Effect of Educational Instructions on Pregnant Women's Knowledge and Practice regarding IronDeficiency Anemia

1Wafaa Kamel Sadek Abd El Rahman, 2 Amany A. Ahmed, 3 Azza Mohamed El-Sayed Atwa

1. Nursing fellow (woman's Health and Midwifery Nursing), students Hospital Mansoura University.
2 Assistant professor of obstetrics, Gynecological and reproductive health Nursing, Sohag & Matrouh University
3 Assistant professor of Obstetrics and Gynecology Nursing, Faculty of Nursing, Sohag University, Egypt.

Abstract

Iron deficiency anemia in pregnancy is a major health problem. All pregnant women are at risk for becoming anemic that is because the iron need for the mother and fetus gradually increases during pregnancy and reaches its highest level at the end of the pregnancy**. Aim:** To investigate the effect of educational instructions on pregnant women's knowledge and practice regarding iron deficiency anemia**. Subjects and method: Design:** A quasi-experimental research design was used to achieve this study. **Setting:** The study was applied in antenatal outpatient clinics at Mansoura University Hospitals. **Subjects**: A purposive sample of 300 pregnant women involved in the study from the previously selected settings. **Three Tools were used for data collection** 1) a structured interviewing questionnaire, 2) a pregnant women's reported practices tool, and 3) a hemoglobin level assessment sheet. **Results**: A statistically significant difference was detected between pregnant women's level of knowledge and practice regarding iron deficiency anemia and Hemoglobin (Hb) value after educational instructions intervention. The hemoglobin level mean was increased among the studied pregnant women after educational instructions intervention**. Conclusion:** Educational instruction intervention has a positive effect on enhancing pregnant women's knowledge and practice regarding iron deficiency anemia and hemoglobin level**. Recommendations:** Educational instruction intervention is recommended in various maternity healthcare settings. Educational booklets should be provided about foods with a high concentration of iron to reduce iron deficiency anemia in pregnant women

Keywords: Educational instructions, Iron deficiency anemia, Knowledge and practice, Pregnant women.

Introduction

The prevalence of iron deficiency anemia (IDA), which is most prevalent in underdeveloped nations, is one of the most prevalent issues connecting undernutrition and public health issues worldwide. The IDA may cause women to feel fatigued and restless because anemia of iron prevents the body from producing enough hemoglobin, which is necessary for red blood cells to carry oxygen (**Ghimire & Pandey, 2019**).

Due to the increased blood volume during pregnancy brought on by greater support for the fetus and placenta, pregnant women are more susceptible to IDA. Women who are in the reproductive stage typically have heavy blood loss from menstruation or childbirth, which can lead to iron deficiency anemia. According to estimates from the World Health Organization (WHO), anemia affected 32.4 million (38%) pregnant women in 2011 and 496 million (29%) non-pregnant people between the ages of 15 and 49. A prevalence of 73.9% in Guyana, 22.1% in Egypt, 39.7% in Kuwait, 78.0% in Liberia, and 50.0% in Bahrain was also found in earlier investigations on IDA **(AlAbedi et al., 2019**).

90% of occurrences of the iron-deficient type of pregnancy in women involve iron deficiency anemia. It is seen as a significant public health issue, especially for the poorest populations in developing nations, who are home to 95% of the world's anemic pregnant women. When a woman's iron stores are low or nonexistent at the start of her pregnancy because of heavy menstruation, a previous pregnancy, a poor iron intake, and increased fetal iron requirements that cause anemia (**National Population Commission, 2014).**

Iron deficiency in the body causes metabolic disorders, lowered immunity in pregnant women, and increased susceptibility to infectious agent attacks. Increased understanding and adherence to appropriate dietary habits can help with anemia, a serious health issue (**Singh et al., 2015**). Most ministries and governmental and nonprofit organizations have implemented policies to provide iron supplementation for pregnant and lactating women as a result of the increased risk of acquiring IDA during pregnancy and lactation (**Souganidis et al., 2019**).

Depending on the culture and awareness of women, women's understanding of and dietary intake of foods high in iron can help prevent iron deficiency. While acute iron insufficiency in pregnant women and a higher prevalence of low birth weight and neonatal deaths are linked to poorer maternal education (**Tashara et al., 2015**). One of the most vital preventive aspects in reaching optimum health is maintaining a woman's health through healthy behavior, which is represented by eating nutritious foods (**Souganidis et al., 2019**).

Hemoglobin, the blood pigment that carries oxygen, contains iron as one of its key constituents. Because blood cannot carry oxygen efficiently when there are insufficient levels of iron in circulation, every cell in the body will not function adequately. Iron is typically gained through meals and by recycling iron from old red blood cells. A median quantity of 840-1210 mg of iron is thought to be required for absorption during pregnancy (**Imdad et al., 2017**)

Pregnant women may experience anemia for a variety of reasons, including inadequate antenatal care, close spacing between births, and poor diet. The current high frequency of anemia may be attributed to women's conduct in treating and avoiding anemia, such as not taking iron supplements regularly. Poverty, ignorance, lack of knowledge of the nutritional worth of foods, and an unsanitary environment are the main causes of low intake of iron-rich foods (**Singal et al., 2018**).

