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Research Article

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The effectiveness of educational programs based on James Brown model on knowledge, attitudes and behaviors related to nutritional iron deficiency anemia in female high school students

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ABSTRACT

Iron deficiency anemia is the most common nutritional problem in the world and one of the main causes of anemia. Education and improving awareness is one of the main recommended ways to prevent this problem. This study was conducted to determine the effectiveness of educational program based on James Brown model on knowledge, attitude and nutritional behavior related to iron deficiency anemia in high school girl students of Syric city. Quasi-experimental study was performed on 190 girl students of first to third grades in high school (2013-2014). Students were divided into two groups of intervention (87 people) and control (103 people) by simple random sampling method. A researcher-made questionnaire was the collecting data tool which its validity and reliability was confirmed. At the beginning of the study, the rate of knowledge, attitude and the behavior related to iron deficiency anemia of all students were assessed by the questionnaire. Then the educational program was performed for the intervention group and after two months, both groups were compared again. Data were analyzed using SPSS statistic software version 19 and independent t-test, chi-square and t-test statistical tests. After the educational intervention, a significant statistical difference was observed in scores of knowledge, attitude and nutritional behavior related to iron deficiency anemia in the test group ($P<0.001$). Educational intervention based on James Brown model had a considerable and very high effect on the rate of knowledge, attitude and nutritional behavior of students. So, it is recommended to use this cheap and simple educational method to improve the students' health.

Key words: James Brown educational model, knowledge, attitude, related behaviors to the iron deficiency anemia, high school girls

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INTRODUCTION

World Health Organization (WHO) estimates that almost two billion people that means one third of the world population suffer from the anemia problem (1). The most obvious anemia effects on health is increasing risk of mortality of the mother and child. Undoubtedly, iron deficiency is the most common cause of anemia in the developing countries (2-3). Iron deficiency anemia is one of the most common public health issues as it causes reducing work efficiency of people (4). It causes reducing physical ability, reducing mindfulness and mood changes (5). The prevalence rate of anemia in students and adolescents is reported 29.2 to 79.6% in developing countries (6).

The groups of young and adolescent girls are at risk of iron deficiency anemia (7). As the prevalence of iron deficiency anemia in girls is increased after puberty because of menstrual bleeding and body growth spurt (8). In the studies, the prevalence of iron deficiency anemia in Iranian girls is reported 32-54.8 (9). The outcome of this anemia in adolescence ages are negative effect of the reproductive performance of the person in future, the risk of low birth weight, premature birth, miscarriage and fetal distress (10). So that iron deficiency is reported as the reason of 20% of mothers' mortality (4). The knowledge of girls as the future mothers is effectively related to the society health (7). Control of anemia has the most public health benefits including reduced mortality among pregnant women and their infants, improved growth and increased work capacity of adults (11-12). The extent of economic and social importance of anemia made it a big deal for the country to challenge and prevent it and in this regard, education is determined as one of the recommended ways (9-13). And the studies in this regard have reported the effect of education on increasing of knowledge (14, 15, 16, 17, 18). As Sehhati Shafaei study (2011) showed that the educational interventions could improve the level of knowledge and performance of students effectively (16). But the results of certain studies such as Ivan Bagha study (2008) which was performed on guidance school girl students showed that educational interventions have no effect on improving of knowledge, attitude and performance (4).
With regard to the problems caused by iron deficiency anemia and as any planning in this area should be done based on the accurate information about educational needs of learners. So the present study was designed to evaluate the effect of educational programs based on James Brown model on knowledge, attitude and nutritional behaviors related to iron deficiency anemia in high school girl students of Syric city.

