %.

Part III: concerned with primary school students reported practices related to iron deficiency anemia. This part will be used before and after health educational program to evaluate the effect of the program.

Scoring System:
Scoring used for the practice of students regarding iron deficiency anemia was classified as done answer was scored 1 and not done answer was scored zero.

Total reported practice was classified as follows.
- Satisfactory reported practice scored > 50 % (from 13 to 25).
- Unsatisfactory reported practice scored< 50% (less than 13).

Tool 2: Health Belief Model constructs: Adapted from champion (1999) The HBM constructs which used in this study was perceive susceptibility (Seven items), perceived severity to iron deficiency anemia (Ten items), perceived barriers (Ten items), perceived benefits (Five items), and cues of action (Seven items).
Scoring system:
Scoring system for HBM All the items of subscales have three-point Likert scale response choices: agree score 3 points, neutral score 2 points, and disagree score 1 point. The total score ranged from 39 to 117 points, which will score as follows: 21 for perceived susceptibility, 30 for perceived severity, 30 for perceived barrier, and 15 for perceived benefits and 21 for cues to action.

Total scoring system for health belief model was classified as follows:
- Positive belief >50% (from 59 to 117)
- Negative belief < 50% (from 39 to less than 59)

2.6 Validity:
The validity of the tool was tested through a panel of five experts from Community Health Nursing Staff from faculty of nursing at Helwan University and Ain Shams University to review relevance of the tools for comprehensive, understanding and applicability.

2.7 Reliability
Reliability of the tool was tested to determine the extent to which the questionnaire items related to each other. Answers from the repeated testing were compared (Test–re-test reliability for knowledge was 0.82) and Alpha Cronbach's for practice reliability was 0.890.

2.8 Pilot study:
The pilot study has been conducted to test the clarity, applicability and understand ability of the tool. It has been conducted on a sample of 10% (30) of primary school students. The results of the pilot helped in refining the interview questionnaire and to schedule the time framework. The participants of the pilot were included in the main study sample.

2.9 Fieldwork
Before conducting the study, permission was obtained from the directors of the schools. The investigator met the students and the aim of the study was explained to them. Their informed verbal consent was secured before collecting data.

The investigator collected data during 2 days-week (Sunday and Tuesdays) visited the previously mentioned setting from 10 am-12 pm, the questionnaire were distributed and completed by the investigator. Each session lasted about 45 minute. Suitable teaching aids prepared specially for the program (booklet).

The investigator met students in (Hassan Ismeal and Elshrouk), Every Sunday due to near distance between two schools and met students in (Elhaddetha) every Tuesday. The program was implemented in the form of group discussion.

The investigator then explained the data of questionnaire to the students and needed time to fill this questionnaire.

Health education program were developed based on the results of pretest questionnaire sheet.

The investigator explained the same information's in the different selected schools.

The health education program was then started on a pre-determined schedule. To make sure exposure of all students to the same information's, all students receive the same program content using the same teaching methods and booklet.

**Preparatory phase**, tools of data collection development review of past and current related literature covering various aspects of prevention of iron deficiency anemia for primary school students. Using available books, articles and magazine.
- The field work was out in 6 months. The study was conducted through four phases’ assessment, planning, implementation and evaluation.

**Assessment phase,** before start the designed health education program, the study tools was applied to assess primary school student's knowledge and practice toward prevention of iron deficiency anemia. Pre test questionnaire was administered to the study sample to assess level of knowledge and practice regarding prevention of iron deficiency anemia. The data obtained during this phase were considered the basics for content of health education. **Planning phase,** after identifying the needs of primary school students in the assessment phase, the investigator develop the program about prevention of iron deficiency anemia based on items of assessment with simple Arabic language to be suitable for understanding.

- It emphasized on knowledge about iron deficiency anemia meaning, causes, vulnerable groups, signs and symptoms, diagnosis, complications, treatment and prevention.

- Primary school students reported practice regarding iron deficiency anemia.

- Health belief model for Primary school students regarding iron deficiency anemia.

**Implementation phase,** health education program was carried out in the Beni suef primary schools (Hassan Ismeal, Elshrouk and Elhaddetha). The students were divided into small groups (20 groups), each group contained 15 students. The researcher met students in (Hassan Ismeal and Elshrouk) every Sunday and met students in (Elhaddetha) every Tuesday. The first session started with greeting and conveying the feeling of acceptance to participant students, after that orientation to the program and it is aims took place, using simple words to identify the program, reduce anxiety level and develop sense of trust, the last sessions started with greeting and welcomed students, summary for the previous session, the content of the new session and at the end of the session, students were asked for their feedback in discussion. - The health education program was applied through 9 sessions; each session took about 30-45 minutes every day at the schools.

