The Impact of Management Protocol on Pregnant Women with Iron Deficiency Anemia Using Health Promotion Model

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Abstract:

Background: IDA is a preventable disease but its consequences can't be prevented or treated easily. **Aim of the study:** to evaluate the impact of management protocol on pregnant women with IDA using health promotion model (HBM) through changing their perception and behavior regarding the risk of IDA. **Subjects and Methods: Research design**: A quasi-experimental design. **Setting**: the study was carried out in El-nahaal MCH Center in Zagazig. **Subjects**: a representative sample of 180 pregnant women diagnosed with IDA . **Tools of data collection:** Six tools were used in data collection namely: An interview questionnaire form, Assessment of women knowledge, Observation checklist for assessing women dietary habits and cooking practices, HBM constructs, follow up assessment record & an educational health program. **Results**: According to their mean hemoglobin level before and after the intervention, it is obvious that the mean hemoglobin level did statistically increase (p=0.001*) among the study group after the second and third visit compared to those in the control group, There's was statistically significant improvements in the mother knowledge about IDA at the post-test from only 7.0% at the pre-test to the majority of women (85.0%) at the post-test compared to those in the control group. Statistically significant improvements in the study group at the post-test regarding the level of perception about IDA compared to those in the control group. **Conclusion**: low level of perceiving risk of IDA is associated with poor dietary practices as a preventive behavior**.** Using HBM to change pregnant women's behavior and dietary practices; produce significant changes at post intervention assessment, in the level of pregnant women's perceptions regard the risk of iron deficiency anemia. **Recommendations:** further study should be conducted, using a sample with a large size, different levels of IDA and in different geographical settings to generalize the study result.

Key words: Iron deficiency anemia, Health belief model, perceiving risk, hemoglobin level.

Introduction:

Iron deficiency is one of the leading risk factors for the disability and death worldwide, affecting an estimate of two billion people.[(1)] The high prevalence of ID in the developing world has substantial health and economic costs, including poor pregnancy outcome, impaired the school performance, and decreased productivity.[(2)]

Because ID is often accompanied by deficiencies of other nutrients, the signs and the symptoms of iron deficiency can be difficult to isolate.[(3)]

Determination of hemoglobin level was the criteria used by EDHS to identify the prevalence of anemia. The World Health Organization defined anemia in the pregnancy as hemoglobin concentration of less than 11 g/dl or hematocrit less than 33%, at any point during pregnancy.[(2)] The most common cause of anemia in pregnancy is iron deficiency. Although the causes underlying iron deficiency in pregnancy may be diverse, yet the main reason imposing increased risk in pregnancy is the increased demand for iron for the fetus as well maternal tissues. Furthermore, closely spaced

births allowing inadequate time for maternal repletion, and infections that destroy red blood cells, interfere with red blood cell formation, increase blood loss and/or deplete nutrient uptake e.g. malaria, hookworm, HIV, diarrhea, and others.[4]

Consequences of anemia on pregnant woman and fetus include increasing maternal mortality and morbidity, increasing fetal morbidity and mortality, increasing perinatal risks for mothers and neonates, increasing incidence of ante-partum hemorrhage, post- partum hemorrhage, low birth weight (LBW) and preterm baby, reducing the work capacity, physical activity and productivity.[5]

"Behavior theories are models that help to understand human behavior. These theories are important when developing group programs and interventions because they give a guideline to follow, which results in a successful program or intervention. The Health Belief Model (HBM) was one of the first theories of health behavior, and is one of the most well-known".[6]

The Health Belief Model is based on the value-expectancy, meaning behaviors can be predicted by a person's expected outcomes of that behavior and how much value they place on that outcome. There are six constructs to the HBM: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action.[7]

The maternal mortality rate of women with hemoglobin of less than 5g/dL is increased by 8 to 10 fold. Thus, the nurse should recognize that one of hemoglobin optimization during the antenatal period is to ensure that all pregnant women commence labor with a Hemoglobin (Hb) level >/=11gms/dl, to ensure safe delivery and tolerate blood loss. Women should be screened for anemia and treated for reversible causes of anemia.[8]Hemoglobin should be re-checked for all women at 32-34 weeks, and referral organized if Hb is <8gms/dl.[9]

