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Effectiveness of self Instructional Module on Pregnant women Suffering from Iron Deficiency Anemia

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Abstract: **Background: Iron deficiency anemia (IDA) is one of the most common complications during pregnancy and a major contributory factor to maternal morbidity and mortality. Aim & design: Quasi-experimental study design was conducted aiming to evaluate the effect of self-Instructional module on pregnant women suffering from iron deficiency anemia. Sample: A purposive sample of one hundred pregnant women suffering from iron deficiency anemia was included in the study. They were divided into two equal groups (study & control).Setting: The present study was conducted at the Antenatal Outpatient clinic at Ain Shams University Maternity Hospital. Tools: Data were collected using; structured interviewing questionnaire sheet, in addition to Supportive material (self-instructional module) was given to the study group. Results: There was no statistically significant difference between both study and control groups regarding total knowledge, practices scores and the total mean score of hemoglobin level pre-intervention. Meanwhile, a highly statistically significant difference was observed between the two groups post-intervention (P<0.001). Conclusion &recommendations: the study concluded that the Implementation of self-Instructional Module has a positive effect on enhancing knowledge and practices regarding iron deficiency anemia among pregnant women. Inaddition, there was an improvement in hemoglobin level among the study group. The study recommended: Applying the developed self-instructional module by all antenatal out-patients' clinics and in-patients' high-risk pregnancy unit, developing a counseling and health education program for pregnant women with iron deficiency anemia. Further research is needed to evaluate the effect of self-instructional module regarding anemia during pregnancy on maternal and fetal outcome.**

Keywords: **Iron deficiency anemia, self-instructional module, pregnant women.**

1. INTRODUCTION

Anemia is a common public health problem among pregnant women in the world. However, it is an important factor responsible for morbidity and mortality in females of the reproductive age in developing countries [1].World Health Organization (WHO) defines anemia in pregnancy as hemoglobin concentration below 11g/dl. This clinical condition often results from increased demand for iron and other nutrients necessary for blood formation during pregnancy. The inability to meet this increased demand either due to poor dietary intake or mal absorption results in anemia [2]. According to WHO, anemia is classified as mild degree (Hb 9.0-11.0 g\dl), moderate (7.0-9.0 g\dl) and severe (4.0-7.0 g\dl)**[3]**.

Anemia in pregnancy develops when physiological changes reduce Hb concentrations. These changes are mainly a result of nutritional deficiencies of which iron deficiency is the most common cause[4].During pregnancy, women need more iron for red blood cells to support fetal growth, and placenta and support the development of brain cells in the fetus. The fetus stores iron during the third trimester of pregnancy for supplies during the first six months of life. Hemoglobin formation is minimal in the first trimester of pregnancy. Hemoglobin formation continued to increase during the second

and third trimesters due to the increased need for iron [5]. Besides poor nutrition, frequent labor, multiparity, abortions, parasitic infestations, consuming excess tea or coffee after meals determined as the predictors of anemia in reproductive age women [6].

Maternal anemia in pregnancy is commonly considered a risk factor for poor pregnancy outcomes and can result in complications that threaten the life of both mother and fetus. These complications could be prematurity, low birth weight, intrauterine growth restriction, infant anemia, increased risk of mortality and impaired mental and motor cognition [7]. On the other hand, women with severe anemia in pregnancy have 3.5 times greater risk of death from obstetric complications including spontaneous abortion, post-partum hemorrhage, stressed labor, puerperal sepsis among others compared with non-anemic pregnant women[8].Further, it has been noticed that in women even a mild degree of anemia leads to fatigue and low physical activity [9].

Anemia can be prevented and controlled in pregnant women by some actions, start from promotive, preventive, and curative actions. Iron and folic acid supplements, B12 vitamin and healthy foods are essential for pregnant women to prevent anemia[10]. The nurse plays a vital role in promoting health during pregnancy. The nurse role within the aspect of health promotion has shifted from a disease model to a health model. The most critical role is figured in teaching and providing pregnant women with information needed based on social and psychological behavioral changes to maintain health during pregnancy mainly those related to nutritional aspects. The nurse role should emphasize on self-practical changes to assist mothers to change their eating habits and practices that contribute to nutritional deficit especially anemia that is one of the most common hematologic complications during pregnancy[11].

Justification of the study:

The World Health Organization (WHO) has reported that about 2.17 billion people worldwide are suffering anemia. The most vulnerable groups are pregnant women. These reports also reveal that the prevalence of anemia among pregnant women is 40-60 percent in developing countries. In Africa, the estimated prevalence in pregnant women is 50-60%. [11]. Iron deficiency is the primary cause of anemia in pregnant women, accounting for 75% of all pregnancy anemia[4].

Maternal mortality is one of the critical indicators of the quality of health services in a country. Anemia during pregnancy is one of the significant causes for maternal mortality which contributed to 22,000 maternal deaths [12]. Anemia is a significant risk factor in pregnancy, and it is associated with an increased incidence of both maternal and fetal morbidity and mortality. More than three percent of maternal mortality in Africa is directly attributable to anemia [5]. Maternal anemia also contributes to an increase in perinatal mortality, low birth weight, stillbirth, and fetal wastage. Anemia in pregnancy reduces tolerance to blood loss and leads to impaired function and cardiac failure [13].

Despite efforts being made to reduce the burden of anemia, its prevalence is still high in developing countries. Thus; this study aimed to evaluate the effect of self-instruction module on pregnant women suffering from iron deficiency anemia.

2. AIM OF THE STUDY

The present study aimed to evaluate the effect of self-Instructional module on pregnant women suffering from iron deficiency anemia.