- At the beginning of the first session, an orientation to the aim of the study and the goal of the health education program. Also, student were oriented about program sessions time, duration, place and contents. The investigator stressed on the importance of continues attendance and active participation.

- Different teaching and learning methods were used during the sessions which included lecture, discussion and brain storming. Instructional media includes booklet. The health education program was presented in a clear and concise form to be used as memorial references.

- Each session started with a summary about the previous session and the objectives of the new session, using a very simple language that suit the level of primary school students without ignoring motivation and reinforcement techniques.

- Direct reinforcement in the form of a copy from the booklet pamphlet was given as a reward for each student to use it as a future reference.

- Students were allowed to ask any interpretation, elaboration or explanations of any item included in the sessions.

- At the end of every session, the students were discussed to correct any misunderstanding.

**Program evaluation,** after implementation of booklet, post –tests was being done to evaluate the level of improvement in student's knowledge and practice. The post test was being done immediately at the end of the sessions of health education program using the same tools of pretest evaluation.

**2.10 Ethical considerations:**

Ethical consideration was be gained from scientific ethical committee of Helwan University, students in the study are voluntary and was given complete full information's about the study and their role before signing the informed consent. The ethical considerations were including explaining the purpose and nature of the study, staving the possibility to withdraw at any time, confidentiality of the information were guaranteed. Ethics, values, culture and beliefs will be respected.
2.10 Statistical analysis:

Data collected from the study sample was revised, coded and entered using personal computer (PC). Computerized data entry and Statistical analysis were fulfilled using the statistical Package for the Social Science (SPSS), version 24. Data were presented using descriptive statistics in the form of frequencies, percentage, Chi-square test was used for compressions between qualitative variables, Paired t test used to determine the strength and direction of association between two ranked variables. Also, used Mean SD.

Significance of the results:
- Highly significant at p-value < 0.01.
- Statistically significant was consider at p-value < 0.05.
- Non-significant at p-value > 0.05.

Results

Table (1) shows that, 86.7% of primary school students their age 11-12 years with mean age was 11.34 ± 0.91. Regarding to the father age, 53.3% of them were in age group from 35-<45 years with means was 43.76 ± 3.10. As regarding mother age, 57% of them were in age group from 35-<45 years. Concerning father education, 67.7% of them had basic education. Regarding to mother education 66% of them had basic education. Concerning father occupation, 55% of them were employed. Concerning mother occupation, 58.7% of them were housewives. Regarding family income, 48.7% had sufficient income for essential needs only.

Figure 1: illustrates that, 67% of primary school students were female while 33% of them were male.

Figure 2: illustrates that, 79% of primary school students live in urban area while 21% of them live in rural area.

Figure 3: Shows that, 40% of the primary school students had poor total knowledge scores before the program, which improved to 67% of them had good total knowledge scores after the program.

Figure 4: Shows that, 77.3% of primary school students had unsatisfactory total reported practice scores about iron deficiency anemia before the program, which improved to 71.3% of them had total satisfactory reported practice scores after the program with p value = .000.

Figure 5: shows that, 67.7% of primary school students had negative total health beliefs model scores toward iron deficiency anemia before the program, which improved to 83.3% of them had positive total health beliefs model scores after the program with p value = .000.

Table 2: reveals that, there is no statistically significant relationship between total knowledge scores and total reported practices scores with p value = .494 before the program. As well as, reveals that there is a high statistically significant relationship between total knowledge scores and total reported practices scores after the program with p value = .000.

Table 3: reveals that, there are no statistically significant relationship between total knowledge scores of students and level of total health beliefs models scores with p value = .320 before the program. As well as, reveals that there is a high statistically significant relationship between total knowledge scores of students and total health beliefs model scores after the program with p value = .000.

Table 4: reveals that, there is a high statistically significant relationship between total reported practice scores and total health beliefs model scores with p value = .000 before the program. As well as, reveals that there is a high statistically significant relationship between level of total reported practice scores of students and total health beliefs model scores after the program with p value = .000.

