

PRECEDE educational model for controlling iron-deficiency anaemia in Talesh, Iran

Gholamreza Sharifirad,¹ Parastoo Golshiri,² Hossein Shahnazi,³ Sorayya Shakouri,⁴ Akbar Hassanzadeh⁵

Department of Health Education and Health Services,^{1,3,4} Department of Social Medicine,²

Department of Epidemiology and Biostatistics,⁵ Isfahan University of Medical Sciences, Isfahan, Iran.

Abstract

Objectives: To determine the effect of applying the PRECEDE educational model as a framework for controlling iron deficiency anaemia (IDA) among high school girl students.

Methods: This Quasi-experimental study was conducted between April and July 2009 at Isfahan, Iran. Using a simple random sampling technique, a total of 72 students were selected and divided in two intervention and control groups. Data gathering tools were questionnaire and laboratory tests (Hb, Hct, and Ferritin). After using the Precede educational model, (model for, Planning health education & health promotion programme and policies) results were analyzed with SPSS software and appropriate statistical tests (Independent-Sample T test and Chi-Square).

Results: After education, the mean scores of awareness and attitude as predisposing factors, applying of educational resources and participation in educational programmes such as enabling factors, encouragement of parents, teachers and friends as reinforcing factors had a significant increase in the intervention group compared with control group ($p < 0/001$). Also, in terms of blood indices there was a significant difference between the two groups, before and after educational programme ($p < 0/001$).

Conclusion: Results of this study indicate positive effect of model base educations especially PRECEDE model in preventive health cares such as IDA prevention. Therefore, using of health education models for planning and implementing educational programmes is recommended.

Keywords: Anaemia, Iron-deficiency, Educational, Preventive, City (JPMA 61:862; 2011).

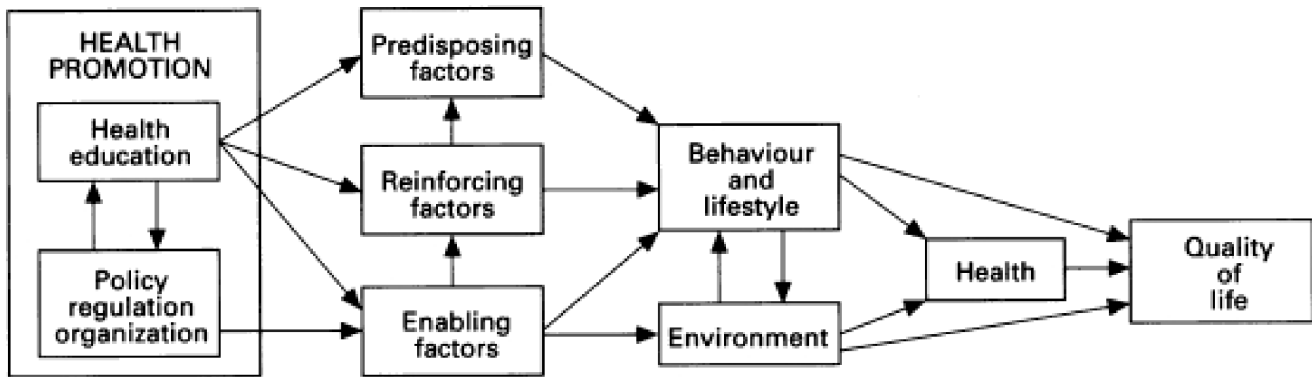
Introduction

Iron is essential to normal human growth. It plays a crucial role in enzymatic functions such as monoamino oxidase, cytochrome oxidase, peroxidase, and ribo nucleotide reductase. Iron deficiency is the most common cause of anaemia worldwide.¹ Anaemia is the most common blood disease in infancy and childhood.² The absorption of dietary iron is assumed to be 5-10%, but it increases 3-5 times when iron storage is depleted.³ Inadequate dietary iron, iron

absorption and intense exercise, along with blood loss and parasitic infestations, are some etiologies of iron deficiency anaemia (IDA). Some consequences of IDA are growth retardation, exercise intolerance, behavioural change, and abnormal thermo genesis. Although the prevalence of IDA has declined in industrialized countries, there have been little changes globally.⁴ According to a UNICEF report, two billion people suffer from anaemia worldwide and most of them have IDA,⁵ especially in under developed/developing