This aim was achieved through the following:

1- Assessing women's knowledge and practices regarding iron deficiency anemia during pregnancy.

2- Designing and implementing self-Instructional Module for pregnant women suffering from iron deficiency anemia.

3- Evaluating the effect of self-Instructional Module on pregnant women suffering from iron deficiency anemia.

3. RESEARCH HYPOTHESIS

- Implementation of self-Instructional Module has a positive effect on enhancing knowledge and practices regarding iron deficiency anemia among pregnant women for the intervention group compared to the control group.
- Prevalence of anemia is expected to be reduced among study group rather than the control group after exposure to intervention.

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4. SUBJECTS AND METHODS

Research design:

Quasi-experimental study design was utilized to achieve the aim of this study.

Setting:

The study was conducted at the Antenatal outpatient clinic at Ain Shams University Maternity Hospital.

Subjects:

Sample type: A purposive sample with the following:

Inclusion criteria:

- Pregnant Women suffering from only anemia during pregnancy "HB less than 11gm".
- Pregnant women with gestational age of 12-16 weeks,
- Primipara or multigravida
- Their age range between 20 and 35 years,
- Pregnant women who can read and write

Exclusion criteria:

- Pregnant women suffered from any medical disorder,
- Women have experienced pregnancy complications (bleeding, pregnancy-induced hypertension, and preterm birth, etc.).

Sample size: one hundred pregnant women were included in this study

Sample size Equation: The researchers depended on the following equation to calculate the sample size: Steven Thompson Equation

$$n = \frac{Z1_{-\alpha/2}^{2}\, P\,(1-P)}{d2}$$

Sampling technique:

The sample divided into two equal groups, each group composed of 50 pregnant women. **Group (1)*Study group*;** they have received self-instructional module in addition to the routine antenatal care at the pre-mentioned setting.

Group (2) Control group: this group received the routine of antenatal care only. The control group was chosen first to ensure no contamination or bias in the sample of the study group.

Tools of data collection:

I) A Structured Interviewing Questionnaire:

The researcher designed it after reviewing recent literature. It adapted from[14,15]to collect the necessary data related to the study aim. The interviewing questionnaire was used in Arabic language pre / post-intervention. The time consumed to fill in the questionnaire was about 15-20 minutes. It consisted of 43 questions; covering five parts as the following;

The first part; included the socio-demographic characteristics of the study sample such as age, residence, marital status, level of education, and occupation (5 questions).

The second part; included past and current obstetric history as gravid, para, gestational age, and previous pregnancy complications (7 questions).

The third part; concerned with the assessment of hemoglobin level of the pregnant women through review of the studied women records (one question).

The fourth part; designed to assess women's knowledge regarding iron deficiency anemia during Pregnancy as meaning, causes, risk factors, symptoms, complications, management, prevention, sources of iron-rich foods and importance of iron supplementation, etc.) (18 questions).

Scoring system: The scores of items ranged as the following: the correct answer scored two degrees, the incorrect answer or did not know scored one. The total score ranged from 0-36. Total knowledge scores were categorized as the following:

Poor knowledge: >50% (0-17 score);

Average knowledge: 50-75% (18-26);

Good knowledge: ≤ 75% (27-36).

The fifth part:

It was used to assess women s' practice regarding iron deficiency anemia as regular antenatal follow up, regular check of HB level, eating iron-rich food, do notdrink tea with or immediately after meals, regular intake of iron supplementation, and use of orange juice with iron supplementation,…etc. (12 questions).

Scoring system:

It was scored as two scores for a correct answer, and one score for an incorrect answer. Total score ranged from (0-24). The total practice scores were classified as the following: unsatisfactory Practice (>60% 0-13), and satisfactory practice (≤ 60% 14-24).

II) The developed supportive material (Self- instructional module):

The researchers developed it based on the recent literature review to enhance pregnant women's knowledge and practices regarding iron deficiency anemia. It was designed using simple Arabic language and different illustrative pictures in order to facilitate the women understanding of its contents. It consisted of, an introduction, general objectives, and the content, which is composed of two parts;

The first part, was consisted primarily of education about iron deficiency anemia, which including; meaning of, causes, risk factors, the signs, symptoms, consequences , diagnostic test, and healthy level of hemoglobin during pregnancy. The second part; included self- care practices information related to iron deficiency anemia including proper diet (iron-rich food, nutritional substances that increase iron absorption), the importance of iron supplementation during pregnancy, side effects of iron supplementation, and measures to control iron supplementation side effects, etc.

Validity & reliability:

Tools were evaluated for feasibility and content validity by five experts from the Faculty of Nursing & Medicine, in the Maternity-Gynecological Nursing Department, Public Health Department, and Nutrition Department. Their comments were considered. Reliability was done by Cronbach's Alpha coefficient test which revealed

r = 80.2

Pilot Study:

It was carried out in three weeks on 10 % of the sample. The pilot study conducted to assess the validity, clarity, comprehensiveness of the tools and to test the feasibility of the study process. The necessary modifications were done based on the pilot study findings such as (omission of some questions from the tool) in order to strengthen their contents or for more simplicity and clarity. These groups were excluded from the study sample.

Administrative design:

An official written approval letter clarifying the title, purpose, and setting of the study was obtained from the Dean of Faculty of Nursing of Ain Shams University & director of Ain Shams Maternity University Hospital.

Ethical considerations:

Ethical approval was obtained from the Scientific Research Ethical committee of Faculty of Nursing at Ain Shams University before starting the study. Informed consent obtained from participants after explaining the purposes of the study. No harmful methodology used with participants. Each participant had the right to withdraw from the study at any time. Human rights were granted. Data was confidential, and a coding system for data was used.