Table 5: reveals that, there is no statistically significant relationship between total knowledge scores and total reported practice scores with p value = .878 before the program while there is a high statistically significant relationship between total students knowledge scores and total reported practice scores with p value = .000 after
The program, as well as, there is a high statistically significant relationship between total reported practice scores and total health beliefs model scores before and the program with p value = .000.

Table (1): Number and percentage distribution of the primary school students and their parents regarding to their demographic data (n=300).

<table>
<thead>
<tr>
<th>Items</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of students (Year)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-12</td>
<td>260</td>
<td>86.7</td>
</tr>
<tr>
<td>≥12</td>
<td>40</td>
<td>13.3</td>
</tr>
<tr>
<td>Mean ± S.D</td>
<td>11.34 ± 0.91</td>
<td></td>
</tr>
<tr>
<td>Father's age (Year)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-&lt;35</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>35-&lt;45</td>
<td>160</td>
<td>53.3</td>
</tr>
<tr>
<td>45-&lt;55</td>
<td>71</td>
<td>23.7</td>
</tr>
<tr>
<td>≥55</td>
<td>39</td>
<td>13</td>
</tr>
<tr>
<td>Mean ± S.D</td>
<td>43.76 ± 3.10</td>
<td></td>
</tr>
<tr>
<td>Mother's age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-&lt;35</td>
<td>55</td>
<td>18.3</td>
</tr>
<tr>
<td>35-&lt;45</td>
<td>171</td>
<td>57</td>
</tr>
<tr>
<td>45-&lt;55</td>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>≥55</td>
<td>14</td>
<td>4.7</td>
</tr>
<tr>
<td>Mean ± S.D</td>
<td>39.73 ± 2.97</td>
<td></td>
</tr>
<tr>
<td>Father's education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>do not read or write</td>
<td>4</td>
<td>1.3</td>
</tr>
<tr>
<td>basic education</td>
<td>203</td>
<td>67.7</td>
</tr>
<tr>
<td>secondary education</td>
<td>44</td>
<td>14.7</td>
</tr>
<tr>
<td>university education</td>
<td>49</td>
<td>16.3</td>
</tr>
<tr>
<td>Mother's education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>do not read or write</td>
<td>10</td>
<td>3.3</td>
</tr>
<tr>
<td>basic education</td>
<td>198</td>
<td>66</td>
</tr>
<tr>
<td>secondary education</td>
<td>16</td>
<td>5.3</td>
</tr>
<tr>
<td>university education</td>
<td>76</td>
<td>25.3</td>
</tr>
<tr>
<td>Father's occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>165</td>
<td>55</td>
</tr>
<tr>
<td>Craftsman</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Free business</td>
<td>96</td>
<td>32</td>
</tr>
<tr>
<td>on retirement</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Mother's Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>124</td>
<td>41.3</td>
</tr>
<tr>
<td>Housewife</td>
<td>176</td>
<td>58.7</td>
</tr>
<tr>
<td>Family income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sufficient for all requirements and daily needs</td>
<td>146</td>
<td>28.7</td>
</tr>
<tr>
<td>Sufficient for essential needs only</td>
<td>86</td>
<td>48.7</td>
</tr>
<tr>
<td>Not enough</td>
<td>68</td>
<td>22.6</td>
</tr>
</tbody>
</table>
Figure (1): Distribution of the primary school students according to their gender (n=300).

Figure (2): Distribution of the primary school students according to their place of residence (n=300).

Figure (3): Total knowledge scores of the primary school students at pre and post implementation of a health education program about Iron Deficiency Anemia (n=300).
Figure (4): Total reported practice scores of the primary school students at pre and post implementation of a health education program about Iron Deficiency Anemia (n=300).

Figure (5): Total health belief model scores of the primary school students at pre and post implementation of a health education program about Iron Deficiency Anemia (n=300).

Table (2): Relation between total knowledge scores of students about iron deficiency anemia and their total reported practices scores at pre and post implementation of a health education program (n=300).

*significant at p < 0.05. **highly significant at p < 0.01.
### Table 3: Relation between total knowledge scores of students about iron deficiency anemia and their total health belief model scores at pre and post implementation of a health education program (n=300).