Significance of the study:

Anemia is estimated to contribute to more than 115,000 maternal deaths and 591,000 perinatal deaths globally per year.[10] Despite the high prevalence and serious consequences of anemia in Egypt and other developing countries, a variety of interventions for anemia prevention and control are available, addressing all the major causes, but experience with effective protocol for management has been limited. The present study is undertaken to evaluate the effect of management protocol on pregnant women with iron deficiency anemia using health promotion model through changing their perception and behavior regarding the risk of anemia.

Aim of the study:

The present study aims to evaluate the impact of management protocol on pregnant women with iron deficiency anemia using health promotion model through changing their perception and behavior regarding the risk of anemia.

Research Hypothesis:

Pregnant women receiving the protocol of management adopt better nutritional eating practices and improve their general health.

Subjects and methods:

Research design:

A controlled quasi-experimental research design with pre-post assessment was used to achieve the aim of this study.

Study Setting:

The present study was carried out in El-nahaal Mother Child Health Care

Center in Zagazig, Sharkia governorate, Egypt.

Study subjects:

Any pregnant woman attending the mentioned study setting during the study period (12 months, four days every week) was eligible for inclusion in the study sample if she fulfills the following eligibility criteria:

Inclusion criteria:

- In the first trimester of pregnancy
- Age ranging between 20-35 years
- Both primipara and multipara
- Women Hb level was less than 11g/dl at the booking visit

The sample size is taken according to statistical equation, with confidence interval (CI=95%), Power (80%) and odds ratio (G2/G1=1). The study population consists of 180 pregnant women attending the study setting and fulfilling the inclusion and exclusion criteria were recruited in the study sample. They were assigned in an alternating way to one of the two following groups: Study group: (n=90) and control group: (n=90).

Tools of data collection:

Tool 1: Interviewing questionnaire form

The questionnaire consisted of two parts including:

***Part 1*:** Woman's socio-demographic data such as age, level of education, job status, income and residence as well as the identification data as the address and telephone number for follow-up.

Part 2: Obstetrical history which include; gravidity, parity, weeks of gestation, current pregnancy symptoms and antenatal care.

Tool 2: Assessment of women knowledge and supportive materials: This involved multiple choice questions assessing woman's knowledge about definition, causes, signs and symptoms, complications of IDA and food sources rich in iron or reducing iron absorption and management protocols. For each knowledge question, a correct response was scored 1 and the incorrect zero. Satisfactory knowledge for complete answer and unsatisfactory knowledge for incomplete answer & don't know**)**. For each area of knowledge, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score. Knowledge was considered Unsatisfactory: if the percent score was less than 60%, and Satisfactory: if the percent score was ≥ 60%.

Tool 3: Observation checklist: For assessing women dietary habits and cooking practices, and medication prescribed. 11 questions including HBM construct. The performance questions were based on self-report and consumption of iron enhancing diet as well as cooking habits and each had three choices (“never”, “sometimes” and” always”). Each answer was given zero to two points. Finally, the total score of each segment was converted into percent.

Tool 4: HBM constructs*:* Questions for assess women perception for susceptibility, severity, benefits, barriers, self- efficacy and cues to action.

Tool 5: Follow up record: All participants were followed up by the researcher, till the end of pregnancy and both groups were re-evaluated by questionnaires and observation checklist at the end of the educational program. Medication prescribed, patients compliance, Hb level, signs and symptoms of anemia, women weight, diet intake and problems encountered were all recorded.

Tool 6: An educational health program

An educational health program for pregnant women about iron deficiency anemia (The program aimed at improving pregnant women's knowledge and practice related to the management of the IDA using the health belief model).

Scoring system:

For each knowledge question, a correct response was scored 1 and the incorrect zero. Knowledge was considered Unsatisfactory: if the percent score was less than 60%, and Satisfactory: if the percent score was ≥ 60%.