Fieldwork:

The study was carried out through three phases: assessment, implementation, and evaluation phase. These phases were carried out from the beginning of August 2016 to January 2017, covering a period of six months. The previously mentioned setting was visited by the researchers three days per week from 9.00 am to 12.00 pm.

Assessment phase:

- At the beginning of the interview, the researcher introduced herself to the participants. The researcher explained the aim of the study, reassured the participants that information collected would be treated confidentially and that would be used only for the study purpose. Then verbal & written consent of women was obtained.
- The researcher started to fill the interviewing questionnaire to assess women's general characteristics, their knowledge, practices regarding iron deficiency anemia. In addition to the hemoglobin level for both groups(control & study),that was obtained from women records in a time ranged from 15- 20 minutes. The data obtained during this phase constituted the baseline for further comparisons to assess the effect of the intervention.
- The researcher arranged for follow-up date with participants of both groups after three months

Implementation phase:

- Pregnant women in the control group received only routine prenatal care at pre-mentioned setting, while pregnant women in the study group received self- instructional module, in addition to the routine prenatal care.

- The researcher classified the pregnant women in the study group into five subgroups; each subgroup consisted of ten members. The self-instructional module was distributed among the study group.

- The self-instructional module was provided to each subgroup through two 45-60 minutes sessions, over five weeks in a quiet room at the Antenatal Outpatient clinic. Various teaching methods were employed in the current study as lectures, group discussion, and demonstration were utilized. Pamphlets were provided by the researcher.

First session:

- The researcher started the first session with an orientation about the module objectives, content, and its impact on the women's condition, time and place of sessions. Then started to provide general information regarding iron deficiency anemia during pregnancy as "definition, causes, risk factors, complications, diagnostic tests, and management.

Second session:

- It was started by a summary about what has been discussed in the previous session and the objectives of the new topics. In this session, the researcher focused on self-care practices regarding iron deficiency anemia including proper diet, healthy behavior, and importance of iron supplementations etc.
- Each session ended by a summary of its contents; feedback from the pregnant women to ensure that women got the maximum benefits.
- The researcher also used telephone call with pregnant for more clarification and reinforcement.

Evaluation phase:

- The effect of the self-instructional module was done through comparing between the control and study group by assessing their knowledge and practices regarding iron deficiency anemia, in addition to hemoglobin level by using the same questionnaire pre- intervention and after three months from the data collection started.

Statistical Design: The collected data was revised, coded, tabulated and introduced to a personal computer using Statistical Package for Social Sciences (IBM SPSS 20.0). Descriptive statistics were used to calculate percentages and frequencies for qualitative variables, mean and standard deviations for quantitative variables. The statistical tests such as chi-square test (X^2) were used to estimate the statistically significant differences. For normally distributed data, a comparison between two independent populations was made using independent (t) test. A significant level value was considered when $p < 0.05$, a highly significant level value was considered when $p < 0.01$, and no statistically significant difference when $p>0.5$.

Limitation of the study:

-There were some difficulties in data collection due to the interruption of health worker team and client relatives.

5. RESULTS

Table (1): reveals that, (68%) of the control group their age ranged from 20-<30 years compared with (62%) of the study group. (72%) of the control group were from urban area compared to (68%) in the study group, and (88%) of the controls were married versus (96%) of the study group. (70%) % of control group had secondary education compared with (60%) of the study group. (80%) of control group and (88%) of the study group were housewives. There was no statistically significant difference between study and control groups regarding their socio-demographic characteristics ($P > 0.05$).

Table (2): shows that, (56% &46%) of control and study group, respectively were primigravida, Regarding parity, (77.3%) of control group were para one as compared to (55.5 %) of study group, 40% of control group gestational age per week was between 18-23 compared with (48%) of study group, and (32%) of the control group had previous pregnancy complications versus (20%) of the study group. There was no statistically significant difference between study and control groups regarding their obstetric history (P-value > 0.05).

Table (3): indicates that, there was no statistically significant difference between control and study groups regarding their knowledge about iron deficiency anemia at pre- intervention. While a highly statistically significant difference ($p< 0.001$) was observed between them at post three months of intervention, regarding all knowledge elements, as (92%, 90%,90%, 88%, and 88%) of study group had correct knowledge about of preventive measures of anemia,, definition, effect of it on pregnant women, causes, Sources of iron-rich foods respectively as compared to (40%, 42%,40%, 32%,40%) of control group.

Figure (1): reveals that, the majority (86% & 84%) of the study group and control group respectively had a poor level of total knowledge score regarding iron deficiency anemia pre-intervention.

Figure (2): displays that, the majority of the study group (84%) had a good level of total knowledge score compared to no one of the control group at post-intervention, in addition to 78% of the control group had poor knowledge level.

Table (4): indicates that, there were no statistically significant differences in the total knowledge score regarding iron deficiency anemia between the control and study group at pre-intervention. Meanwhile, a highly statistically significant difference was observed between them at post-intervention as a higher percentage for good knowledge was represented among the study group ($p < 0.001$).

Table (5): reveals that, there was no statistically significant difference between the control and study group regarding their practices toward iron deficiency anemia at pre-intervention. Meanwhile, a highly statistically significant difference (p-values < 0.001) was observed between them at post-intervention as (96%,92, 88%,84%) of the study group were taken iron supplementation with regular pattern , consumed vitamin C rich-foods during or after meal, eating iron rich foods, and eat regular frequent meals, respectively compared to (32%,28,40%,36%) of control group.