EXPERIMENTAL SECTION

This research is an interventional study. Sample of this research were first to third levels of high school girl students in Syric city. The method of collecting samples in high schools was as that the researcher was introduced to the office of education of Hormozgan province and then to the office of education of Syric city with an introduction letter from the faculty of health which among 3 girl's high school of this city, two high schools that are most similar were selected and then one high school as the intervention high school (87 students) and the other as the control high school (103) were selected and entered to the study. Prior to implementation of objectives and research steps to the units of study, enough explanations were presented and announced that their participation into the research was subject to their satisfaction and desires. The criteria of entering to the study: 1- high school girl students of Syric city (except for pre-university), 2- students' satisfaction to participate to the research, 3- non-displacement and immigration from the selected high school in time of study and exclusion criteria of the study: 1- unwillingness of students to participate in research, 2- mobility and immigration during research was announced.

The tools to collect data in this research was a researcher-made questionnaire that its validity through the panel of experts and reliability of the questionnaire in two steps with an interval of 10 days were completed by 20 girl students of one of high schools which were not entered to the study that was confirmed using Cronbach's alpha coefficient. Cronbach's alpha coefficient was obtained 82% for knowledge questions, 83% for attitude, 77% for behavior and 79% for the related questions to James Brown model.

The questionnaire consists of five sections as follows:
First section was included 15 questions about demographic information. Second section was included 25- three options questions (Yes, No and I don't know) which were related to knowledge assessment. Scoring is as score 1 and 0 were given to the correct answer and incorrect answer/I don't know, respectively. Minimum and maximum obtained scores were 0-25, respectively.

Third section was included 20 related questions to attitude. The scoring method of attitude questions based on 5-points Likert scale from strongly agree to strongly disagree were scored from 0 to 4 (strongly agree=4, agree=3, without comment=2, disagree=1 and strongly disagree=0). To calculate attitude, the mean of scores and two ranges scales of positive and negative were used. Thus, if the average of scores is 41 or higher is considered as a positive attitude and the average of scores from 40 and lower are considered to have a negative attitude. The forth section was included 5 questions regarding questions related to iron deficiency anemia that the average of scores and two-ranges scale of good and bad were used to calculate behavior. So that the average of scores of 11 and higher and 10 and lower were considered as good nutritional behavior and bad nutritional behavior, respectively. The fifth section was the related questions to James Brown model. The questions of James Brown model section consist of 5 questions which were asked from the subject regarding the suitable time of education, number of training sessions and training time of each session, suitable teaching method and teacher. Obviously, questions of this section are

valuable for researcher to provide a training program and this section of questionnaire was completed only once at the beginning of evaluation by subjects of the research.

The cause of using the designed educational James Brown model, is its similarity and closing to the executive template in health section of the country of Iran. James Brown model has explained all details of training program clearly and accurately and will design a clear picture prior to the education. James Brown has set his model in four stages as below: 1- Identifying and developing the educational goals (in three parts of general goals, partial and behavioral goals), 2- Determining of conditions (in three parts of learning experiences, teaching and learning groups and teaching methods), 3- Determining of resources (in three parts of human resources, educational equipment and materials and educational spaces), 4- Efficacy of training program in two parts of evaluation (partial and final) and correction of the design (19-20-21-22).

Educational intervention was designed based on the survey from all the students of this study, in two 45-minutes educational sessions (that was according to the survey and completion the fifth section of the questionnaire which was related to James Brown model). This educational intervention was performed by a researcher using lecture associated with using white board and Q & A and also educational content were given to the intervention group as pamphlets and educational booklets to be more effective. In the first session of training, the students of intervention group were introduced to iron, iron deficiency anemia, reasons of iron deficiency prevalence among adolescent girls, causes of iron deficiency and the symptoms of iron deficiency anemia. In the second session, the students of intervention group were introduced to the groups that are at risk of iron deficiency anemia, the outcomes of iron deficiency anemia, iron-rich food sources, recommendations for the prevention of iron deficiency and treatment of iron deficiency anemia. And an opportunity was found for students to talk about their nutritional behavior as a group. Two months after educational intervention, the questionnaire was completed again by both groups (intervention and control). The gathered information was analyzed using SPSS software version 19 and the statistical tests of paired t test, t test and Chi-square.