Content validity & Reliability:

Data were collected using a self-administered questionnaire, after the translation of the instruments to Arabic.The content and face validity were established by a jury of experts (5 professors & assistant professors) from academic nursing staff, Zagazig and Suez Canal Universities. According to their opinions all necessary modifications were done. Reliability was done by Cronbach's Alpha Coeffiecient Test which revealed that each item of the utilized tools consisted relatively homogeneous items its results was . 0.983.

Field work:

The process of data collection and implementation of the educational program consumed 10 months from December 2013 to September 2014. The data were collected according to the following phases:

1. *Baseline assessment phase*: During this phase, the process of sampling was done.
2. *Design of the educational nutrition program:* An educational program aimed at improving pregnant women's knowledge and practice related to the management of the IDA using the health belief model. The program included education and training of the participants, it involved both theoretical and practical training
3. *Implementation phase:*

All of the education sessions were conducted by the researcher, At the beginning of the classes, a question and answer session was conducted for the initial survey of the women's knowledge, this was followed by a lecture, presentation of posters, photographs, and training booklet, and then continued with group discussions. Physical assessment; pregnant women's weight, length and vital signs were measured at first visit, and at second and third trimester of pregnancy. The results of blood test /hemoglobin level was obtained from pregnant women record at first booking visit. The hemoglobin level was repeated at second and third trimester at MCH laboratory. Signs and symptoms denoting anemia were recorded.

All participants were followed up by the researcher for a period that ranged between 3-4 months. The program was administered to members of the study group only. This was done in small groups. Different and suitable teaching methods were used including; booklet, data shows (laptop), and real objects.

Evaluation phase: Evaluation of women' knowledge and dietary practices regarding the management of IDA was done after the end of the program by using the same tools. This was done for both study and control groups. Additionally, Hb level was estimated for both the study and control groups at the end of the program**.**

Pilot study:

A pilot study was carried out on 15 women who match with eligibility criteria in order to test the applicability of the tools, clarity and simplicity of the included questions as well as to

estimate the average time needed to complete the sheets. Those who shared in the pilot study were excluded from the main study sample.

Administrative design and ethical considerations:

An official permission was granted by submission of an official letter from the Faculty of Nursing to the responsible authorities of the study setting to obtain their permission for data collection**.** Nursing and medical staff responsible for the patient were approached to gain their cooperation. All ethical issues were taken into consideration during all phases of the study; the researcher maintained an anonymity and confidentiality of the subjects. The researcher introduced herself to the women and briefly explained the nature and aim of the study to every woman before participation and obtained an oral consent from her. Women were assured that the information obtained during the study was confidential and used for the research purpose only.

Statistical analysis:

After collection of data, it was revised, coded, and fed to statistical software SPSS version 16. The statistical analysis used T test with alpha error = 0.05. Microsoft office excel software was used to construct the needed graphs. After data manipulation was done all numeric data were expressed in the form of range (minimum to maximum), mean and standard deviation (SD). Categorical data were expressed in the form of frequencies and percentages.

Level of significance:

For all statistical tests done, the threshold of significance was fixed at the 5% level (p-value). A p-value > 0.05 indicates non-significant result and the p-value < 0.05 indicates a significant results and the p-value is the degree of significance. The smaller the p-value obtained, the more significant is the result, the p-value being the probability of error of the conclusion.

Results:

Table (1): shows that the higher percentage of patients (45.6%) in the study group was in the age group between 30-35 with a mean age of 27.8± 4.8, compared to those in the control group (40.0%, and 25.3±3.5 respectively). Meanwhile, more than one third and one fourth of the study and control groups had secondary level of education (32.3% vs. 25.6% respectively) and they were mostly housewives (72.2% vs. 75.6% respectively). Moreover, most of them had an income that meet their life expenses and were living in rural areas (55.6%, 63.3% vs. 70.0%, 61.1% respectively).