Figure (3): shows that, (68% &70 %) of study and control group respectively had unsatisfactory total practices score while (32%& 30%) of them had a satisfactory level at pre-intervention

Figure (4): indicates that, the majority of the study group (86%) had a satisfactory level of total practice score regarding **iron deficiency** anemia as compared to (34%) of the control group at post-intervention.

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Table (6): Clarifies that, there were no statistically significant differences in total practices scores regarding iron deficiency anemia between study and control group at pre-intervention. Meanwhile, there was a highly statistically significant difference between them at post-intervention ($p < 0.001$).

Table (7): clarifies that, there is no statistically significant difference in total mean scores of hemoglobin level among control & study groups pre-intervention, while there was a highly statistically significant difference between them at post-intervention ($p < 0.001$), as (78%) of study group had normal hemoglobin level post-intervention, while (48%&36%) of control group had moderate and mild level of anemia respectively.

Table (1): Frequency distribution of studied groups according to their socio-demographic characteristics

Personal data	Control group N=50		Study group N=50		X^2	P value
	No.	%	No.	%		
Age						
Less than 20	8	16	4	8		
20-<30	34	68	31	62		
30-<	8	16	15	30	3.602	0.165
Residence						
Rural	14	28	16	32		
Urban	36	72	34	68	0.190	0.663
Marital status						
Married	44	88	48	96		
Divorced	6	12	2	4	2.174	0.140
Educational level:						
Read & Write	2	4	6	12		
Primary	3	6	6	12		
Secondary	35	70	30	60		
High	10	20	8	16	3.607	0.307
Occupation						
Working	10	20	6	12		
Housewife	40	80	44	88	1.190	0.275

Table (2): Frequency distribution of studied groups according to their obstetric history

Obstetric history	Control group N=50		Study group N=50		X^2	P
	No.	%	No.	%		
Gravida						
1	28	56	23	46		
2	14	28	13	26	2.146	0.339
3+	8	16	14	28		
Parity						
1	17	77.3	15	55.5		
2	2	9	8	29.7	3.393	0.183
3+	3	13.7	4	14.8		
Gestational age						
13+	7	14	10	20		
18+	20	40	24	48	2.149	0.341
24-28	23	46	16	32		
Previous pregnancy, complications:						

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Yes	16	32	10	20		
No	34	68	40	80	1.871	0.171
Types of problem						
Abortion	9	56	4	40		
Anemia	3	19	4	40	1.424	0.491
Hypertension	4	25	2	20		

Table (3): Frequency distribution of the studied sample according to their correct knowledge regarding iron deficiency anemia among control & study group at pre and post- intervention

Women's Knowledge	Pre-intervention				Post-intervention			
	Control group No=50		Study group No=50		Control group No=50		Study group No=50	
	no	%	no	%	no	%	no	%
Definition of anemia	21	42%	20	40%	22	42%	45	90%
X^2 & P value	X^2 = 0.041 & P = 0.839				X^2 = 23.93& P = 0.000**			
Causes	15	30%	17	34%	16	32%	44	88%
X^2 & P value	X^2 = 0.184& P = 0.668				X^2 = 32.67& P = 0.000**			
Risk factors	12	24%	16	32%	14	28%	42	84%
X^2 & P value	X^2 = 0.794& P = 0.373				X^2 = 31.82& P = 0.000**			
Signs and symptoms	20	40%	21	42%	22	44%	40	80%
X^2 & P value	X^2 = 0.041 & P = 0.839				X^2 = 13.75& P = 0.000**			
Effect of anemia on pregnant women	21	42%	20	40%	20	40%	45	90%
X^2 & P value	X^2 = 0.041 & P = 0.839				X^2 = 27.47& P = 0.000**			
Effect of anemia on the neonate	14	28%	16	32%	15	30%	41	82%
X^2 & P value	X^2 = 0.190& P = 0.663				X^2 = 27.44& P = 0.000**			
Measures of prevent	19	38%	18	36%	20	40%	46	92%
X^2 & P value	X^2 = 0.043& P = 0.836				X^2 = 30.13& P = 0.000**			
Treatment	16	32%	17	34%	18	36%	45	90%
X^2 & P value	X^2 = 0.045& P = 0.840				X^2 = 12 & P = 0.001*			
Sources of iron rich foods	20	40%	19	38%	20	40%	44	88%
X^2 & P value	X^2 = 0.041 & P = 0.832				X^2 = 25& P = 0.000**			
Importance of iron supplementation	22	44%	21	42%	21	42%	42	84%
X^2 & P value	X^2 = 0.041 & P = 0.840				X^2 = 18.92& P = 0.000**			
Side effects of iron supplementation	21	42%	19	38	22	42%	44	88%
X^2 & P value	X^2 = 0.167& P = 0.683				X^2 = 21.57& P = 0.000**			
Measures to control iron supplementation side	10	20%	13	26%	12	24%	43	86%
X^2 & P value	X^2 = 0.508& P = 0.475				X^2 = 38.83& P = 0.000**			

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Figure (1): Frequency distribution of the study group and control group according to their total knowledge score regarding iron deficiency anemia at pre-intervention