The promotion of health during pregnancy by obstetrics and gynecology nurses is essential as the focus of health promotion has changed from a disease model to a health model (**Piper, 2009**). The most important function is on educating and supplying pregnant women with the knowledge they need to help preserve their health during pregnancy, particularly when it comes to nutritional factors. They have a focus on behavioral adjustments to help expectant women alter their dietary habits and understanding that cause an IDA deficiency (**Nisar and White, 2013 Aboye et al., 2018).**

Numerous studies have been conducted and it has been found that there is a correlation between knowledge and practice among pregnant women and anemia. The lower the

knowledge and insufficient practice about the prevention and management of anemia in pregnant women, the higher the risk—by more than five times. The provision of thorough, succinct, and pertinent information to women before, during, and after pregnancy regarding anemia prevention and management is one of the most significant duties of qualified health professionals. Pregnant women can have anemia prevented and controlled by increasing their understanding of food, using it as a preventative measure, and optimizing their diet (**WHO, 2018**)

A very important role in supporting health throughout pregnancy is played by nurses who work in primary healthcare settings and family health clinics. The nurse's responsibility now falls under the category of health promotion rather than disease prevention. Teaching expectant mothers about the value of regular iron supplementation and frequent hemoglobin level measurements is considered to be the most crucial duty. Teaching and educating expectant mothers about the significance of preserving their health during pregnancy, particularly concerning nutritional elements, and encouraging them to change their eating habits and lifestyles that lead to nutritional deficits are the other key roles (**McLean, et al., 2019**).

Significance of the study

The deficit in iron in pregnant women's anemia is regarded as a common issue during pregnancy. Anemia is thought to be common in pregnancy, with an estimated frequency of 41.8%4; but, it is unknown what proportion of people lack enough iron without anemia. Numerous variables, including a lack of awareness about nutritive foods and a low intake of foods high in iron, contribute to the development of anemia (**Whitehead & Seaton, 2016**).

Health education and continued nursing care can help treat anemia. patients can access healthcare services and information using smartphone apps at any time. Studies have shown that mobile apps can benefit patients in clinical practice and healthcare environments (**Schlachta, 2015**).

In Egypt, where anemia prevalence surpassed 40%, iron deficiency anemia continues to be a major public health concern (**Seabraetal., 2011).** The major causes of anemia can be addressed with a variety of interventions for prevention and control, but there is limited experience with effective management protocols. For this reason, the present study was conducted to investigate the effect of educational instructions on pregnant women's knowledge and practice regarding iron deficiency anemia.

Aim of the study:

The study aimed to investigate the effect of educational instructions on pregnant women's knowledge and practice regarding iron deficiency anemia through:

- Assessing pregnant women's knowledge and practice regarding iron deficiency anemia.
- Designing and implementing educational instructions for pregnant women with IDA regarding IDA
- Evaluating the effect of educational instructions on hemoglobin level among pregnant women.
- Evaluating the effect of the educational instructions intervention on pregnant women's knowledge and practice regarding iron deficiency anemia and Hemoglobin (Hb) level.

Research hypothesis:

- Educational instruction intervention is expected to have a positive effect on improving pregnant women's knowledge and practice regarding iron deficiency anemia**.**
- Educational instructions intervention is expected to increase pregnant women's hemoglobin levels.

Subjects and Methods:

Research design:

A quasi-experimental research design was utilized in this study to achieve the study's aim.

Setting:

The study was applied in antenatal outpatient clinics at Mansoura University Hospitals.

Subjects:

A purposive sample of 300 pregnant women involved in the study was recruited from the previously selected settings within six months from July 2021 until December 2021.

Inclusion criteria included:

- Attending for follow-up antenatal visit
- Pregnant women suffering from only anemia during pregnancy (HB less than 11gm)
- Free from any medical disorders,

Sample size:

The sample size was calculated based on apower analysis of 0.95(β=1-0.95=0.5) at alpha .05(one-sided) with a large effect size (0.5)was used as the significance

Tools of data collection:

Three tools were used to collect the data for thestudy as the following:

Tool I: Structured interviewing questionnaire: it was developed by researchers based on reviewing the relevant literature and consisted of three parts as follows **(World Health Organization, 2018).**

Part (1): It included demographic data of the pregnant women such as age, educational level, occupation, and residence.

Part (2): It included the obstetrical history of pregnant women; it contained five questions about parity, abortion, pregnancy stage, gestation age in weeks, having anemia previously, and Birth spacing in years.

Part (3): Pregnant women's anemia knowledge tool (pre-post tool)**:** it was designed by the researchers to identify the level of pregnant women's knowledge regarding iron deficiency anemia such as IDA meaning, causes, symptoms, prevention, risk factors, source of iron-rich foods, the importance of iron supplementation, etc.) Knowledge scoring system: Were scored as one score given for a correct answer while zero for an incorrect answer. Total knowledge scores were categorized as>50% (0-10 score) poor knowledge; 50-75% (11-17) average knowledge; and ≤ 75% (18-22) good knowledge.

Tool II: Pregnant women's reported practices tool (pre-post tool); it was composed of questions regarding practice regarding eating iron-rich food, don't drink tea with meals, regular intake of iron supplementation, and use of orange juice with iron supplementation. It was scored one score for an answer done, and zero scores for an answer not done. Total knowledge-related practice scores were evaluated as >50% (0-7), unsatisfactory knowledge-related practice; and ≤ 50% (8-15) satisfactory knowledge-related practice.

