Knowledge of Pregnant Women Regarding the Factors Affecting Their Compliance with Iron and Folate Supplementation

Amaal Mohamed Ahmed El-Zeftawy[1], Manal Abdalla Gaheen[2], and Neamat Mazloum Mohamed[3]

[1,3]Community Health Nursing and [2]Maternity and Gynecological Nursing, Faculty of Nursing, Tanta University, Egypt
Corresponding Author: Amaal Mohamed Ahmed El-Zeftawy

Abstract

Background: - *Iron and folic acid supplementation with optimal adherence during pregnancy can effectively prevent anemia and its complications.*

The aim of the study: - *to assess knowledge of pregnant women regarding the factors affecting their compliance with iron and folate supplementation.*

Subjects and Method: -Study design: - *In this study, a descriptive cross-sectional study design was used.*

Study settings: - *The study was conducted in outpatient clinics of Maternity Hospitals and Maternal and Child Health (MCH) centers in Tanta City.*

Study subjects: - *A systematic random sample was used to collect the study data for 214 pregnant women aged (19- 49) years.*

Tool of data collection: - *Structured interview schedule tool, which consisted of seven parts, was used to collect the necessary data from the studied subjects.*

Results: -*More than two –thirds and nearly three-quarters of the studied subjects had a poor score of knowledge about folic acid, iron, and anemia and had an unsatisfactory compliance with iron /folate supplementation. More than one-third of the studied subjects not taking iron-folate tablets during pregnancy, about two thirds and more than one- third of them reported that lack of their knowledge and followed by its bad taste respectively as factors of non-compliance with iron-folate tablets during pregnancy. However, more than half of them taking iron-folate tablets during pregnancy, this is due to many factors reported by the studied subjects such as its effect to prevent complications during pregnancy, delivery, and fetus; followed by protection the fetus from complications and protect the mother from anemia. There was a high statistically significant positive correlation between women s score of knowledge about folic acid, iron and anemia and their score of compliance to iron /folate supplementation during pregnancy.*

Conclusion and recommendations: - *This study concluded that the compliance rate to iron/folate supplements was low among pregnant women. Lack of information followed by bad taste was the most common reasons for not receiving iron/folate supplements during pregnancy. This study recommended that there is a crucial need for focusing on more orientation of pregnant women by health professionals regarding the importance of continuous intake of iron/folate supplements throughout pregnancy to prevent anemia and its complications.*

Keywords: - *Compliance, Iron, Folic Acid supplement, Pregnant women.*

I. Introduction

Anemia is a global public health problem affecting two billion people worldwide [1]. In Egypt, the prevalence of anemia among women at the reproductive age from 15-49 years old was 34.50% at 2011 [2]. Anemia during pregnancy considers one of the most important causes of maternal and fetal morbidity and mortality [1]. There is approximately more than 40% of pregnant women are anemic, nearly half of them have iron deficiency anemia, which is the most common type of anemia related to malnutrition worldwide. It represents a major problem in developing countries; especially in Egypt [3, 4]. Furthermore, anemia is a leading cause of adverse pregnancy outcomes in developing countries [5].

Pregnancy **is** considered as a critical period of time, in which there are many physiological changes such as increased plasma volume 50% more than the normal percentage, serum iron and fall in plasma folate concentration, which affects the number of red blood cells and hematocrit [6]. So, the need for Iron and folic acid were doubled from six to seven times from early pregnancy among pregnant women than non-pregnant to compensate this changes and maintain normal development for the fetus and protect the pregnant woman from complications during pregnancy, labor and post natal period [7,8].

According to Maskey et al., 2014**,** the prevalence of anemia during pregnancy was 67% with major associated risk factors. These risk factors include history of complications during previous pregnancy, low knowledge about anemia among pregnant women, women with low body mass index, age at marriage, socio-economic status, gravidity, parity, smoking, infrequent antenatal visits, irregular intake of iron supplement, low weekly intake of meat and fruits. Also frequent daily tea consumption and lack of education, which is, play a vital role in its existence [9, 2].

Iron and folic acid deficiency during pregnancy have negative outcome on the health of the expectant mother and her fetus [10], so, she should increase the amount of iron and folic acid intake to meet her own and fetus nutritional needs [11]. Daily oral iron supplementation with 30 mg to 60 mg and 0.4 mg of folic acid is recommended during pregnancy to prevent maternal anemia and its complications such as bleeding during pregnancy, post-partum hemorrhage, puerperal sepsis, low birth weight, fetal deformity, low APGAR score, intrauterine growth restriction, and preterm birth [12].