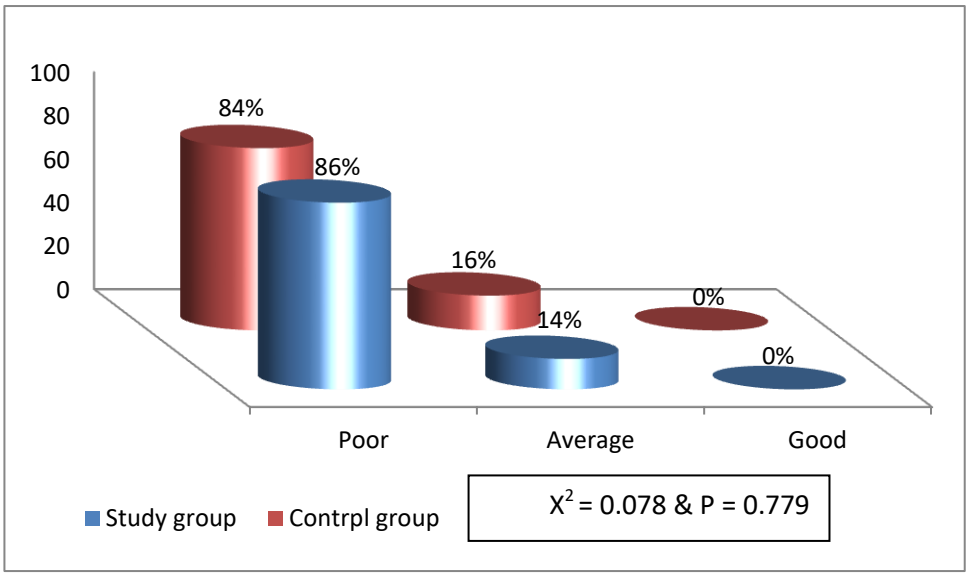

Figure (2) Frequency distribution of the study group and control group according to their total knowledge score regarding iron deficiency anemia at post-intervention

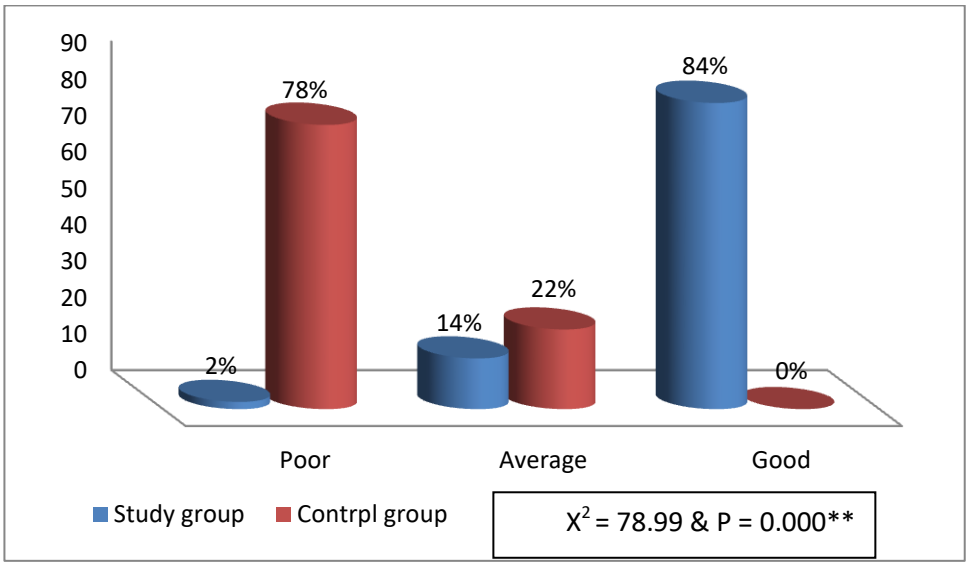

Table (4): Comparison between control and study groups regarding their total knowledge score regarding iron deficiency anemia at pre &post intervention

Total women knowledge	Pre-intervention				Post-intervention			
	Control group N=50		Study group N=50		Control group N=50		Study group N=50	
	No	%	No	%	No	%	No	%
Poor	42	84%	43	86%	39	78%	1	2%
Average	8	16%	7	14%	11	22%	7	14%
good	0	0.0	0	0.0	**0**	**0.0**	**42**	**84%**
X^2 & P value	X^2 =0.078 & P = 0.779				X^2 = 78.99& P = 0.000**			

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Table (5): Frequency distribution of the studied sample according to their Self-Care practices towards iron deficiency anemia among the control and study group at pre-post intervention

	Pre-intervention				Post-intervention			
	Control group No=50		Study group No=50		Control group No=50		Study group No=50	
	No	%	No	%	No	%	No	%
Regular antenatal follow up	29	58	28	56	30	60	45	90
X^2 & P value	**X^2 = 0.041& P = 0.840**				**X^2 = 12& P = 0.001***			
Regular check of HB level	28	56	27	54	30	60	45	90
X^2& P value	**X^2 = 0.040& P = 0.841**				**X^2 = 12 & P = 0.001***			
Eat regular frequent meals	16	32	15	30	18	36	42	84
X^2 & P value	**X^2 = 0.047& P = 0.829**				**X^2 = 12.72& P = 0.000****			
Eating iron rich foods	18	36	19	38	20	40	44	88
X^2 & P value	**X^2 = 0.043& P = 0.836**				**X^2 = 25& P = 0.000****			
Consume vitamin C rich foods during or after meal	13	26	15	30	14	28	46	92
X^2 & P value	**X^2 = 0.189& P = 0.565**				**X^2 = 38.47& P = 0.000****			
Consumption of tea/ coffee after meal	**44**	**88**	**42**	**84**	**41**	**82**	**14**	**28**
X^2 & P value	**X^2 = 0.323& P = 0.564**				**X^2 = 29.46& P = 0.000****			
Patten of Iron supplementation use								
Regular	**14**	**28**	**15**	**30**	**16**	**32**	**48**	**96**
Irregular	**26**	**52**	**19**	**38**	**25**	**50**	**2**	**4**
Do not take it	**10**	**20**	**16**	**32**	**9**	**18**	**0**	**0**
X^2 & P value	**X^2 = 2.508& P = 0.285**				**X^2 = 44.59& P = 0.000****			
Drinks are taken with Iron tablet								
Milk	**8**	**16**	**7**	**14**	**10**	**20**	**0**	**0**
Juice (V. c)	**2**	**4**	**4**	**8**	**3**	**6**	**40**	**80**
Water	**40**	**80**	**39**	**78**	**37**	**74**	**10**	**20**
X^2 & P value	**X^2 = 0.746& P = 0.689**				**X^2 = 57.35& P = 0.000****			