PRECEDE Model

Phase 5	Phase 4	Phase 3	Phase 2	Phase 1
Administrative and policy diagnosis	Educational and organizational diagnosis	Behavioural and environmental diagnosis	Epidemiological diagnosis	Social diagnosis



The PRECEDE model. Reproduced, with permission from health promotion planning: A educational and environmental approach by L.Green and M.Kreuter; published by the Mayfield publishing company 1991

countries, where 40-50% of women and children, especially those in low income families are suffering from iron deficiency.⁶ Health care specialists can contribute to development of healthy behaviours through innovative interventions based on educational models.⁷

PRECEDE model is a conceptual model for planning health education and health promotion programmes and policies. This model provides a well tested means of articulating a programme plan and a rational means of documenting a systematic, step by step approach to planning, implementing and evaluating health related programmes and policies.⁸ The model has been widely applied with over 500 publications.⁹ It was developed in the 1970 s in a series of clinical and field experiments at John Hopkins University, and then used in the development of the health promotion objective and other national and regional programmes.¹⁰

Hypotheses:

1- The mean score of knowledge about IDA causes and prevention approaches is different between intervention and control groups after educational programmes.

2- The mean score of attitude about IDA causes and prevention approaches is different between intervention and control groups after educational programmes.

3- The mean score of practice about IDA causes and prevention approaches is different between intervention and control groups after educational programmes.

4- The state of enabling factors is different between intervention and control groups after educational programmes.

5- The state of reinforcing factors is different between intervention and control groups after educational programmes.

6- The mean of blood indices is different between intervention and control groups after educational programmes.

The purpose of this study was to demonstrate how the PRECEDE model was adapted and applied as a framework for controlling the IDA among high school girls in Talesh city of Iran.

Subjects and Methods

In this quasi-experimental study 72 adolescent girls from two high schools were randomly selected and divided in to two groups of intervention and control (36 students in each group). The study was conducted from April to July 2009 in Isfahan, Iran. At first, the list of all high schools in Talesh city was prepared. Then, two high schools were selected randomly from the list. After that, 36 students from each high school was randomly selected so that, one group was considered as intervention and another as control group.

High school girls are one of the most important high risk groups regarding IDA, that's why this age group was considered as study subject. To control potential confounding factors the two groups were matched. Inclusion criteria were: onset of menstruation, no inherited anaemia or acute infection. Those people who did not intend to participate or complete the study were excluded. The investigators asked all participants to sign consent forms and complete questionnaires. In Iran for doing any interventional study in schools, parent's consent is necessary. Therefore with parent's

permission, blood samples were taken to assess their IDA status. Data gathering instruments included :1) a questionnaire on the basis of components of PRECEDE model and 2) haematological blood tests for determination of Haemoglobin (Hb), Haematocrit (HCT) and Serum Ferritin (S.F) to assess the prevalence of anaemia in girls. The participants completed questionnaires to evaluate the effectiveness of the educational diagnosis. The reliability test - retest coefficient for the questionnaire was 0/75. The content validity of the questionnaire was determined by a panel of reviewers consisting of college professors in health education. A total of 40 questions were included, among which 15 were about knowledge, 10 about attitude, 10 about practice, 3 about enabling factors, and 2 about reinforcing factors. The knowledge questions were in a multiple choice format with one correct answer for each question, while the attitude and the practice scales consisted of five-point Likert type questions. The enabling factors and the reinforcing factors response options were yes and no.

Pre — testing was done in two ways. Participants completed a questionnaire and venous blood samples were taken before their breakfast. The intervention group participated in four — sessions (each session 60 min) training, based on PRECEDE model. The teaching materials (poster, booklet and pamphlet) were provided based on the participants need and the teaching methods related to the model such as short lecture, group discussion and showing the educational films. After the training sessions the follow-up intervention programme according to the model was conducted by the investigators. After the intervention a final test was done three months later. It again included completing questionnaires and taking blood samples from participants.