Table (2): shows the distribution of the study subjects according to their mean hemoglobin level before and after the intervention. It is obvious that the mean hemoglobin level did statistically increase (p=0.001*) among the study group after the second and third visit compared to those in the control group (10.8±0.6 & 11.8±0.7 vs. 10.3±0.4 & 10.7±0.6 respectively).

Table (3): shows no significant difference between the two groups knowledge about IDA during pregnancy before the intervention. However, after the intervention, as much as 100.0% of the study group did obtain satisfactory knowledge about the definition of IDA, its causes, and foods and drinks that reduce iron intake compared to those in the control group (62.3%, 53.1% and 55.0% respectively). Differences observed are statistically significant (p=0.001*).

Table (4): describes women dietary habits throughout program phases. It points to statistically significant improvements at the post-test (p<0.001). The only exception was related to the intake of animal and plant proteins which was already very low in the study group (5.0%) at the pre-program phase, and increased to 45.6% at both post-test. On the other hand, as much as 96.0% and 100.0% of the study group did acquire satisfactory dietary habits about eating free sugar substances rather than fruits and drinking tea or cola with meal compared to those in the control group (22.3% & 10.9% respectively).

Table (5): Concerning the cooking habits before and after implementation of the study intervention, table 6 shows statistically significantly more satisfactory habit of refreezing meet (0.001*) or vegetables (0.001*) among women in the study group. Moreover, women in the study group had statistically significantly (0.001*) higher percentage of considering all food element while preparing their meal or the habit of returning back defreeze food to freeze compared to those in the control group (30.2% & 65.2% vs. 10.3% & 7.9% respectively). Differences observed are statistically significant.

Figure (1): displays the mean score of total women perception about IDA throughout the intervention phases. It points to statistically significant improvements in the study group at the post-test from 39.2±2.9 to 49.0±2.4 compared to women in the control group (37.9±3.3 to 38.3±2.9 respectively). The difference observed is statistically significant (**P+**=0.001*).

Table (6): It is noticed from table 8 that pregnant women in the study group become more compliant to take iron therapy after the implementation of the program during the second and third visit compared with the control group with statistically significant difference (P=0.001*). They showed significantly in regular use of taking medication during the second visit (94.1% vs. 25.0%) and third visit (100.0% vs. 31.4%). Moreover they were significantly more likely to follow diet regimen and attend regular visit especially during the third visit.

Discussion:

Iron deficiency anemia is the one of the most common hematologic complication during pregnancy.[11] In spite of the fact that most Ministries of Health in developing countries have policies to tackle this main health problem, maternal anemia prevalence has not declined; the prevalence rate of iron deficiency anemia among pregnant women worldwide is 55.8% compared to 58% in developing countries.

The present study aims to evaluate the impact of management protocol on pregnant women with iron deficiency anemia using health promotion model through changing their perception and behavior regarding the risk of anemia.

The study involved an intervention group for implementation of the educational program and a control group for comparison. The two groups were chosen to be similar in every respect as regards their socio-demographic, biological and medical characteristics. This was quite important to be able to compare the outcomes in the two groups without biases or confounders since the socio-economic status is an important determinant of IDA practices knowledge and habits.

Young and advanced maternal age in the current study has been associated with the risk of IDA. This is partially in coherence with Abd ElHameed et al.,[12] study in Egypt who

found that 50% of the study group was 18-32 years old, with a mean of 26.43±4.38. Manjunath and Veena[13] study in India also reported that the studied women were 18- 32 years. A possible explanation of the discrepancies between the above finding and the present one that, most of these studies were considerably smaller with different sample criteria and covered a shorter time span than the present one.

Concerning the level of education and the job status, the present study revealed that the majority of women in the two groups had secondary school education and were housewives. On the contrary the study of Abu-Hasira et al., [14] in Palestine revealed that the prevalence rates of IDA was much higher among the working group of pregnant women, as they might be engaged in their work and may not be able to pay the required attention for their body needs of rest and nutrition. In the same line AL-Tell et al.,[15]in Egypt reported that 45.1% & 43.1% of study and control group, respectively, had the secondary level of education and 76.5% of the study group and 84.3% of the control group were housewives. They attributed this to the fact that less educated women may lack knowledge and practice regarding healthy lifestyle or health seeking behavior, which in turn makes them at high risk for IDA.