Tool III: Hemoglobin level assessment sheet: Pre-post tool that assessed pregnant women's hemoglobin level was taken pre/post educational instructions intervention at the first visit and after two months. The degree of anemia was estimated according to to cut off point of the WHO (2018), it is divided into three degrees concerning Hb level mild (9.0–10.9%gm), moderate (7.0-8.9%gm) and severe degree (<7.0% gm).

Tool Validity and reliability:

Five experts in the field of obstetrics nursing evaluated the tools' content validity before utilizing them in the study to ensure that they were clear, complete, and appropriate. The panel's assessment of the clarity of sentences and the suitability of the content guided the "rephrasing and canceling" of the modifications. The Cronbach's Alpha Coefficient Test was used to measure reliability, and the results showed that each of the tools used had generally homogeneous items in each of its components. In terms of knowledge and practice, Cronbach's coefficient alpha was 0.893 and 0.791 respectively.

Operational Design:

The operational design for this study consisted of three phases named by; preparatory, implementation, and evaluation phases.

A-Preparatory phase:

Based on assessments of knowledge and practices related to iron deficiency anemia that were made using interview questions and literature reviews. After evaluating relevant literature about the treatment of iron deficiency anemia, the researchers created teaching material (a booklet) and distributed it to all of the study's female participants. In the Arabic version of the pamphlet, there are definitions, risk factors, symptoms, and instructions on how to avoid and treat anemia.

Administrative and Ethical considerations:

The directors of the antenatal outpatient clinics received administrative approval to carry out this study through a letter from the dean of the nursing faculty at Mansoura University Hospital. The purpose of this letter was to request permission to gather study data. It also included an explanation of the study's goal and the anticipated results from its implementation. Pregnant women were informed of the study's objectives. The study was optional, and participants were free to decline to participate, the researchers told them. Pregnant women have the right to leave the study at any time and without explanation. The confidentiality of their information and its usage for purely research objectives were promised to expectant women.

Pilot study

A pilot study was conducted on 10% of the studied pregnant women (20). The clarity and testing of the feasibility of the research process needed for modifications were carried out based on the results of the pilot study to develop the final form of the tools. Pregnant women involved in the pilot study were included inthe study.

B-Implementation phase:

The directors of the chosen settings gave their approval for the study before it could begin. The study included all expectant mothers who at the time of data collection met the inclusion criteria. The researchers made themselves known to the expectant mothers. The researchers spoke with pregnant women and provided them with concise explanations of the study's purpose and methodology. Pregnant women were asked for their verbal informed consent to secure both their acceptance and cooperation. Two days a week, from 9:00 a.m. to 12:00 p.m., the researchers visited the antenatal outpatient clinics.

Data were collected over six months from the beginning of July 2021 until the end of December 2021. The interview took approximately 20 minutes for each woman to answer and fill the questionnaire (Tools 1&II) to assess the knowledge and practice of pregnant women regarding the management of iron deficiency anemia and also Hb level was assessed.

At the end of the day, three sessions were held to address any queries raised by expectant mothers, using a variety of teaching techniques such as lectures, group discussions, and demonstrations. Each session's location and time were disclosed to each woman.

Three sessions about appropriate educational instructions were given to pregnant women (two theoretical sessions and one practical). Each session lasted 20-30 minutes. The first session included the IDA meaning, incidence, causes, and clinical features of iron deficiency anemia. The second session contained the followings topics: risk factors, source of iron-rich foods, the importance of iron supplementation, and diagnostic test for iron deficiency anemia; finally, the third session included prevention, ways of management of iron deficiency anemia as education about eating iron-rich foods, don't drink tea with meals, regular intake of iron supplementation, and use of orange juice with iron supplementation, enhancers, and inhibitors of iron absorption, iron medication adherence, and cooking habits.

Hemoglobin levels in blood samples were measured. Venipuncture was used to draw blood into a container. An experienced laboratory worker took blood samples from each pregnant woman. These tests were all conducted in a private medical testing facility. Hemoglobin levels below 11 g/dL are considered anemic. After three months of nursing intervention, blood samples were again obtained. The first time was before the

nursing intervention.

The evaluation phase:

The evaluation was concentrated on examining the effect of the educational instructions intervention on the knowledge and practice of pregnant women regarding iron deficiency anemia after three months of intervention by using the same tools used in the pre-test. The hemoglobin level of pregnant women was also assessed after three months of nursing intervention.

Statistical analysis:

After completion of data collection, data were revised, coded, computed, and analyzed using the statistical package for social sciences (SPSS) version 23. Frequency distribution, percentages, mean and standard deviation were calculated, and Chi-square and Paired sample T-tests were used to describe the level of statistical significance which was considered at $p < 0.05$.

Results:

Table (1) shows that 50% of pregnant women their ages ranged between 22 < and 26 years and their mean age was 22.13 ± 6.68, (40%) of them had secondary education. Regarding residence, 80% of the studied pregnant women were living in rural areas. Finally, (70%) of pregnant women were housewives.