Data were analyzed by using the Statistical Package for Social Sciences (SPSS) computer programme (version 15).The knowledge of students about IDA was evaluated using the total scores for each subject on knowledge questions, with one point for each correct answer and zero points for each incorrect answer. Attitude towards IDA and related behaviours were measured by summing obtained scores on attitude and behaviour items for each subject, so that each item was scored from four points for the most positive to zero point for the most negative responses. About enabling and reinforcing factors positive responses (yes) gained one and negative responses (no) gained zero scores. Independent-Sample T test was employed to test the knowledge, attitude, practice scores and blood indices differences between intervention and control group before and after education. For the enabling and reinforcing factors test was applied to detect the statistical differences in the two groups before and after education. Statistical significance was defined as $P < 0.05$.

Results

In this study 72 high school girls fully cooperated with the researchers. The mean of participant's age was 16.7 ± 38 years. Contrary to our expectation almost 85% of participants did not have any type of formal education about IDA. Table-1 compares the means of knowledge, attitude and practice scores about IDA, before and after the educational programs in the two groups. There was no significant difference in knowledge, attitude and practice scores of the two groups before education, but after the education these three items scores in the intervention group were significantly higher than the control group ($p < 0/001$). Table-2 shows the mean of blood indices before and after educational programmes. Haemoglobin (Hb),

Table-1: Knowledge, attitude and practice scores (0-100) of high school girls before and 3 months after educational programmes in the intervention and control groups.

Variable	Intervention		Control		*Pvalue for comparing intervention and control	
	Before education	After education	Before education	After education	P. before education	P. after education
Knowledge	44.62 ± 10.30	77.30 ± 5.39	40.55 ± 10.37	40.20 ± 10.40	0.099	< 0.001**
Attitude	35.83 ± 3.77	66.04 ± 5.8	35.83 ± 3.77	35.20 ± 4.36	1	< 0.001**
Practice	34.79 ± 10.61	60 ± 10.64	33.26 ± 10.62	33.26 ± 10.62	0.54	< 0.001**

*Independent-Sample T test

** SPSS software shows Pvalues of up to 3 digit decimals. Any number with decimal digits of three zeros must be less than 0.001.

Table-2: Blood indices of high school girls before and 3 months after educational programmes in the intervention and control groups.

Variable	Intervention		Control		*Pvalue for comparing intervention and control	
	Before education	After education	Before education	After education	P. before education	P. after education
Hb	12.30 ± 0.50	12.35 ± 0.44	12.40 ± 0.47	12.41 ± 0.46	0.98	0.58
HCT	38.63 ± 1.52	38.95 ± 1.35	38.66 ± 1.42	38.65 ± 1.41	0.91	0.52
S.F	16.56 ± 0.93	23.61 ± 1.01	16.61 ± 0.57	17.66 ± 0.54	0.8	< 0.001**

*Independent-Sample T test

** SPSS software shows Pvalues of up to 3 digit decimals. Any number with decimal digits of three zeros must be less than 0.001.

haematocrit (HCT) and serum ferritin (S.F) of the two groups were not significantly different before the education. But after the education, there was a significant difference in terms of serum ferritin between two groups so that it was significantly increased in the intervention group compared to the control group ($p < 0/001$). In terms of enabling and reinforcing factors, the test showed that there was a significant difference between two groups after education ($p < 0/001$).

Discussion

Various approaches for improving the IDA among young girls are recommended: iron supplementation, nutrition, education and expanding the fortification of processed foods.¹¹ This research investigated the effectiveness of educational programmes for controlling IDA in high school girls in Talesh, Iran. The PRECEDE educational model places emphasis upon self — care, incentives and self — reliance through training. This approach proved the most effective in upgrading participant levels of knowledge and in promoting their attitudes toward behaviour change.¹² The PRECEDE framework is a systematic health education process which has been used in numerous studies to help systematically organize a procedure for developing programs.¹³ The major advantage of using this framework is the clear delineation of the factors linked with healthy behaviour.¹⁴ The authors found the educational programmes on the basis of PRECEDE model effective in controlling IDA as well as having achieved success in other field of study. Alteneader, et al¹⁵ determined the effectiveness of this model with a one — period school — based AIDS education programme with an adolescent population of seventh and eighth grade students.¹⁵ An instrument based on the PRECEDE model was used to assess program effectiveness. Alteneader¹⁵ found statistically significant effects on changes in the knowledge, attitudes and beliefs of the study subjects. These three factors are among components of the PRECEDE model (predisposing factors). Bonangaro¹⁶ used the PRECEDE framework to define factors related to wellness. The results of this study suggest that, health educators who wish to control iron deficiency, have to focus on improving the health knowledge of communities and practice with planned education.¹⁶ In this research, using the educational programmes on the basis of PRECEDE model, result in meaningful increase of serum ferritin in intervention group. Hazavehei et al¹⁷ have also achieved similar results in Kerman, Iran. The researchers believe that most effective approaches to combat iron deficiency in developing countries include supplementation targeted at high risk groups combined with a planned dietary education to maximize the availability of food iron. Childs et al¹⁸ assessed a dietary health education programme to reduce the incidence of IDA in