The present study finding revealed that a hemoglobin level was elevated among the study group during the first and second assessment compared to those in the control group. This finding is in line with Garg and Kashyap[16] study in Indian who have shown significant improvement at the post assessment of the mean hemoglobin level among the intervention group compared to those of the non-intervention group (9.65 ±0.97 vs. 7.85± 1.58) and the prevalence of anemia reduced post education than before education (78.7% vs. 96%).

In investigating women knowledge about IDA before the intervention, the findings indicated discrepancies between the two groups, with women in the study group having better knowledge in some areas and women in the control group in other areas. Nevertheless, they both had similarly low total knowledge, with about 12.0% of them having satisfactory knowledge. This low level of knowledge reflects some deficiency in the role of ANC in the area of nutritional education pertaining to IDA. Thus, although women may be convinced with the importance of ANC, they may not receive adequate information and counseling regarding nutrition during pregnancy and its importance to IDA while seeking this service.

In agreement with this, Scanlon et al.,[17] retrospective cohort analysis among 173 pregnant women from 11 states in U.S.A revealed that the high prevalence of anemia has persisted among low income women, with poor nutritional status. Moreover, ***Conrad et al.,***[18] emphasized that greater efforts to improve the quality and uptake of educational interventions implemented through ANC services are necessary to increase their effectiveness.

The current study aim was also to improve pregnant women's dietary practices. The study findings revealed major deficiencies in their daily intake of food groups and balanced diet before the intervention. The findings are expected given the revealed low levels of dietary knowledge and misconceptions among women. Many Egyptian families prefer males and take care of their nutrition more than females. Furthermore, modernization

led to preferred takeaway and junk foods. In addition to inadequate knowledge of nutritional values, and following unhealthy dietary habits in preparing, preserving and cooking foods which can destroy iron and other micronutrients.

On the same line, a cross-sectional study conducted in primiparous mothers in southwestern Sydney revealed that low proportions of mothers were meeting the recommended intake of vegetables or fruit as well as essential diet containing iron during pregnancy [19] . Hence, Murrin et al., [20] concluded that a large proportion of reproductive-aged women internationally fail to meet food group recommendations.

The implementation of the present study intervention led to significant improvements among women in the study group in their daily intake of all food groups, eating habits, and cooking practices compared to those in the control group. The foregoing findings confirm the positive effect of the educational program in improving the dietary habits of pregnant women. This may be attributed to the fact that the researcher used simple applications and simulations in order to simplify the information and help attendants to apply their knowledge to practice.

The present study showed increased trends of intake of animal and plant proteins and eating green vegetables and fruits daily after intervention in the study group. These trends are in agreement with Lowdermilk and perry[21] who demonstrated that eating fresh vegetables with changing types of foods daily and proper handling of vegetables during cooking enhance preserving the main value of nutrients.

Apart from the dietary intake, some habits and patterns may influence the nutritional status of pregnant women. In the current study, more women in both groups had eating habits which interfere with iron absorption, such as drinking tea and cola during meals or having an unbalanced diet before the intervention. The post-intervention assessment revealed significant decrease in these food habits. Moreover, the mean numbers of daily meals that contain iron increased. These changes indicate a positive impact of the educational program among women in the study group. In this regard, Santiago et al.,[22] mentioned that this is not a simple task, as many foods, beverages and medications carry known or unknown risks. For instance, caffeine which can be found in coffee, sodas, energy drinks, and tea was labeled as a teratogen, so the FDA advised limiting intake of caffeine during pregnancy, noting the substance's association with fetal mortality, birth defects, and decreased birth weights.

The finding of the present study was expected in relation to HBM model constructs, thus there were statistical differences for all variables post intervention among the study group compared with the control group. Similar finding was reported by Boonserm [23] study in Bangkok about Factors Affecting Compliance with the Prevention and Treatment Measure of IDA in Pregnant Women, who found that perceived susceptibility, seriousness of anemia are associated with health behaviors in preventing and treatment of IDA in pregnant women.