<table>
<thead>
<tr>
<th>Item</th>
<th>Level of total health belief model scores at pre education program</th>
<th>X2 (P-Value)</th>
<th>Items</th>
<th>Level of total health belief model scores at post education program</th>
<th>X2 (P-Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive (n=203)</td>
<td>Negative (n=97)</td>
<td></td>
<td>Positive (n=250)</td>
<td>Negative (n=50)</td>
</tr>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Total knowledge score at pre education program</td>
<td>46</td>
<td>82.1</td>
<td>10</td>
<td>17.9</td>
<td>2.360 (.294)</td>
</tr>
<tr>
<td>Good (n=56)</td>
<td>70</td>
<td>77.8</td>
<td>20</td>
<td>22.2</td>
<td></td>
</tr>
<tr>
<td>Average (n=90)</td>
<td>87</td>
<td>56.5</td>
<td>67</td>
<td>43.5</td>
<td></td>
</tr>
<tr>
<td>Poor (n=154)</td>
<td></td>
<td></td>
<td></td>
<td>Poor (n=40)</td>
<td></td>
</tr>
</tbody>
</table>

*significant at p < 0.05.  **highly significant at p < 0.01.

### Table 4: Relation between total reported practices scores of students about iron deficiency anemia and their total health beliefs model scores at pre and post implementation of a health education program (n=300).

<table>
<thead>
<tr>
<th>Item</th>
<th>Level of total health belief model scores at pre education program</th>
<th>X2 (P-Value)</th>
<th>Items</th>
<th>Level of total health belief model scores at post education program</th>
<th>X2 (P-Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative</td>
<td>Positive</td>
<td></td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Total reported Practice score at pre education program</td>
<td>60</td>
<td>88.2</td>
<td>8</td>
<td>11.8</td>
<td>17.03 (.000 **)</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>143</td>
<td>61.6</td>
<td>89</td>
<td>38.4</td>
<td></td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td></td>
<td></td>
<td></td>
<td>Unsatisfactory</td>
<td></td>
</tr>
</tbody>
</table>

*significant at p < 0.05.  **highly significant at p < 0.01.

### Table 5: Correlation between total students’ knowledge scores about iron deficiency anemia and their total reported practices scores and total health beliefs model scores at pre and post implementation of a health education program (n=300).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total reported practice scores</th>
<th>Total health beliefs model scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-educational Program</td>
<td>Post-educational program</td>
</tr>
<tr>
<td>Total knowledge scores</td>
<td>rp</td>
<td>.009</td>
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<tr>
<td>Total reported practice scores</td>
<td>rp</td>
<td>.235</td>
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III. DISCUSSION

Iron deficiency and IDA are severe health problems in the whole world. Iron has a vital role for many biologic functions including energy production, respiration, and cell proliferation. IDA is the end-stage result of the lack of iron in the body resulting from inadequate iron intake, increased iron loss, or excessive iron requirements. As a consequence, erythropoietin is insufficient to fulfill the body’s physiologic needs. IDA diminishes working performance by constraining muscles to depend on anaerobic metabolism in order to greater attain muscle extent in contrast to healthy individuals. As a result, in affected students capability to perform physical work is decreased. Furthermore, in students, both growth and learning capacities are affected [17].

The health Belief Model (HBM) is one of the main models to train preventive behaviors. Educational interventions can be designed and implemented in order to prevent diseases using HBM. The model defines the key factors that influence health behaviors as an individual's perceived threat to sickness or disease (perceived susceptibility), belief of consequence (perceived severity), potential positive benefits of action (perceived benefits), (perceived barriers to action, exposure to factors that prompt action (cues to action)). Community health nurse play an important role in prevention of iron deficiency anemia by instructs students about increasing ingestion of ferrous-containing foods such as: liver, red meats and green leafy vegetables [10].

Regarding demographic data of the primary school students, the current study showed that, majority of primary school students their age 11-12 years. Concerning father and mother education more than two thirds of them had basic education. More than half of their fathers were employed, and more than half of their mother was housewives. Less than half of them had sufficient income for essential needs only. More than two thirds of primary school students were female. More than three quarters of primary school students live in urban area. This result was in agreement with Mirzei et al., (2018) who conducted a study entitled "Application of Health Belief Model (HBM) to promote preventive behaviors against iron-deficiency anemia among students of primary School in Fereydan City: " whose found that majority of primary school students their age from 11to 12 years. As well as, more than two thirds of parent's education had basic education, more than half of mother's participants were housewife. More than half of participant's students were female and nearly three quarters live in urban area. Also, this result was supported with Munira & Viwattanakulvanid, (2019) who conducted a study entitled "Influencing Factors and Knowledge Gaps on iron deficiency Anemia Prevention among primary school Students in Indonesia" whose found that half of father's participants were employed and had enough income. This from the investigator point of view could be explained due to the importance of this specific age where there are many changes and the students are more prone to iron deficiency anemia than other groups as well as, lowering levels of parent's education as well as low economic status lead to decrease awareness about the needs and development of their children's.