Figure (3) Frequency distribution of study and control group according to their total practice regarding anemia pre intervention

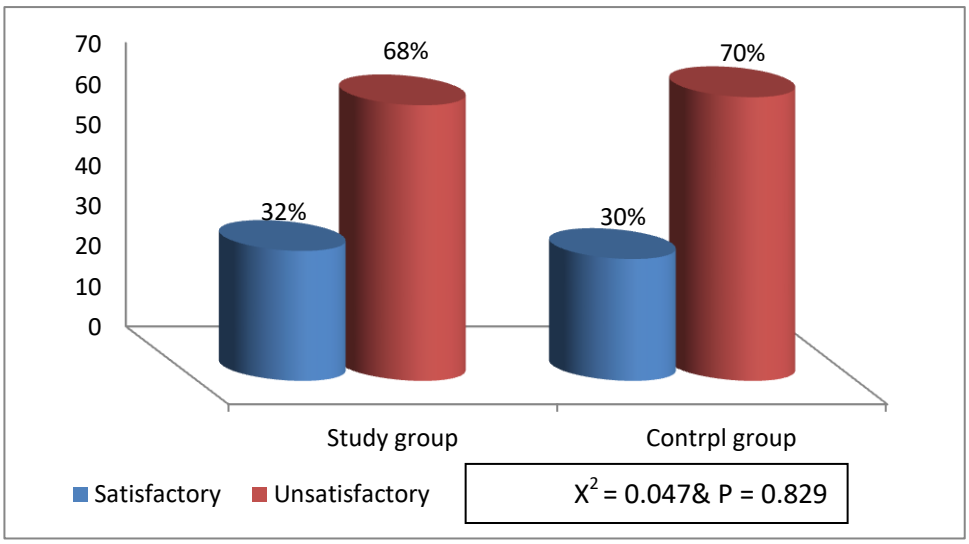

Figure (4) Frequency distribution of study group and control group according to their total practice regarding iron deficiency anemia post intervention

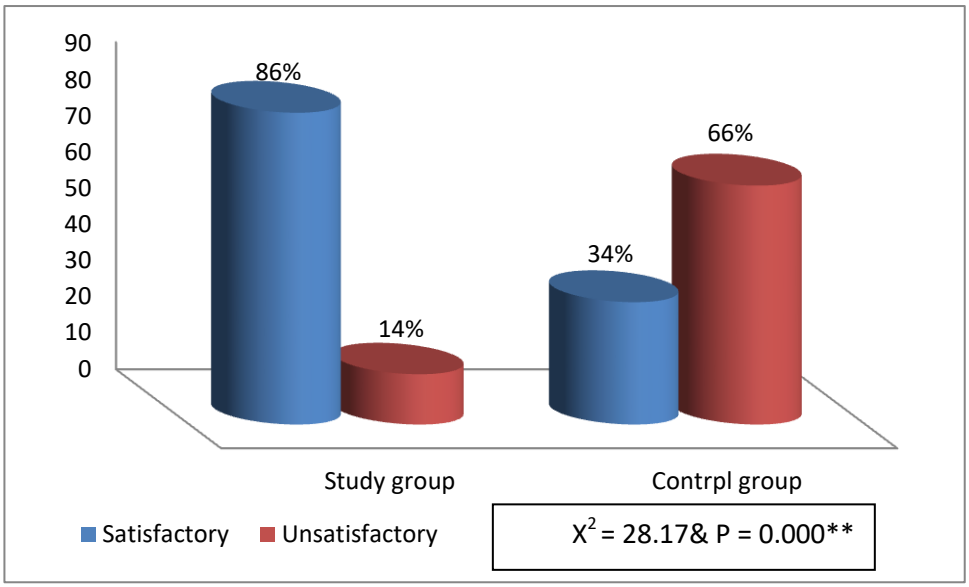

Table (6): Comparison between control and study groups regarding total practices towards iron deficiency anemia at pre-post intervention

Total women knowledge	Pre-intervention				Post-intervention			
	Control group N=50		Study group N=50		Control group N=50		Study group N=50	
	No	%	No	%	No	%	No	%
Satisfactory	15	30%	16	32%	17	34%	43	86%
Unsatisfactory	35	70	34	68%	33	66%	7	14%
X^2 & P value	X^2 = 0.047& P = 0.829				X^2 = 28.17& P = 0.000**			

Table (7): Frequency distribution of the study group and control group according to their Hemoglobin level at pre-post intervention

Hb Level	**Control group N=50**		**Study group N=50**	
Pre-intervention	No	%	No	%
Mild	32	64	15	30
Moderate	18	36	35	70
Mean ±SD	**8.90 ± 0.65**		**8.66 ± 0.69**	
t-test & P value	**t = -1.74 & P = 0.088**			
Post-intervention				
Normal	8	16	39	78
Mild	18	36	11	22
Moderate	24	48	0	0
Mean ±SD	**8.88 ± 0.86**		**11.14 ± 0.82**	
t-test & P value	**t = 12.42 & P = 0.000****			

8. DISCUSSION

Anemia has emerged as a significant public health issue in developed and developing countries. Maternal mortality is one of the critical indicators of quality of health services in a country. Anemia during pregnancy is one of the important causes of maternal mortality. According to WHO, 29% of all women of reproductive age group are diagnosed to have anemia.