As shown in **table 2,** (45%) of the studied pregnant women were multigravida, 60% of them were not aborted before, and 42% were in the first trimester. Also, it was observed that 78% of them have a previous history of anemia. Regarding birth spacing, 51.3% of them have more than 3 years. In addition, 48% of the studied pregnant women were at 23-28 weeks of gestational age.

Table (3) displays the comparison between mean scores of studied pregnant women's knowledge before the educational instructions intervention and afterthree months. There were highly statistically significant differences between knowledge mean scores of studied pregnant women before and after intervention $p< 0.001$.

It was observed from **Figure (1)** that 45% of pregnant women had a poor level of knowledge regarding iron deficiency anemia pre-educational instructions intervention as compared to 5% post the educational instructions intervention, While, 80% of them had a good level of knowledge post intervention as compared to 20% pre educational instructions intervention with statistically significant differences at ($p< 0.001$).

Table (4): shows that highly statistically significant differences ($p<0.001$) were detected between mean scores regarding all practice items of the studied pregnant women regarding iron deficiency anemia pre/post educational instructions intervention.

Table (5): Illustrates that 85 % of the studied women had a satisfactory level of practice post-educational instructions intervention and 15% had unsatisfactory practice as compared with 80% at pre-educational instructions intervention.

Table (6) showed that 25% of pregnant women have a moderate level of anemia post-educational instructions intervention (second time) compared to 90% of them pre-educational instructions intervention (first time). This result indicates a highly significant difference between the first and second times ofmeasuring hemoglobin level at P<.**0.001**.

Table (7) showed that a statistically significant relationship was found between pregnant women's total knowledge and their reported practice regarding iron deficiency anemia pre and post-educational instructions (**R=**.85, **P=**0.001*).

Table (8): illustrated that there was a statistically significant relationship between the age, educational level, and residence of the pregnant women and their knowledge, and practices level throughout the phases of the intervention**.**

.

Table (1): Frequency and percentage distribution of studied pregnant women according to their demographic characteristics(n=300)

Item	Pregnant women (300)	
	No.	%
Woman's age in years		
18 < 21	60	20
22 < 26	150	50
27 < 30	60	20
31 < 35	19	10
Mean ±Stander deviation	22.13 ± 6.68	
- Women's education		
- Illiterate	0	0
-Read and write	60	20
-Basic education	45	15
-Secondary education	120	40
-University education	75	25
-Residence		
-Rural	240	80
-Urban	60	20
Occupation		
Housewives	210	70
Working	90	30

Table (2): Frequency and percentage distribution of studied pregnant women according to their obstetrical history (n=300)

Item	Pregnant women (210)	
	No.	%
Parity:		
- Primigravida	105	35
- Multigravida	135	45
- Grand Multigravida	60	20
Abortion		
- Less than 2	67	30
- More than 2	17	10
- No abortion	126	60
Pregnancy stage		
- First Trimester	126	42
- Second Trimester	114	38
- Third Trimester	60	20
Having anemia previously		
- Yes	66	22
- No	234	78
Birth spacing in years(n=195):		
< 1	30	15.4
1-3	65	33.3
>3	100	51.3
Gestational age in weeks:		
13-	108	36
18-	54	18
23-28	144	48

Table (3) Comparison of mean score regarding knowledge of the studied pregnant women regarding iron deficiency anemia pre/post educational instructions intervention (N=300).

Women's Knowledge	Pre educational instructions Mean ±SD	Post educational instructions Mean ±SD	Paired t-test	*P* value
Meaning of IDA	0.28 ± 0.56	0.94 ± 0.73	23.77	≤0.001**
Incidence of IDA	0.23 ± 0.58	0.95 ± 0.74	26.73	
Causes of IDA	1.12 ± 0.42	1.53 ± 0.35	15.44	≤0.001**
Clinical features of IDA.	0.83 ± 0.64	1.55 ± 0.46	18.22	≤0.001**
Diagnostic test of IDA	0.57 ± 0.41	1.49 ± 0.53	15.34	≤0.001**
Eating iron-rich foods	0.45 ± 0.43	0.84 ± 0.82	12.35	≤0.001**
Prevention of IDA	0.43 ± 0.75	1.36 ± 0.46	18.79	≤0.001**
Risk factors of IDA	0.57 ± 0.63	1.34 ± 0.45	20.62	≤0.001**
Sources of iron-rich foods	1.07 ± 0.72	1.59 ± 0.69	15.52	≤0.001**
Importance of iron supplementation	1.02 ± 0.86	1.58 ± 0.78	18.88	≤0.001**
Enhancers and inhibitors of iron absorption	1.44 ± 0.71	1.43 ± 0.73	18.78	≤0.001**
Control measures for iron supplementation sideeffects	0.52 ± 0.78	1.42 ± 0.79	16.69	≤0.001**