RESULTS

This study was performed on 190 subjects in two groups of 87-people intervention and 103-people control. The average age of students was 16.3 years old that the minimum and maximum ages of participants were 14 and 20, respectively. The distribution of certain demographic and socioeconomic characteristics of participants' families are shown in table 1.

The comparisons of knowledge, attitude and nutritional behavior of the students in both groups of intervention and control before and after the training program are shown in table 2.

Regarding the questions of the fifth section of questionnaire (questions of James Brown educational model) which were valuable for the researcher to program the educational interventions and was completed before the educational intervention by both groups of intervention and control, the following results were obtained. 55.3% of students had chosen two educational sessions for training of iron deficiency anemia, 73.3% of students had known health experts more suitable for education of iron deficiency anemia. Also, more than 59.5% of students had selected lecture associate with Q & A as the educational method for teaching the anemia issues. More than 56.3% of students selected using white board as the educational aids in discussing iron deficiency anemia, but researcher used slides to show the related images to iron deficiency anemia and students' better understanding. And for continuing and reminding the educational topics in students, booklets and pamphlets with the same subject were designed and given to the students and more than 87.4% of students selected the intermediate group for education of iron deficiency anemia discussion. It is needed to be mentioned that the designed educational booklet with the pamphlets were given to the students of control group after completion the questionnaire after the test.

Table 1- distribution of absolute and relative frequencies of the studied demographic variables in both groups of intervention and control

Demographic variables	Intervention group (%) No.	Control group (%) No.
Field of study		
-General	(36.8) 32	(32%) 33
-Experimental	(63.2 %) 55	-
-Mathematics	-	(15.5%) 16
-Human Science	-	(52.4%) 54
Marital status		
Single	(94.3%) 82	(98.1%) 101
Married	(5.7%) 5	(1.9%) 2
Father's education		
-Illiterate	(20.7%) 18	(17.5%) 18
-Elementary and secondary	(48.3%) 42	(61.2%) 63
-Diploma	(24.1%) 21	(9.4%) 20
-Collegiate	(6.9) 6	(1.9) 2
Mother's education		
-Illiterate	(20.7%) 18	(27.2%) 28
-Elementary and secondary	(73.5%) 64	(74.9%) 73
-Diploma	(3.4%) 3	(1%) 1
-Collegiate	(2.3%) 2	(1%) 1
Father's occupation		
-Free	(67.8%) 59	(70.9%) 73
-Staff	(11.5%) 10	(7.8%) 8
-Labor	(3.4%) 3	(2.9%) 3
-Unemployed	(12.6%) 11	(12.6%) 13
-Died	(4.6%) 4	(5.8%) 6
Source of information		
-Public media	(20.7%) 18	(23.3%) 24
-Through mother	(6.9%) 6	(4.9%) 5
-Through sister	(1.1%) 1	(1%) 1
-Friends and classmates	(9.2%) 8	(3.9%) 4
-Journals and newspapers	(9.2%) 8	(4.9%) 5
-Health team	(6.9%) 6	(1%) 1
-Health educator	(24.1%) 21	(29.1%) 30
-Textbook or others	(17.2%) 15	(12.6%) 13
-Not known	(4.6%) 4	(19.4%) 20

Table 2- comparison of the scores of knowledge, attitude and behavior related to iron deficiency anemia in both groups of intervention and control

Variable	Research steps	Intervention group Mean (SD)	Control group Mean (SD)	Significance level
Knowledge	Before intervention	10.99 (3.25)	10.37 (2.25)	P<0.143
	After intervention	18.97 (3.34)	11.95 (3.33)	P<0.001
	Mean (SD)	7.98 (3.54)	1.58 (2.38)	P<0.001
Attitude	Before intervention	54.72 (7.84)	51.09 (6.15)	P<0.001
	After intervention	65.43 (6.52)	52.38 (6.52)	P<0.001
	Mean (SD)	10.70 (6.13)	1.29 (3.56)	P<0.001
Behavior	Before intervention	11.91 (2.87)	11.24 (3.08)	P<0.128
	After intervention	14.91 (2.60)	11.38 (3.01)	P<0.001
	Mean (SD)	3 (3.3)	0.14 (1.19)	P<0.001

DISCUSSION

Purpose of the present study was to determine the effectiveness of educational program based on James Brown model on knowledge, attitude and nutritional behavior related to iron deficiency anemia in high school girl students of Syric city.