Recently Khoramabadi et al., [24] study in Iran found that there were statistical differences for all variables except for the perceived benefit, and the majority of the model constructs have significantly progressed in the

experimental group compared to the control group.

Concerning the compliance to the Management Protocol in the study and control groups throughout intervention phases, the present study revealed that the study group becomes more compliant to take iron therapy after the implementation of the program during the second and the third visit compared with the control group with statistically significant difference. Moreover, the study group was more compliant to take medication in time and follow IDA diet regimen during the second and third visit compared with the control group with statistically significant difference (P=0.001*).

These findings are in agreement with Vongvichit et al.,[25] in their study about compliance of pregnant women regarding iron supplementation in Vientiane Municipality. They reported that the knowledge of iron deficiency anemia, perceived benefits and obstacles, perceived of threat and cues to action had an association with the good compliance of pregnant women regarding iron supplementation, with statistical significance (p< 0.05).

Conclusion:

In the light of the main study findings, it can be concluded that, implementation of the management protocol using HBM and aimed at improving their knowledge and practice related to, the risk of IDA. This was based on scientific background, and in the light of the needs identified in the pre-test assessment, thus it proved to be successful in raising the hemoglobin level, improving their dietary knowledge and practice and compliance to iron therapy compared to the control group. Moreover, the intervention increased women self-efficacy and cues to action and significantly change their perceptions regarding the risk, susceptibility, coping with barriers and benefits from management of IDA.

Recommendations

Based on the results of the present study, the following recommendations are suggested:

1. The protocol of management of IDA with pregnancy based on HBM which proved successful should be integrated in the ANC program at the study setting and in similar ones.

The future Recommendations

Nurses, working in primary health centers and obstetric hospitals should be encouraged to develop similar educational programs to educate pregnant women with IDA during provision of the ANC services.

Table (1): Distribution of the Studied Women According to their Socio-Demographic Characteristics (n=180).

Demographic data	Groups			
	Study (n=90)		Control (n=90)	
	No	%	No	%
Age (years)				
▪ 20-	25	27.8	39	43.3
▪ 25-	24	26.7	36	40.0
▪ 30-35	41	45.5	15	16.7
Mean ± SD	27.8 ± 4.8		25.3 ±3.5	
Educational level				
▪ Illiterate	13	14.4	17	18.9
▪ Read and write	9	10.0	6	6.7
▪ Primary school	8	8.9	13	14.4
▪ Preparatory school	13	14.4	19	21.1
▪ Secondary school	29	32.3	23	25.6
▪ University	18	20.0	12	13.3
Occupation				
▪ House wife	65	72.2	68	75.6
▪ Government employee	11	12.2	9	10.0
▪ Nongovernmental employee	14	15.6	13	14.4
Monthly income level				
▪ Sufficient	10	11.1	14	15.6
▪ Just meet life expenses	41	45.6	63	70.0
▪ Insufficient	39	43.3	13	14.4
Place of residence				
▪ Rural	57	63.3	55	61.1
▪ Urban	33	36.7	35	38.9

Table (2): Mean Hemoglobin level in the Study and Control Groups throughout intervention phases

Hemoglobin Level	Groups					
	Study group (n=90)			Control group (n=90)		
	First visit (Pre)	2nd visit	3rd visit	First visit (Pre)	2nd visit	3rd visit
Hb level Mean ±SD	10.3±0.4	10.8±0.6	11.8±0.7	10.4±0.4	10.3±0.4	10.7±0.6
F (P)		0.001*			0.085	

Table (3): Knowledge about IDA among the Study and Control Groups throughout intervention phases (n=180)