It was reported in the National Family Health Survey (NFHS – III) 2005, 2006; that only 23% of the pregnant women have used iron and folic acid tablets for at least ninety days during their pregnancy [13]. This negative impact and poor compliance of pregnant women is due to many factors such as inadequate knowledge regarding anemia, iron and folic acid rich food and misconceptions regarding iron and folic acid supplements during pregnancy [14]. In addition, the negative attitudes towards antenatal visits, maintain the healthy diet, could have a reflective effect on their hemoglobin levels [15].

There are four basic approaches for the prevention and control of iron and folic acid deficiency, nutrition education and diet modification, iron and folic acid supplementation fortification of a suitable staple food with iron and folic acid [16]. The role of the nurse is very important to protect the expectant mothers and their fetus from the dangers of iron and folic acid deficiency during pregnancy. This role does not only mean giving the necessary health education but also following up the pregnant women throughout pregnancy and motivating them to carry out the laboratory investigation to ascertain their hemoglobin ratios for early detection of anemia and appropriate treatment to avoid pre-existing hazards. Therefore, nurses must not only understand the medical problem of anemia but also any physical and social circumstances that give rise to it [17].

Iron and folic acid supplementation have been a major strategy to reduce iron and folic acid deficiency in pregnancy. However, issues of adherence remain unresolved. The strategies used for control of nutrition problems need regular review to maintain and improve their effectiveness. For this reason, the present study conducted to assess knowledge of pregnant women regarding the factors affecting their compliance with iron and folate supplementation.

Aim of the study
The aim of this study was to: -
Assess knowledge of the pregnant women regarding to the factors affecting their compliance with iron and folate supplementation.

Research questions
1- What is the pregnant women knowledge about the daily dose and nutritional sources of iron and folate during pregnancy?
2- Are the pregnant women having a knowledge regarding the effect of iron and folate deficiencies on pregnancy out come?
3- What is the pregnant women knowledge about causes, symptoms, and consequences of anemia?
4- What are the factors associated with compliance with iron and folate supplementation among pregnant women?

II. Subjects and method

Subjects
Study design: -
A descriptive cross-sectional study was used in this study.

Study settings: -
The study was conducted in outpatient clinics of Maternity Hospitals and Maternal and Child Health (MCH) centers in Tanta city.The total number of hospitals were four including Tanta university hospital, El-Menshawy hospital, El-Mebara hospital, and El-Helal hospital. Two hospitals were selected randomly for representing the two districts on Tanta city. They were Tanta university hospital and El-Helal hospital. The total number of MCH centers were seven including MCH 1(in fever hospital), MCH 2 (El-Imbaby center), MCH 3(in El Azharia), MCH 4(Kohafa), MCH 5(El-Agezy), medical center (in Sigar), and medical center (in

Boutros). Two MCH centers were selected randomly for representing two districts of Tanta city. They were MCH 2 (El-Imbaby center) and Medical center (in Sigar).

Study subjects:

A systematic random sample was used to collect the study data for 428 pregnant women aged (19- 49) years which represents 20% of women who were attending each of the previously mentioned settings and who were willing to participate in the study.

▪ The following criteria were used for selecting the subjects: -
− **Inclusion criteria:**
• Pregnant women aged (19 -49) years and were willing to participate in the study.

Table showed the monthly attendance rate of the mothers at the previously mentioned settings:

District name	Name of the center and hospitals	Total number of women attended the centers and hospitals /month	Number of women selected from the centers and hospitals
First district	MCH 2 (El-Imbaby center)	450	90
	Tanta university hospital	603	126
Second district	Sigar Medical center	460	92
	El-Helal hospital	600	120
Total		2113	428

Tool of data collection:
Structured interview schedule tool was used to collect the necessary data from the study subjects:

Structured interview schedule [14,17]:-
It was developed by the researchers after reviewing the recent related literature. It consisted **of seven parts.**
Part (1): Socioeconomic and demographic characteristics of the study subjects. It included age, residence, marital status, educational level, occupation, number of children, family income, type of family, number of family members, number of rooms, crowding index, height, weight ,and body mass index.