Regarding total knowledge scores of the primary school students at pre and post implementation of a health education program about iron deficiency anemia, the current study showed that more than one third of primary school students had poor total knowledge scores about iron deficiency anemia before the program, which improved to more than half of primary school students had good total knowledge scores after the program. This finding was in the same line with Larijani et al., (2020) who conducted a study entitled "The effect of health education on preventive behaviors of iron deficiency anemia in primary students in Australia" whose founded that one third of participants students had poor total knowledge scores about iron deficiency anemia before the program, which statically significant improved to majority of them had good total knowledge scores after the program. Also, this result was in agreement with Rashakani et al., (2018) who conducted a study entitled "Effect of Intervention Based on Health Belief Model on the Change in Nutritional Behavior of students with Iron Deficiency Anemia in Iraq" whose found that about near one third of primary school students had poor total knowledge scores about iron deficiency anemia before the program which improved to majority of them had good total knowledge scores after the program. From the investigator point of view, this result may be due to the effect of health education program in playing a vital role in improving primary school student's knowledge about iron deficiency anemia.

Regarding total reported practice scores of the primary school students at pre and post implementation of a health education program about Iron Deficiency Anemia, the current study showed that the more than half of primary...
school students had unsatisfactory total reported practice scores about iron deficiency anemia before the program, which statically significant improved to more than three quarters of them had satisfactory total reported practice scores after the program. This result was in accordance with Araban et al., (2018) who conducted a study entitled "Nutrition modification aimed at enhancing dietary iron and folic acid intake among primary school students: an application of health belief model in practice in Europe" and found that less than half of students had unsatisfactory total reported practice scores about iron deficiency anemia before the program, which improved to the majority of them had had satisfactory total reported practice scores after the program.

Also, this result was in agreement with Ghaderi et al., (2017) who conducted a study entitled "Effect of education based on the Health Belief Model (HBM) on anemia preventive behaviors among primary students in Iraq" and found that more than half of students had unsatisfactory total reported practice scores about iron deficiency anemia before the program, which improved to all most of students had satisfactory total reported practice scores after the program. From the investigator point of view, this result may be due to health education program were very important for primary school students that suffering from iron deficiency anemia and lead to improve their practice.

Regarding total health belief model scores of the primary school students at pre and post implementation of a health education program about Iron Deficiency Anemia, the current study showed that more than half of primary school students had negative total health beliefs model scores toward iron deficiency anemia before the program which improved to more than three quarters of them had positive total health belief model scores after the program. This result was in accordance with Zuraida et al., (2020) who conducted a study entitled "The Effect of Anemia Free Club Interventions to Improve Knowledge and Attitude and health beliefs of Nutritional Iron Deficiency Anemia Prevention among Primary School students in Bandar Lampung City" and found that the more than half of primary school students had negative total health beliefs model scores toward iron deficiency anemia before implementation of educational program which improved to majority of them had positive total health belief model scores after the program.

Conversely, this result was in disagreement with Aboud et al., (2019) who conducted a study entitled "Knowledge, Attitude, beliefs and Practice Regarding Prevention of Iron Deficiency Anemia among primary school students in Tabouk region” and found that the more than half of primary school students had negative total health beliefs model scores toward iron deficiency anemia before implement training program, which improved to majority of them had positive total health belief model scores after the program after the program. From the investigator point of view, this result may be due to educational program were very important for primary school students to enhance their beliefs about iron deficiency anemia.

Regarding relation between total knowledge scores of students about iron deficiency anemia and their total reported practices at pre and post implementation of a health education program, the current study revealed that there is a high statistically significant relationship between total knowledge scores and total reported practices scores after the program with p value =.000. This result was in accordance with Araban et al., (2018) who conducted a study entitled "Nutrition modification aimed at enhancing dietary iron and folic acid intake: an application of health belief model in practice in Europe" whose found that there is a high statistically significant relationship between total knowledge scores and total reported practices scores after the program.