Knowledge items	Study group		Control group		*P 1*	*P 2*
	Pre	Post	Pre	Post		
	%	%	%	%		
Definition of IDA						
▪ Satisfactory (Complete Answer)	48.9	100.0	58.9	62.3	0.456	0.001*
▪ Unsatisfactory (Incomplete Answer & Don't know)	51.1	0.0	41.1	37.7		
Sign & Symptoms of IDA						
▪ Satisfactory (Complete Answer)	41.1	87.8	53.3	48.4	0.187	0.001*
▪ Unsatisfactory (Incomplete Answer & Don't know)	58.9	10.2	46.7	51.6		
Causes of IDA						
▪ Satisfactory (Complete Answer)	36.9	100.0	43.1	53.1	0.324	0.001*
▪ Unsatisfactory (Incomplete Answer & Don't know)	63.1	0.0	56.9	46.9		
Consequences of IDA in women during pregnancy						
▪ Satisfactory (Complete Answer)	48.0	85.1	42.2	57.2	0.293	0.001*
▪ Unsatisfactory (Incomplete Answer & Don't know)	52.0	14.9	57.8	42.8		
Food sources rich in iron						
▪ Satisfactory (Complete Answer)	40.0	90.1	47.8	59.7	0.655	0.001*
▪ Unsatisfactory (Incomplete Answer & Don't know)	60.0	9.9	52.2	40.3		
Food and drinks reducing iron absorption						
▪ Satisfactory (Complete Answer)	46.7	100.0	52.2	55.0	0.652	0.001*
▪ Unsatisfactory (incomplete answer & Don't know)	53.3	0.0	47.8	45.0		
Food and drinks increase iron absorption						
▪ Satisfactory (Complete Answer)	50.0	88.9	47.8	47.8	0.765	0.001*
▪ Unsatisfactory (Incomplete Answer & Don't know)	50.0	11.1	52.2	52.2		

Table (4): Dietary Habits among Women in the Study and Control Groups throughout intervention phases (n=180)

Variables	Study group %		Control group%		*MCP* 1	*MCP* 2
	Pre	Post	Pre	Post		
Eating balanced diet (which is rich in iron)						
▪ Satisfactory (Always)	10.0	75.0	8.9	10.9	0.251	0.001*
▪ Unsatisfactory(Never & Sometime)	90.0	25.0	91.1	81.1		
Eating plant and animal proteins						
▪ Satisfactory (Always)	5.0	45.6	4.1	11.1	0.014	0.023*
Unsatisfactory (Never & Sometime)	95.0	54.4	95.9	88.9		
Eating row green vegetables& fruits daily						
▪ Satisfactory (Always)	30.5	95.0	22.8	22.8	0.085	
Unsatisfactory (Never & Sometime)	69.5	5.0	77.2	77.2		0.003*
Drinking tea or cola with meal						
▪ Satisfactory (Never)	17.8	100.0	14.4	10.9		
Unsatisfactory (Always & Sometime)	82.2	0.0	85.6	89.1	0.125	0.001*
Preferring specific type of food regardless of its nutritional value (Salty fish, Herring, Pickles)						
▪ Satisfactory (Never)				20.5	[	
Unsatisfactory (Always & Sometime)	6.7	82.1	5.6	79.5	0.854	0.001*
	93.3	17.9	94.4			
Eating chips and chocolate more than fruit						
▪ Satisfactory (Never)	14.4	96.3	20.0	22.3	0.084	0.004*
▪ Unsatisfactory (Always & Sometime)	85.6	3.7	80.0	77.7		

Table (5): Cooking Habits among Women in the Study and Control Groups throughout intervention phases (Cont….)

Variables	Study group %		Control group %		*MCP 1*	*MCP 2*
	Pre	**Post**	**Pre**	**Post**		
Preparing meal considering all food elements						
▪ Satisfactory (Always & Sometime)	2.2	30.2	7.8	10.3	0.328	0.001*
Unsatisfactory (Never)	97.8	69.8	92.2	89.7		
Using the meat soup in cooking						
▪ Satisfactory (Always & Sometime)	6.7	42.8	7.8	7.8	0.251	0.003*
Unsatisfactory (Never)	93.3	57.2	92.2	92.2		
Refreezing meat putting it in hot water						
▪ Satisfactory (Never)	10.2	90.1	8.8	10.5		
Unsatisfactory (Always & Sometime)	90.8	9.9	91.2	89.5	0.621	0.001*
Refreezing vegetables putting it in hot water						
▪ Satisfactory (Never)	30.3	100.0	27.5	30.8	0.125	0.001*
Unsatisfactory (Always & Sometime)	69.7	0.0	72.5	69.2		
Return back defreeze food to freeze						
▪ Satisfactory (Never)	9.2	65.2	7.9	7.9		
Unsatisfactory (Always & Sometime)	90.8	34.8	92.1	92.1	0.085	0.001*