**** Highly statistically significant difference**

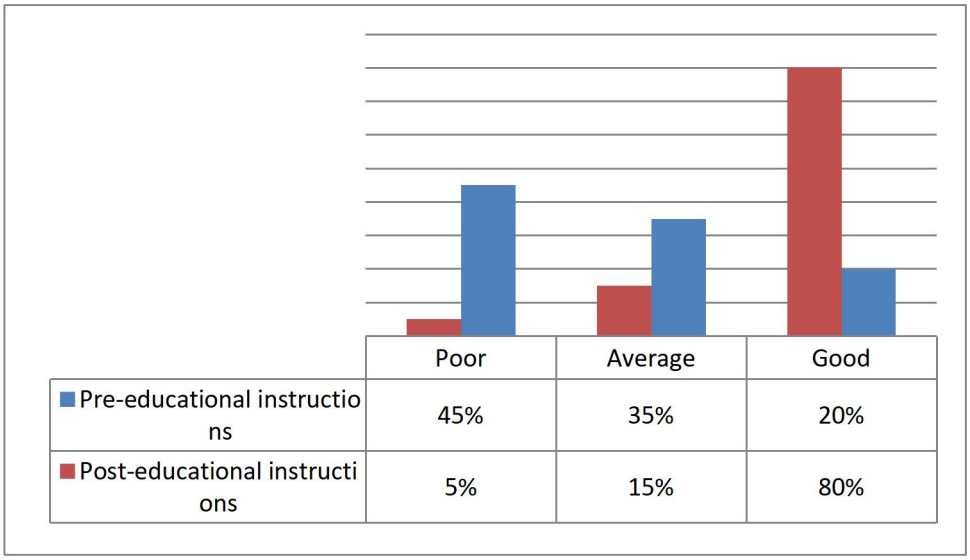

Figure (1): Percentage distribution of the studied pregnant women regarding their total knowledge score pre and threemonths post-educational instructions intervention

Table (4): Comparison of mean scores regarding the reported practice of the studied pregnant women regarding IDA pre/post educational instructions intervention (n=300).

Women s' Practice		Pre educational instructions		Post educational instructions		x^2	*P* value
		No	%	No	%		
Eating iron-rich foods	Done	105	35	210	70	73.23	≤0.001**
	Not done	225	75	90	30		
Don't drink tea with meals	Done	270	90	150	50	82.77	≤ 0.001**
	Not done	30	10	150	50		
Regular use of iron supplementation	Done	60	20	240	80	57.62	≤ 0.001**
	Not done	240	80	60	20		
Administer iron supplementation	Done	60	30	225	85	56.44	≤ 0.001**
	Not done	210	70	45	15		
Eat regular frequent meals	Done	120	40	225	85	54.34	≤ 0.001**
	Not done	180	60	45	15		
Use iron supplementation with fruit juice	Done	45	15	180	60	73.65	≤0.001**
	Not done	225	85	120	40		

*Statistically significant difference ($p \leq 0.05$). ** Highly statistically significant difference ($p \leq 0.001$)

Table (5): Distribution of the studied pregnant women regarding their total levels of practice pre andpost-educational instructions intervention (no =300)

Items	Pregnant women s' scores reported practices			
	Pre educational instructions		Post educational instructions	
	No	%	No	%
Unsatisfactory	240	80.0	45	15
Satisfactory	60	20.0	255	85
X2= 8.245, P-value=0.000				

Table (6): Distribution of the studied pregnant women regarding their hemoglobin level pre andpost-educational instructions intervention (no =300)

Items	Pregnant women's hemoglobin level			
	Pre educational instructions		Post educational instructions	
	No	%	No	%
≥11	0	0%	75	25
Mild (10.0 to 10.9 g/dl)	18	6	150	50.0
Moderate (7.0 and 9.9 g/dl)	270	90	75	25
Severe (less than 7.0 g/dl)	12	4	0	0
X2= 11.813, p-value=0.001				

Table (7): Correlation between pregnant women's total knowledge and their total reported practicescore pre and post-educational instructions **(no =300)**

Knowledge	Pregnant women's practice			
	Pre		Post	
	R	P	R	P
Pre	.42	.047*	-	-
Post	-	-	.85	0.001*

Table (8): Correlations between pregnant women's knowledge and practices toward anemia and their demographic characteristics (n=300).

Items	Knowledge	Practices
Pre-intervention		
Age	-.134	.067
Education	.133	.186
Residence	-.104	-.153
Occupation	.063	-.062
Post-intervention		
Age	-.206	-.254*
Education	.308**	.347**
Residence	.305**	.353**
Occupation	.087	-.005

(*) Statistically significant at p<0.05

Discussion:

The most significant contributing factor to a nutritional issue, which can result in difficulties like malnutrition and non-contagious infections, is a lack of nutritional awareness and subsequently inappropriate practice. Over two billion individuals worldwide had anemia. Additionally, the WHO reported that 58% of expectant mothers in underdeveloped nations are anemic. Anemia during pregnancy can be avoided and controlled, nevertheless, by being knowledgeable about iron deficiency anemia prevention and management and according to recommended procedures **(Padmavathi et al 2015).**

Anemia is a common medical condition during pregnancy and also an issue in underdeveloped nations. Significant effects for both the mother and the fetus are established. Due to cultural differences in socioeconomic level, way of life, and health-seeking practices, anemia in pregnancy occurs at dramatically variable rates depending on the country (**Tanay et al., 2014**). Anemia is a major public health issue that has a significant impact on both socioeconomic development and human health in both emerging and industrialized nations. All stages of the life cycle are affected, but young pregnant women are more likely to experience it **(Seyoum, 2019).** This study set out to determine how educational materials affected pregnant women's understanding and use of iron deficiency anemia information.