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Anemia in pregnancy has detrimental effects on maternal and child health and prevalence of anemia during pregnancy is alarmingly high despite the implementation of the national nutritional anemia prophylaxis program which provides iron and folic acid which are the essential nutrients lacking in their diet. [16]. In light of the previous references, the quasi-experimental research design was used in this study to evaluate the effectiveness of self-instructional module on pregnant women suffering from iron deficiency anemia.

According to researcher point of view, improving Knowledge of pregnant women has a vital role in the maintenance of the nutritional status of healthychildren. Adequate knowledge regarding various aspects of feeding practices during pregnancy is essential especially among females as they are going to influence the feeding practices of this vulnerable group, adequate maternal nutrition knowledge and dietary practice before and during pregnancy are necessary to ensure positive pregnancy outcomes. In this study, the majority of study and control groups had a poor level of total knowledge score regarding iron deficiency anemia pre- intervention with no significant difference between them. This finding may be explained by the fact that these women did not receive enough information about the disease and also may be due to lack of knowledge and awareness of pregnant women regarding iron deficiency anemia.

However, there was a highly significant difference between control and study group regarding total knowledge score after three months of intervention as the majority of the study group had good knowledge about iron deficiency in the form of meaning, causes, preventive measures, sources of iron-rich foods, and Importance of iron supplementation. This finding confirmed the positive effect of the self-instructional module in enhancing women knowledge and awareness among the study group. So the first hypothesis is supported

This finding supported by another study carried out by [17] who investigate the effect of nutritional educational intervention on improving knowledge, attitude and practice of iron deficiency anemia among iron-deficient female adolescents and found that the majority of the study sample was unaware of knowledge regarding iron deficiency anemia, medication, and factors affecting the absorption of medication before intervention. This result could be attributed to many causes including cultural beliefs, lack of health education and counseling by health team. Also, this may be due to poor awareness related to the value of the iron and the importance of prevention of iron deficiency anemia. While after applying for the educational program, most patients had good knowledge level and there were statistically significant differences between pre and post-test regarding their knowledge and practice.

In a study conducted by [18] for evaluating knowledge, attitude and practices of pregnant women regarding anemia, and in similarity to thecurrent study finding , stated that overall half of the participants had good knowledge regarding anemia, iron-rich food, and iron supplementation but when specifically questioned only one third were aware of and understood the term anemia. A similar study conducted at Karnataka, India [15].This cross-sectional study performed at the obstetrics and gynecological outpatient department of Karnataka hospital. The study comprised a total of 400 pregnant women. Their knowledge regarding the causes of anemia, sign and symptoms of anemia, proper diet to prevent anemia was poor pre-intervention. Therefore, the need for increased knowledge regarding the prevention of iron deficiency anemia in pregnant women is reaffirmed.

The current study finding was in agreement with a study done by [19] in Kalyobia governorate. The study aimed to evaluate the effect of nutritional, educational guidelines on knowledge and practice of 200 pregnant women with iron deficiency anemia at rural areas at maternal and child health care centers in Kalyobia Governorate. The results of the study revealed a highly statistically significant improvement regarding the knowledge and practice of the studied pregnant women after the educational program. In addition to the prevalence of iron deficiency anemia among studied participants was slightly decreased after the intervention.

In the same line with the current study finding and with an attempt to assess the knowledge regarding iron deficiency anemia among female adolescents, the overall findings of a study by, [12] showed that total knowledge of females after the intervention of educational sessions regarding anemia during pregnancy are moving in a desirable direction. This similarity confirmed the need to improve healthcare services, facilities with comprehensive health education regarding anemia and consequences among pregnant females that can yield a significant dividend in the future life of women.

According to [20] who conducted a study to evaluate the Effect of One-to-one Counseling to Pregnant Women's Knowledge about Anemia in Semarang, the promotive and preventive activities through counseling and health education

of anemia were essential to increase the knowledge of pregnant women for reducing the incidence of anemia, in this study counseling method was very useful. Every single pregnant woman had a chance to increase and improve their knowledge through this one-to-one counseling about anemia this result similar to current study findings, highlighted the importance of pregnant women education in improving their knowledge.

Impact of educational intervention regarding iron deficiency anemia and its preventive measures among pregnant women was evaluated by [21]. An interventional study was undertaken purposively on selected 100 pregnant women selected from the outpatient department of Obstetrics and Gynecology Department of GMERS Medical College in Gandhinagar, India. The study revealeda significant improvement in the knowledge regarding anemia and its preventive measures among pregnant women after a single educational session. This result was similar to the current study findings that showed significant improvement of pregnant women knowledge towards iron deficiency anemia after implementing self-instructional module. This compatibility between two studies supports the fact that education interventions should be done regularly in the outpatient department to improve pregnant women knowledge and to encourage them to adopt healthy lifestyles which prevents anemia and other micronutrient deficiencies during and after pregnancy.