Part (2): An obstetrical history of the pregnant women. It included age of menarche, age at marriage, gravidity, parity, history of miscarriage and stillbirth, fetal deformity, gestational age of the present pregnancy, follow up visit of antenatal clinic (ANC) and its number.

Part (3): **The current and past health history of the pregnant women regarding anemia** during the previous pregnancy, anemia during the current pregnancy, and hemoglobin levels.

Part (4): Knowledge of pregnant women about their iron/folate supplementation practice during their pregnancy.
Knowledge was assessed by participants which included if they had 'heard or read' about iron and folic acid and meaning of iron and folic acid. Nutritional sources of iron and folic acid, the exact dose of iron/folate per day needed for pregnant women, the effect of iron and folic acid deficiency on pregnancy outcomes, and the suitable time for taking   iron and folic acid supplementation during pregnancy.

Part (5): Knowledge of pregnant women about the causes, signs and symptoms, consequences and prevention of anemia.
Participants were asked about the meaning of anemia, causes (unbalanced diets, lack of iron supplement, excessive bleeding and inadequate intake of food rich in iron. Signs and symptoms (pallor, exhaustion, irregular heartbeat, difficulty in breathing ect. Consequences (loss of consciousness, miscarriage, intra uterine fetal death (IUFD), delivery complications, the low birth weight of newborn, postpartum hemorrhage, women death and how the women could prevent the condition in pregnancy and their sources of knowledge about anemia.

Scorning system: -
The total score was obtained by summing all responses. Each item was coded "zero" for an incorrect answer or a "don't know", and "one" for the correct answer. The total score of knowledge was forty-eight points. The total score of knowledge was categorized as follows: -
• Good knowledge: $\geq 70\%$ of the total score (more than 33.6 points).
• Fair knowledge: 50 % - < 70 % of the total score (more than 24 to less than 33.6 points).

- Poor knowledge: < 50 % of the total score (less than 24 points).

Part (6): Factors affecting pregnant women compliance with iron –folate supplements during pregnancy:

Asked about taking of iron-folate tablets during pregnancy. Reasons for not receiving iron/folate supplements during pregnancy (lack of information about its important, diet provides adequate nutrients, its side effects such as vomiting, heartburn, forgot to buy, its bad taste, lack of money to buy, unwillingness to take and health care centers and hospitals not supply(. Reasons for receiving iron/folate supplements during pregnancy (protect from anemia, following doctor's advice, increase appetite, protect the fetus and prevent complications during pregnancy and labor for both woman and fetus).

Scorning system: -

The total score was obtained by summing all responses. Each item was coded "zero" for an incorrectly reported compliance, and "one" for the correct reported compliance. The total score was categorized as follows: -

➤ Satisfactory compliance: more than 50%of the total score.
➤ Unsatisfactory compliance: less than 50%of the total score.

Part (7): Dietary diversity and frequency of consumption of iron and folate-rich foods by pregnant women (Dietary practices).

A food frequency questionnaire was used to collect data on the frequency of consumption of iron, folate and Vitamin C rich foods by the pregnant women.

Method

1. An official permission to carry out the study was obtained from Dean of the Faculty of Nursing to the Directorate of Health Affairs in Tanta and from him to the directors of the hospitals, MCH and Medical centers in Tanta city and to the manager of outpatient clinics in Tanta university hospital.
2. Ethical considerations:
- An informed consent of the study subjects included in the study was obtained after an appropriate explanation of the nature and purpose of the study.
- Anonymity and confidentiality of the collected data and the right to withdraw from the study at any time was assured. A code number was used instead of names.
- Nature of the study was not caused harm and/or pain to the entire subjects.
3. The researchers based on reviewing recent related literature developed tool of data collection. The tool of data collection was tested for its face and content validity by five experts from obstetrics and gynecology nursing and community health nursing, the necessary modifications were done.
4. The reliability of the tool was tested using Cronbach's Alpha test which was 0.761
5. A pilot study was carried out on a sample of 42 pregnant women and they were excluded from the study subjects to assess the tool for its applicability, clarity ,and feasibility. Necessary modifications were done accordingly.
6. The researchers were meeting the study subjects in the waiting areas of previously mentioned settings two days per week.
7. Every 2nd pregnant woman was selected, with randomization of the first pick. 428 pregnant women were sampled.
8. Data collection. The study was conducted from the beginning of October to the end of December 2017.
9. Data Analysis: Data were analyzed using the Statistical Package for Social Science (SPSS version 20). The obtained data were coded, analyzed and tabulated. Descriptive analysis was performed in this study including frequencies and percentage. Chi-square and p - value were also calculated for statistical significance.