According to the results of the current study, half of the pregnant women were between the ages of twenty-two and twenty-six, two-fifths of them had a secondary education, and four-fifths of them lived in rural areas. This conclusion is consistent with those of the **Palestinian Central Bureau of Statistics, (2014)**, which showed the age range of pregnant women in his study.

Pundkar et al., (2017), who investigate the risk variables for anemia during pregnancy, follow a similar vein. The bulk of study participants was between the ages of 20 and 25, it was observed. Additionally, **Mageed et al. (2017)** reported that the level of iron deficiency anemia among pregnant women was not affected by the level of education and the job status of their study subjects who were in secondary school education and were housewives.

This characteristic homologue to that of young married women in rural areas in Egypt. In this respect, **Farrag et al., (2020**) reported that one-third of participants were below 25 years, the majority of the sample was not employed, and more than half of them completed secondary school education.

More than two-thirds of pregnant women were housewives, according to the study's findings. More than two-thirds of pregnant women in the study group are housewives, according to Amer et al. (2010), who reported these results.

In terms of the investigated women's obstetric history, The results of the current study showed that fewer than half of the pregnant women were multigravida; these findings are consistent with those of **Amer et al. (2010**), who investigated the "Effect of nutritional intervention on anemic pregnant women's health using health promotion" and found that roughly half of the study group had borne children once to three times. **Schweitzer (2016**), who noted that the prevalence of iron deficiency anemia rose with parity in women with more than four children, provided support for these findings. Repeat pregnancies are a risk factor for the development of iron deficiency anemia in subsequent pregnancies, according to the findings of a different study by **Malhotra et al., (2019**).

The current study findings indicated that there were highly statistically significant differences between knowledge mean scores of studied pregnant women before and after the intervention. This reflected the importance and positive effect of the educational instructions intervention introduced to a woman.

According to the current study's findings, roughly fewer than half of the pregnant women had a poor level of knowledge before receiving educational instructions, but the majority of them had a good level of knowledge following the pre-educational instructions intervention. This is related to the intervention's beneficial effects. This finding is supported by **the Abujilban et al., (2019**) study, which looked at how a planned health education program affected the compliance and knowledge of Jordanian pregnant women with anemia. They discovered that after the nursing intervention, pregnant women had higher knowledge scores about iron deficiency anemia management. These results were in line with those of a related study conducted by **El Sayed, (2019**), who noted that all rural pregnant women knew different sources of iron-rich foods after the nursing intervention.

Regarding pregnant women's practice level of iron deficiency anemia, the findings of the present study indicated that the majority of pregnant women had a satisfactory level of practice pre-educational instructions intervention; meanwhile, the majority of them had a satisfactory level of practice post-educational instructions intervention. This is reflected in the important role of the educational instructions intervention in improving pregnant women's practice regarding iron deficiency anemia. The findings of **Abd ElHameed et al. (2012**), who examined the impact of nutritional educational guidelines among pregnant women with iron deficiency anemia in rural areas of the Kalyobia governorate, support this conclusion. They discovered that nutritional educational guidelines can improve pregnant women's knowledge and behavior regarding iron deficiency anemia. Along with **Nahrisah et al. (2019**), who investigated the impact of integrated pictorial handbook education and counseling on enhancing anemia status, knowledge, food intake, and iron tablet compliance among anemic pregnant women in Indonesia and demonstrated an improvement in iron-rich food intake in diversity, the weight of food (portion), and frequency of intake among pregnant women after the intervention.

Regarding pregnant women's Hb value pre and post-educational instructions intervention, the findings of the present study indicated that nearly more than one-third of pregnant women had moderate anemia post-educational instructions (second time) compared to ninety percent of pregnant women pre-educational instructions intervention (first-time). This result indicates a high significance difference and improvement between the first and second time of measuring hemoglobin level pre and post-educational instructions intervention which explained the effect of the intervention on the improvement of hemoglobin level in the study group, post-educational instructions intervention. These findings were in line with a study by **World Health Organization, (2018)** that mentioned that "many pregnant women enter pregnancy with the low iron store. While post-educational instructions intervention, the study showed improvement in hemoglobin levels.

According to the findings of the current study, 13% of women during the first trimester had mild anemia, which was followed by moderate anemia in the majority of the study subjects. This level changed from 88% mild and 12% moderate after using the health promotion guidelines. This finding is consistent with that of **Abdel-Ati et al. (2019**), who assessed the effects of a health promotion directive based on health belief instructions on pregnant women in Egypt who were diagnosed

with iron deficiency anemia and reported that hemoglobin levels were higher in the study group during the first and second assessments. As reported by **Maka et al. (2017**), mild, moderate, and severe anemia were all reported to occur 28%, 54%, and 18% of the time, respectively. The majority of anemic women (84% of them) were from low socioeconomic backgrounds. maternal problems affected 16% of the population. In unbooked and referred instances, a poor perinatal outcome was observed. The prevalence of anemia among pregnant women was 18.0%, according to **Grace Stephen et al., (2018)**, which is the polar opposite of the previous statement. Additionally, **Bekele et al. (2016**) stated that mild anemia was shown to be prevalent among pregnant women, followed by moderate anemia.

These findings were also consistent with a study by **Irbihat et al. (2011**), which examined the effects of education on hemoglobin levels in pregnant Indian women. They found that the intervention group's hemoglobin levels significantly improved compared to the non-intervention group.