The results of present study showed that after intervention, knowledge of the students of intervention group is increased significantly (from 10.99 to 18.97) that this finding was in consistent with the results of some other studies. Including, Mehrabian et al study (2013) which was conducted on knowledge of the girl students in second-level high school of Babol city and showed that knowledge of the majority of students before the educational students regarding iron deficiency anemia was intermediate and is increased after the educational intervention (23). Also the results of Shahnazi et al study (2009) on the girl students of guidance schools in Isfahan city showed a

significant difference in knowledge of participants before and after the educational intervention (17). The results of another study by Jafari et al (9), Sehhati Shafaei et al (16) Giti et al (24) showed the effectiveness of education on improving of knowledge in intervention group that these results explained the necessity of using programmed educational interventions in improving of participants' knowledge. But this finding was not in consistent with the results of Ivan Bagha et al study (2008) on the students in guidance school of Khalkhal city (4). Perhaps the reason of this inconsistency is not-matching of target group in terms of educational level (research subjects in this study were high school girl students while in the study of Ivan Bagha were the students of guidance schools and also can be due to the conditions and teaching method, inappropriate time and place of workshop, educational content and … as in the present study, increasing the scores of knowledge in intervention group after the training program, some factors including: appropriate educational content according to the needs of target group in the step of pre-test was designed, also performing of training programs in different sessions and presentation of educational subjects to the intervention group immediately after education for continuing and reminding the educational discussions can be noted which shows the importance of using regular educational James Brown model on knowledge of the audience before the educational intervention and designing an appropriate training program for learners (4-9).

Also results of the present study showed a significant increase in total score of attitude in intervention group (before intervention 54.72 and after intervention 65.43) that is consistent with the results of Shakuri et al study (2007) on the girl students of guidance school in Talesh city (14) and also with the results of Amani et al (25), Fallahi (26), Shakeri et al (18) which all of them show the positive effect of educational interventions in improving of attitude of intervention group's people after training.

But was inconsistent with the results of Sallar study (2009) on knowledge and attitude of people in regards to AIDS and the results showed that participants' attitude about AIDS is still negative after education (27). Possible reasons of this difference may be that generally attitude is created following the knowledge and through the information that person receive from the environment and sometimes attitude is formed without any basic knowledge so that having only science and knowledge does not lead to attitude change, but the structure and beliefs of people should be established deep and scientific (28-29) and maybe the educational interventions in this study such as using various issues, simple explanations along with pictures and discussion and conversation in a friendly atmosphere and also giving the educational booklets and pamphlets could create a significant difference in interventional group in correcting and creatinga positive attitude.

The present results indicated a significant increase in total score of nutritional behavior on students in the intervention group (from 11.91 to 14.91). And this results was consistent with several studies in this field (14-17-23-25-26).The results of Hosseini et al study (2004) on girls in guidance school of GhaemShahr (15). Also the results of Sehhati Shafaei et al study (2011) on student girls of third-level guidance school, showed the positive effect of educational interventions in modification of interventional behavior (16).

Makulani (2010) knew the models of health education very effective in facilitating of learning and indicate that first essential and key element for each attempt and with goal of creation health behavior, is having information and knowledge from the target group and selection of these methods with the educational level and understanding of the audience is one of the important and effective cases. So, choosing appropriate educational strategies in order to increase students' knowledge and gathering new and updated information is one of the most efficient and cost-effective works for prevention of iron deficiency anemia (30).

CONCLUSION

The results of this study showed that we can achieve to the considerable results in improving knowledge, attitude and related nutritional behaviors to iron deficiency anemia in students using not-complicated educational programs and with the lowest cost. Therefore, it is recommended that educational model is used more in education.

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