III. Results
Table (1): Distribution of socio-demographic characteristics and body mass index (BMI) of the studied pregnant women

Variables	The studied subjects (N=428)	
	N	**%**
Age Range Mean±SD	(16-38) 26.15 ±4.498	
Residence ▪ Rural	230 198	53.7 46.3

▪ Urban		
Marital status		
▪ Married	428	100
Level of education		
▪ Illiterate	48	11.3
▪ Read and write	96	22.4
▪ Secondary education	170	39.7
▪ University education	14	26.6
Working status		
▪ Work	70	16.4
▪ Not Work / Housewife	358	83.6
Family income		
▪ Enough and save	92	21.5
▪ Enough	314	73.4
▪ Not enough and borrow	22	5.1
Type of family		
▪ Nuclear family	380	88.8
▪ Extended family	48	11.2
Body mass index		
▪ Normal weight (18.5–24.9 kg/m2)	24	5.6
▪ Overweight (25.0–29.9 kg/m2)	266	62.2
▪ Obese (30.0 kg/m2)	138	32.2
Range **Mean±SD**	**(19-41)** **28.91 ±3.943**	

Table (1) represents the distribution of socio-demographic characteristics and body mass index (BMI) of the studied pregnant women. The table showed that the age and BMI of studied subjects ranged from (16-38 and 19-41) respectively, the mean age and mean BMI of them were 26.15 ±4.498 and 28.91 ±3.943 respectively. More than one-third (39.7%) of them had secondary education, the majority of them (88.8%, 83.6% &73.4% respectively) were from nuclear family, were housewives and had enough family income.

Table (2): Distribution of the studied subjects according to their obstetrical history

Variables	The studied subjects (N=428)	
	N	%
Age of menarche Range Mean±SD	**(10-18)** **13.16 ±1.477**	
Age at marriage Range Mean±SD	**(16-33)** **20.64 ±2.447**	
Gravidity Primi-gravida Multigravida	182 246	42.5 57.5
Parity Non Para one Multipara	182 40 206	42.5 9.3 48.2
History of miscarriage	78	18.2
Number of miscarriage One time Two time	58 20	13.6 4.7
Fetal deformity	28	6.5
Gestational age of the present pregnancy Range Mean±SD	**(6-40)** **21.29 ±9.677**	
Stage of starting to follow up in the current pregnancy First trimester Second trimester Third trimester	 286 114 28	 66.8 26.6 6.6

Table (2) shows the distribution of the studied subjects according to their obstetrical history. The table showed that the age of menarche, age at marriage and gestational age of studied subjects ranged from (10-18,16-33 and 6-40) respectively, the mean age of menarche, mean age at marriage and mean gestational age of them were 13.16 ±1.477, 20.64 ±2.447and 21.29 ±9.677respectively. More than half (57.5%) and more than one third (48.2%) of the studied subjects respectively were multigravida and multipara.

Figure (1): Distribution of the studied subjects according to their current hemoglobin level