an inner — city population. In this deprived population, they found no reduction in anaemia by using of a targeted nutritional programme. They believe that, health educators have to understand iron nutrition and different cultural practices and economic constraints.¹⁸

Conclusion

There is a positive effect of Precede educational model in preventing iron deficiency anaemia among high school girl students. Therefore, school based nutrition education programmes can help improve young person's eating habits.

Acknowledgements

The authors would like to thanks Talesh school managers and personnel for their kind cooperation.

References

1. Miller D. Blood diseases of infancy and childhood. 6th ed. New York: CRC, 1990, pp 74-7.
2. Mc Millan J. Oskis Pediatrics: Principle and practice. 3th ed. New York: Lippincott Williams & Wilkins 1999; pp 55-9.
3. Shinton N. CRC desk references for hematology. 3th ed. New York: CRC, 1998; pp 37-45.
4. Cook JD, Skikne BS, Baynes RD. Iron deficiency: the global perspective. *Adv Exp Med Bio* 1994; 356: 219-28.
5. Janus J, Moerschel SK. Evaluation of anaemia in children. *Am Fam Physician* 2010; 81: 1462-71.
6. Akramipour R, Rezaei M, Rahimi Z. Prevalence of iron deficiency anaemia among adolescent schoolgirls from Kermanshah, Western Iran. *Hematology* 2008; 13: 352-5.
7. Sharifirad GR, Entezari MH, Kamran A, Azadbakht L. The effectiveness of nutritional education on the knowledge of diabetic patients using the health belief model. *J Res Med Sci* 2009; 14: 1-6.
8. Meador MG, Linnan LA. Using the PRECEDE Model to Plan Men's Health Programs in a Managed Care Setting. *Health Promot Pract* 2006; 7: 186-96.
9. Clarke VA, Frankish CJ, Green LW. Understanding suicide among indigenous adolescents: a review using the PRECEDE model. *Inj Prev* 1997; 3: 126-31.
10. Mo PK, Mak WW. Application of the PRECEDE Model to Understanding Mental Health Promoting Behaviors in Hong Kong. *Health Educ Behav* 2008; 35: 574-87.
11. Muwakkit S, Nuwayhid I, Nabulsi M, et al. Iron deficiency in young lebanese children: Association with elevated blood lead levels. *J Pediatr Hematol Oncol* 2008; 30: 382-6.
12. Deren S, Kang SY, Rapkin B, et al. The utility of the PRECEDE model in predicting HIV risk behaviors among Puerto Rican injection drug users. *AIDS Behav* 2003; 7: 405-12.
13. Meagher D, Mann KV. The effect of an educational program on knowledge & attitudes about blood pressure by junior high school students: a pilot project. *Can J Cardiovasc Nurs* 1990; 1: 15-22.
14. Chiou CJ, Wu CM, Wang RH, Lee ST. Utilizing the PRECEDE model to predict health examination behavior of the elderly. *Kaohsiung J Med Sci* 1999; 15: 348-58.
15. Alteneader RR, Price JH, Telljohann SK, et al. Using the PRECEDE model to determine junior high school students' knowledge, attitudes, and beliefs about AIDS. *J Sch Health* 1992; 62: 464-70.
16. Bonaguro JA. PRECEDE for Wellness. *J Sch Health* 1981; 51: 501-6.
17. Hazavehei SM, Jalili Z, Heydamia AR, Faghizadeh S. Application of the PRECEDE model for controlling iron-deficiency anaemia among children aged 1-5, Kerman, Iran. *Promot Edu* 2006; 13: 173-7.
18. Childs F, Aukett A, Darbyshire P, Ilett S, Livera LN. Dietary education and iron deficiency anaemia in the inner city. *Arch Dis Child* 1997; 76: 144-7.