Regarding pregnant women practices related to iron deficiency anemia. The current study revealed no statistically significant differences between the control and study group at pre-intervention. As more than two third of both groups had unsatisfactory level of total practice score, whereas after intervention there was a highly statistically significant difference between them. A majority of the study group had satisfactory level compared to the control group that received the routine antenatal care. This finding may be due to continuous education and support among study group by using the self-instructional module and telephone follow-up that provided a great support and encouraging pregnant women to improve their self-care practices, and also enhancing women to participate in performing their care that increased their self-esteem and independence. This evidence also supports the first study hypothesis

This finding agreed with a study done by [22] that assessed the knowledge, attitude, and practices regarding anemia amongst antenatal patients attending teaching hospital in Dehradun, India. One third of the women in this study were aware of the iron-rich food and other food to be consumed during pregnancy. However half of the women were aware and still did not implement these food items in their daily diet. It was also noticed in this study that less than one-third of them were consuming iron tablets with water, less than half of them with milk and other food items, and less than one-quarter of the women consumed as soon as they remembered.

On the other hand, according to the current study finding the majority of the study group was taken iron supplementation with regular pattern. They consumed vitamin C rich foods during or after the meal, eating iron-rich foods, and eat regular,frequent meals. The previous findings were confirmed by a study done by [23] who mentioned that the majority of rural pregnant women had iron-rich food after the intervention program. This similarity might be due to that the implementation of the educational program and self-instructional module regarding iron deficiency anemia helped pregnant women to identify different sources of iron-rich foods, regulate their time to take iron supplementation, and overcome side effects of iron supplementation.

The previous finding has disagreed with the finding of a study done by [24].The study evaluating pregnant women practices regards iron supplementary usage. The study assessed time of use, fluids used with an iron supplement, and the adherence of pregnant women to the use of an iron supplement. The findings reflected the poor practices of pregnant women regarding iron supplement use. This practice effects on the amount of iron bioavailability and the benefit of using it. It also reflects their knowledge about iron absorption promoters and inhibitors. These differences highlighted the importance of health education to prevent iron deficiency anemia among pregnant women in developing countries to decrease maternal morbidity and mortality rate among women in reproductive age and, prevention of any corresponding complications regarding their future [21]

The present study revealed a remarkable reduction in the prevalence of anemia among pregnant women after implementing a self-instructional module. The present study showed a non-statistical significant difference in total mean score of hemoglobin level (Hb) among control& study group pre-intervention. While there was highly statistically significant improvement in total mean score of hemoglobin level among study group than control group post-intervention. These finding coincided with a study done by [25] that clarified the positive effect of the distribution of self-instructional module on helping the antenatal mothers to prevent iron deficiency anemia and further complications by the adoption of

healthy behavior and modified self-care practices. In this study conducting such intervention as using self-instructional module was a crucial factor in improving pregnant women knowledge and related practices in issues related to anemia. thus improvement affected the prevalence of anemia among pregnant women. This result emphasized the fact that anemia during pregnancy could be prevented and reduced by using appropriate health education and continuous follow up. This finding is supporting the second study hypothesis

Incongruent with the current study finding, and according to [26] who evaluated the impact of the educational program on pregnant women practices and their hemoglobin level at the third trimester of pregnancy. The study explained the positive effect of practices and thereby on the improvement of hemoglobin level in the study group, post-intervention of the educational program. These results were supported by[27] and by [28] who reported a decrease in the prevalence rate of anemia that after nutrition education program and iron supplement. Besides, a similar study done by [23] pointed out to significant improvement in hemoglobin level in the intervention group compared to the non-intervention group.

Furthermore, studies were done on evaluating the effect of implementing educational sessions regarding anemia and hemoglobin level among pregnant women, and similar to current study findings[3]. They stated that half of the pregnant women showed a statistically highly significant association between educational program and improvement of hemoglobin level among the studied group. This finding strengthens and supports the current study findings. It indicated that implementing a self-instructional module associated with good practices and lead to good Hb levels. These findings were also strongly assured by finding of a study done by [29] that stated a significant positive effect among practices score and Hb levels after conducting health education program among pregnant women with anemia.

Contrary to our study findings, a study was done by [18] to evaluate the effect of an educational program for improving Hb level among pregnant women. The study showed statistically non-significant improvement post-intervention despite improving pregnant women knowledge; this can be explained by the ground that small sample size could be a probable reason. These findings were strongly supported by another research [30]that found no significant association between the Hb levels and implementing educational sessions. These results were not following our study findings; this may indicate that having good knowledge regarding the problem of anemia was not surety improved levels of Hb.

in conclusion, the current study confirmed that implementation of self- instructional module has a positive effect on improving knowledge and practices regarding iron deficiency anemia among pregnant women. In addition, there was a significant reduction in the prevalence of anemia after implementing self-instructional module. These results confirmed our research hypothesis. Meanwhile, iron deficiency anemia during pregnancy is a major high prevalence health problem. It could be prevented by comprehensive planned health education programs primarily for improving related knowledge and changing unhealthy behavior and practices.

9. CONCLUSION

The study concluded that; there was highly statistically significant improvement in the women's total knowledge and total practices score regarding iron deficiency anemia for study group than the control group after three months of intervention, in addition; a significant improvement in hemoglobin level among study group compared to the controls. The findings of the current study supported the research hypotheses.

10. RECOMMENDATIONS

In light of the findings of the current study, the following recommendations were suggested:

- Applying the developed self-instructional module by all antenatal out-patients' clinics and in-patients' high-risk pregnancy unit.
- Developing a counseling and health education program for all pregnant women to prevent iron deficiency anemia before the occurrence, and for those with iron deficiency anemia early in pregnancy, to improve their knowledge, awareness, and practices of how to maintain a healthy lifestyle during pregnancy.
- A further researcher is needed to evaluate the effect of self-instructional module regarding anemia during pregnancy on maternal and fetal outcomes

- A further researcher is needed to evaluate the effect of other strategies like planned teaching program and video assisted teaching on pregnant women suffering from iron deficiency anemia.

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