Also, this result was in agreement Mehrabian et al., (2019) who conducted a study entitled "The effect of education based on health belief model on promoting of nutritional behavior to prevent iron deficiency anemia between primary school students in Turkey” and found that there is a statistically significant relationship between total knowledge scores and total reported practices scores after the program. From the investigator point of view, this result may be due to good knowledge being able to play essential role in improving student's practices.

Regarding relation between total knowledge scores of students about iron deficiency anemia and their total health belief model scores at pre and post pre implementation of a health education program, the current study revealed that there is a high statistically significant relationship between total knowledge scores and total health beliefs model scores after the program with p value =.000. This result was in accordance with Vahedian et al., (2019) who conducted a study entitled "The impact of health education based on health belief model on nutritional habits in primary school students suffering from iron deficiency anemia in Lebanon " and found that there is a high statistically significant relationship between total knowledge scores and total health beliefs model scores after the program. Also, this result was in congruence with Ghaderi et al., (2018) who found that revealed that there is a
high statistically significant relationship between total knowledge scores and total health beliefs model scores after the program. From the investigator point of view, this result may be due to the health education program for primary students provide them with precious information's that can affect their health knowledge, beliefs and preventive behaviors.

Regarding relation between total reported practices scores of students about iron deficiency anemia and their total health beliefs model scores at pre and post implementation of a health education program, the current study revealed that there is a high statistically significant relationship between total practice scores and total health beliefs model scores before the program with p value =.000. As well as, revealed that there is a high statistically significant relationship between level of total reported practice scores and total health beliefs model scores after the program with p value =.000.

This result was supported with Aboud et al., (2019) whose found that there is a high statistically significant relationship between level of total reported practice scores and total health beliefs model scores after the program. In addition, this result was in agreement with Mohammadi et al., (2019) who conducted a study entitled "The Effects of Family-Centered Education Based on the Health Belief Model on Knowledge, practice and Attitude among primary Students with Anemia in turkey" whose found that there is statistically significant relationship between level of total reported practice scores and total health belief model scores after the program. From the investigator point of view, this result may be due to Following the healthy belief model enables students to gain the necessary information and avoid the barriers that expose them to iron deficiency anemia.

Regarding relation between total students’ knowledge scores about iron deficiency anemia and their total reported practices scores and total health beliefs model scores at pre and post implementation of a health education program, the current study revealed that, there is a high statistically significant relationship between total knowledge scores, total reported practice scores and total health beliefs model scores after the program with p value =.000 after the program. This result was supported with Zuraida et al, (2020) whose found that there is statistically significant relationship between total knowledge scores, total reported practice scores and total health belief model scores after the program.

Also, this result was in agreement with Irandegani et al., (2020) who conducted a study entitled " The Effect of a Date Consumption-Based Nutritional Program on Iron Deficiency Anemia in Primary School students Aged 6 to 12 Years Old in Iran" and found that there is a high statistically significant relationship between total knowledge scores, total reported practice scores and total health beliefs model scores after the program. From the investigator point of view, this result may be reflect that this is due to the acquisition of good information and health practices, in addition to the presence of health beliefs among students, help them to build an information base on the prevention of exposure to iron deficiency anemia.

IV. CONCLUSION

Based on the study finding and research hypothesis it can be concluded that:

The results of the study supported the hypothesis of the study which showed that, there was a marked improvement in primary school student's knowledge and reported practice about prevention of iron deficiency anemia after implementation of a health education program based on the health belief model. Also, there were significant improvement in perceived severity, barriers, benefits, and cues to action scores after implementation of the program compared with the scores before the program. Also, there are highly statistically significant relationships between total knowledge scores, reported practice and health belief model scores after the program.

Recommendations

On the basis of the result of the study, the following recommendations' are suggested:

1-Continues educational programs for all primary school students to raise their awareness about prevention of iron deficiency anemia.

2 -Disseminating health education pamphlet to increase primary school student's knowledge and practice about measures of prevention of iron deficiency anemia.
3- Propagation of health education program should be initiated to raise public awareness about iron deficiency anemia.

4-Further researches are needed on a wide scale to assess the barriers that prevent iron intake and modifying their attitude toward his barriers to prevent of iron deficiency anemia.

REFERENCES


28. Irandegani, F., Arbabisarouj, A., Ghaljazi, F., Navidian, A., & Karajibani, M., (2019) : The Effect of a Date Consumption-Based Nutritional Program on Iron Deficiency Anemia in Primary School students Aged 6 to 12 Years Old in Zahedan (Iran). Pediatric health, medicine and therapeutics, 10, 183

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