The current study's findings showed a statistically significant association between pregnant women's overall knowledge and their reported practice during the educational instructions intervention. This link can be explained by the fact that as knowledge has improved, so too have pregnant women's practices for managing iron deficiency anemia. This finding is supported by a study by **Hershko and Camaschella (2014**) that looked at how I treat unexplained refractory iron deficiency anemia and discovered a significant relationship between the subjects' practice and their knowledge of the management and prevention of iron deficiency anemia during pregnancy.

The findings of the present study revealed that there was a statistically significant relationship between the age, educational level, and residence of the pregnant women and their knowledge, and practices level throughout the phases of the intervention**.** This finding may be explained by the fact that knowledge and practice among pregnant women are intertwined and influenced by sociodemographic characteristics; from the researcher's perspective, there is a positive correlation between knowledge and practice.

Conclusion:

From the results of the current study, it was concluded that Educational instruction intervention has a positive effect on enhancing pregnant women's knowledge and practice regarding iron deficiency anemia and hemoglobin level. There is a significant statistical relationship between the demographic characteristics of the studied pregnant women and their level of knowledge and practice about iron deficiency anemia.

Recommendations:

Based on the findings of the present study, the following recommendations were suggested:

- Educational instruction intervention is recommended in various maternity healthcare settings. Educational booklets should be provided about foods with a high concentration of iron to reduce iron deficiency anemia in pregnant women
- Educational booklets should be provided to pregnant women about iron deficiency anemia prevention and management.

References:

- **Abd ElHameed H., Mohammed A., Abd El Hameed L. (2012):** Effect of Nutritional Educational Guideline among Pregnant Women with Iron Deficiency Anemia at Rural Areas in Kalyobia Governorate. Life Science Journal; 9 (2)
- **Abdel-Ati I., Sayed Shama EE., Baraia, Z., Sharaa HM., and Ali NA.,(2019**): Impact of Health Promotion Directive Based on Health Belief Instructions on Pregnant Women Diagnosed with Iron Deficiency Anemia World Journal of Nursing Sciences 5 (3): 117-126, 2019.
- **Aboye, W., Berhe, T., Birhane, T., & Gerensea, H. (2018):** Prevalence and associated factors of low birth weight in Axum town, Tigray, North Ethiopia. BMC Research Notes, 11(1), 684. https:// doi. org/10.1186/s13104-018-3801-z
- **Abujilban S, Hatamleh R., Al-Shuqerat S .**

(2019): The impact of a planned health education program on the compliance and knowledge of Jordanian pregnant women with anemia. Women Health Aug; 59 (7):748-759.

- **AlAbedi GA, Arar A, Radhi TA.** (2019): Assessment of Knowledge for Pregnant Women toward Risk of Pregnancy in Al-Amara Primary Health Care Centers at Southern of Iraq. Indian Journal of Public Health; 10: 57.
- **Amer M, El-Guidi k, Soliman M. (2010):** Effect of nutritional intervention on anemic pregnant women's health using health promotion model, An-Najah National University, March, TheMedical Journalof Cai
- **Bekele A., Tilahun M., and Mekuria A.(2016):** Prevalence of Anemia and Its AssociatedFactors among Pregnant WomenAttending Antenatal Care in health institutions of Arba Minch Town, GamoGofa Zone, Ethiopia: A Cross-Sectional Study Volume2016, Article ID 1073192, 9pageshttp://dx.doi.org/10.1155/2016/1073192.
- **El Sayed, I.,(2019):** Evaluation of antenatal care services among anemic pregnant women in upper Egypt. I of PH 16(4): 351-367.
- **Farrag N, Fathy AA and AbdelWahabF(2020):** Practice of Family PlanningamongMarried Female Attendants toShawaFamily Health Unit, Dakahlia, Egypt. Egyptian Family Medicine Journal (EFMJ) Vol .4(1), May. 2020www.efmj-eg.org
- **Gebre, A, Mulugeta A. (2015):** Prevalence of Anemia and Associated Factors among Pregnant Women in North Western Zone of Tigray, Northern Ethiopia: A Cross-Sectional Study. J Nutr Metab.
- Ghimire N, Pandey N. Knowledge, and Practice of Mothers Regarding the Prevention of Anemia During Pregnancy, in Teaching Hospital, Kathmandu, Journal of Chitwan Medical College. 2019; 3: 14-17.
- **Grace Stephen,1 Melina Mgongo,2,3 Tamara Hussein Hashim,2,4 Johnson Katanga,1,5 Babill Stray-Pedersen,3,6 and Sia Emmanueli Msuya1,2,7(2018):** Anaemia in Pregnancy: Prevalence, Risk Factors, and Adverse Perinatal Outcomes in Northern Tanzania.
- **Hershko C, Camaschella C. (2014):** How I treat unexplained refractory iron deficiency anemia, *Blood*; 123(3):326– 333.
- **Imdad, A., Lassi, Z., Salaam, R., & Bhutta, Z. A. (2017):** Prenatal Nutrition and Nutrition in Pregnancy: Effects on Long-Term Growth and Development. Early Nutrition and Long-Term Health, 3-24. https://doi.org/10.1016/B978-0- 08-100168-4.00001-X
- **Irbaihat, H., Qatatshehm, J., Dawoodeyah, I. (2011):** Primary Health Care Initiatives, (PHCI). The effect of a health education program on prevalence anemia among pregnant women in Tafila governorate, Retrieved from http:// www. Elsevier science. com
- **Mageed, A., H. Moustafa, S. Nour Eldin, I. Abd Allah, and H. Amasha, (2017):** The Impact of Management Protocol on Pregnant Women with Iron Deficiency Anemia Using Health Promotion Instructions. Zagazig Nursing Journal, 13(2): 67-85
- **Maka SS. Tondare SB. Tondare MB.(2017):** Study of the impact of anemia on pregnancy. International Journal of Reproduction, Contraception, Obstetrics, and Gynecology Reprod Contracept Obstet Gynecol. 2017 Nov;6(11):4847-4850
- **Malhotra, M**., **Sharma, J., Batra, S., Arora, R.,(2019**): Maternal and perinatal outcome in varying degrees of anemia International J, of Gyne/Obstetric:7(79):93-100.
- **McLean, S., M. Francis, N. Lacy, and A. (2019):** Alvarado: Point-of-Encounter Assessment: Using Health Belief Instructions Constructs to Change Grading Behaviors. Journal of medical education and curricular development. 6, 2382120519840358.
- **Nahrisah P, Somrongthong R, Viriyautsahakul N, Viwattan-akulvanid P, Plianbangchang S. (2019):** Effect of Integrated Pictorial Handbook Education and Counseling on Improving Anemia Status,