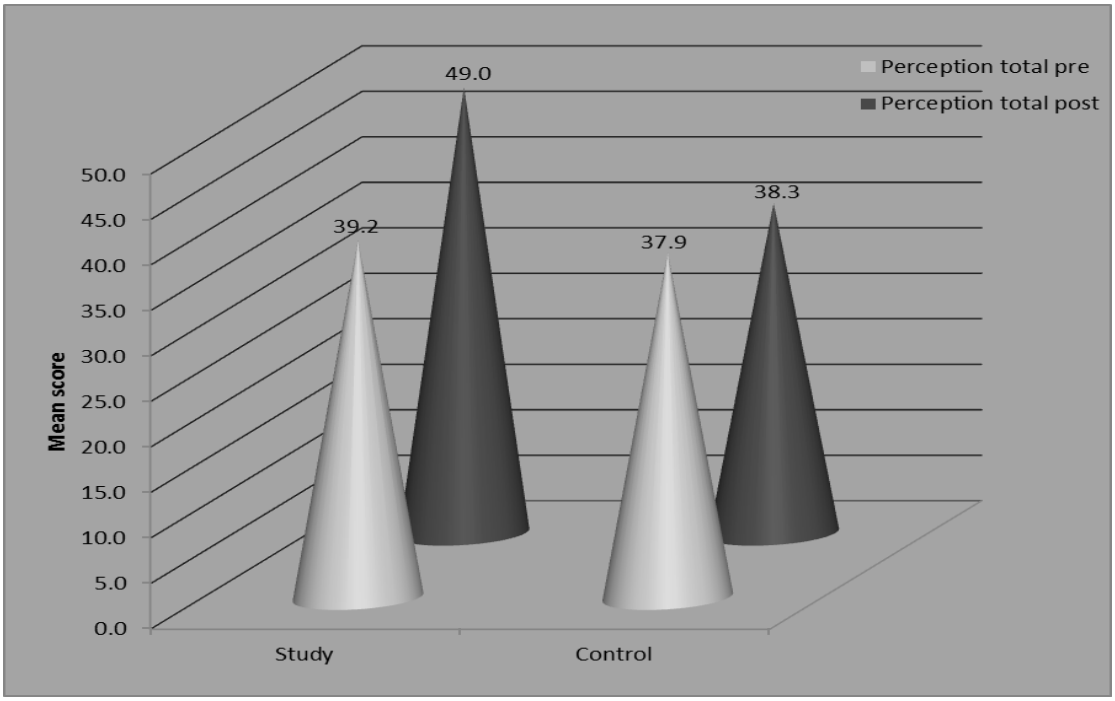

Figure (1): Total mean level of women perception pertaining to IDA in the study and control groups throughout intervention phases

Table (7): Compliance to the Management Protocol in the Study and Control Groups throughout Intervention Phases

Medication compliance	Pre-intervention		2nd Visit		3rd Visit	
	Study	Control	Study	Control	Study	Control
Current use of iron supplements	14.4	16.7	94.4	22.2	100.0	38.9
P	0.061		0.001*		0.001*	
Regular use of taking medication (iron)	8.3	20.0	94.1	25.0	100.0	31.4
P	0.006*		0.001*		0.001*	
Following diet regimen	0.0	5.6	55.0	7.5	67.8	10.0
P	0.061		0.001*		0.001*	
Attend regular visit	33.0	30.0	75.9	50.3	90.4	58.3
P	0.314		0.001*		0.001*	

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