Knowledge, Food Intake, and Iron Tablet Compliance Among Anemic Pregnant Women in Indonesia: A Quasi-Experimental Study. Journal of Multidisciplinary Healthcare » Volume 13

- **National Population Commission (NPC) [Nigeria] and ICF International. (2014):**.Nigeria Demographic and Health Survey. Abuja, Nigeria, and Rockville, Maryland, USA: National Population Commission and ICF International.
- **Nisar, N., and White, F. (2013):** Factors affecting utilization of Antenatal Care among reproductive age group women (15-49 years)in an urban squatter settlement of Karachi, *Journal Of Pakistan Medical Association Vol 53, No.2*, Department of Community Health Sciences, The Aga Khan University, Karachi. Retrieved from http://www.elsevierscience.com
- **Padmavathi, N. and K. Hephzibah. (2015):** Awareness of anemia in pregnancy among the caregivers of pregnant women in Saveetha Medical College Hospital. International Journal of Scientific and Research Publications, 5(3): 2250-3153.
- **Palestinian Central Bureau of Statistics (2014**): Demographic and Health Survey. http://www.pcbs.gov.ps
- **Pundkar R., Powa rJ., SonarS., Desai A.(2017):** Risk Factors for Anemia in Pregnancy: A Case-Control Study WIMJOURNAL, Volume No. 4, Issue No. 2, 2017
- **Schlachta-Fairchild, L., (2015):** Telehealth and telenursing are live: APN policy and practice implications. The Journal for Nurse Practitioners, 6(2):98-106.
- **Schweitzer, A. (2016)**: Dietary supplements during pregnancy, the J. Prenatal education: 15(4):44-45.
- **Seabra G, Padilha Pde C, de Queiroz JA&Saunders C. (2011**): Pre gestational overweight and obesity: prevalence and outcome associated with pregnancy. Rev Bras Ginecol Obstet. 33: 348-353.
- **Seyoum, Y., Humblot, C., Nicolas, G. (2019):** Iron deficiency and anemia in adolescent girls consuming predominantly plant-based diets in rural Ethiopia. Sci Rep 9, 17244.
- **Singal, Setia, Taneja, & Singal. (2018):** Factors associated with maternal anemia among pregnant women in rural India. Bangladesh Journal of Medical Science, 17(04), 583–592. https://doi.org/DOI: http://dx.doi.org/10.3329/bjms.v17i4.383 20 Introduction
- **Singh I. Singh H. and Kaur D. (2015):** Evaluation and comparison of knowledge, attitude and practice about iron deficiency anemia amongst medical students of rural and urban background, International Journal of Research in Medical Sciences; 3: 1342-1344.
- **Souganidis E S, Sun K, Pee S, Kraemer K, Rah J, Pfanner R M. Sari M. Bloem M W. Semba R D.** (2018): Relationship of maternal knowledge of anemia with maternal and child anemia and health-related behaviors targeted at anemia among families in Indonesia, Matern Child Health J; 16: 1913– 1925.
- **Tanay M, Joanna AS, Rose N. (2014):** Anemia in pregnancy and infants' mortality in Tanzania. Trop Med Int Health; 9:262-6.
- **Tashara I F. Achen R K. Quadras R. D'Souza M V. Jyothi P J. (2015):** Knowledge and self-reported practices on prevention of iron deficiency anemia among women of reproductive age in a rural area, International Journal of Advances in Scientific Research; 1: 289-292.
- **Whitehead, L., and Seaton, P. (2016):** The effectiveness of self-management mobile phone and tablet apps in long-termcondition management: a systematic review. Journal of medical Internet research, 18(5), e97.
- **World Health Organization. (2018):** Worldwide prevalence of anemia: WHO global database on anemia.