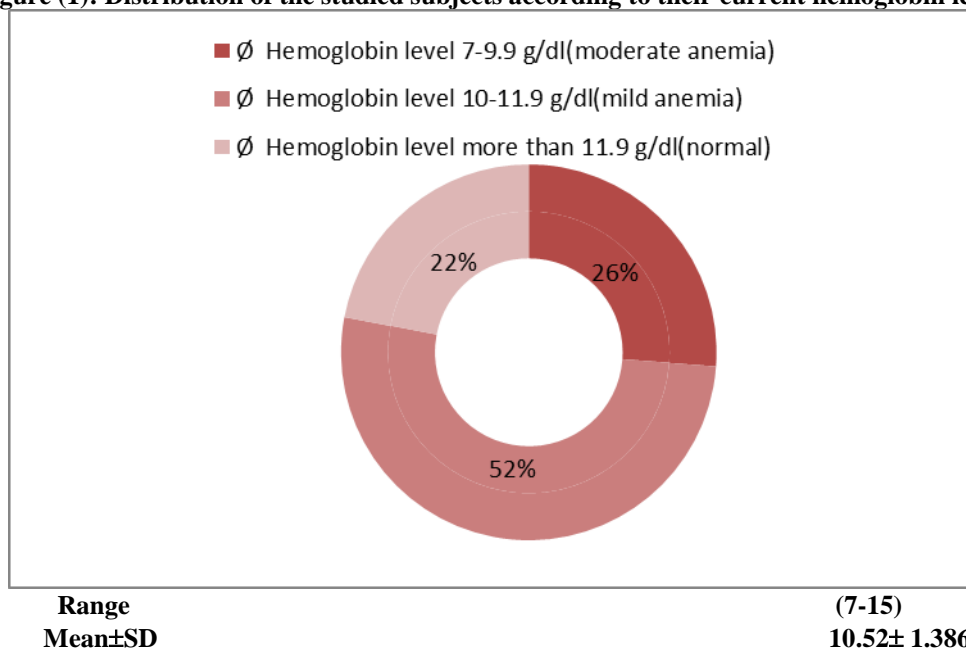| Range	(7-15)
Mean±SD	**10.52± 1.386**

Figure (1) represents the distribution of the studied subjects according to their current hemoglobin level. The figure showed that (52.0% &26.0%) respectively of the studied subjects suffering from mild and moderate anemia, while only 22.0% of them had normal hemoglobin level. The figure also showed that the hemoglobin level of the studied subjects ranged from (7-15), with the mean 10.52± 1.386.

Table (3): Distribution of the studied subjects according to their knowledge about folic acid supplementation practice during their pregnancy

Variables	The studied subjects (N=428)	
	N	**%**
▪ **Folic acid is: -**		
- Type of minerals	56	13.1
- Vitamin B	82	19.2
- Don't know	290	67.8
▪ **Sources of folic acid**		
- Know	156	36.4
- Don't know	272	63.6
▪ **Outcomes of the shortage of folic acid**		
- No problem	22	5.1
- Atrophy of spinal cord	100	23.4
- Don't know	306	71.5
▪ **Daily requirements of folic acid**		
- 500 micrograms	18	4.2
- 400 micrograms	30	7.0
- Don't know	380	88.8
▪ **Time of taking of folic acid during pregnancy**		
- Before pregnancy and during first trimester	176	41.1
- Don't know	252	58.9
Range	**(0-7)**	
Mean±SD	**1.54± 1.908**	

Table (3) shows the distribution of the studied subjects according to their knowledge about folic acid supplementation practice during their pregnancy. The table showed that (67.8%, 63.6%, 71.5%, 88.8% & 58.9%) respectively of the studied subjects do not know the meaning, source, outcomes of shortage, daily requirements and time of taking of folic acid. The table also showed that the knowledge of the studied subjects regarding folic acid supplementation during pregnancy ranged from (0-7), with the mean 1.54± 1.908.

Table (4) Distribution of the studied subjects according to their knowledge about iron supplementation practice during their pregnancy

Variables	The studied subjects (N=428)	
	n	%
▪ **Meaning of iron: -**		
- Type of minerals	80	18.7
- Type of vitamins	86	20.1
- Don't know	262	61.2
▪ **Sources of iron**		
- Know		
- Don't know	70	16.4
	358	83.6
▪ **Daily requirements of iron**	36	8.4
- 27-30 mg	30	7.0
- 33- 40 mg	362	84.6
- Don't know		
▪ **Time of taking of iron during pregnancy**		
- During second trimester	150	35.0
- At the beginning of pregnancy	136	31.8
- At the end of pregnancy	34	7.9
- Don't know	108	25.2
Range **Mean±SD**	(0-8) **4.03± 1.790**	

Table (4) shows the distribution of the studied subjects according to their knowledge about iron supplementation practice during their pregnancy. The table showed that (61.2%, 83.6%, 84.6% & 25.2%) respectively of the studied subjects do not know the meaning, source, daily requirements, and time of taking iron. The table also showed that the knowledge the studied subjects regarding iron supplementation during pregnancy ranged from (0-8), with the mean of 4.03± 1.790.

Table (5): Distribution of the studied subjects according to their knowledge about anemia

Variables	The studied subjects (N=428)	
	N	%
▪ **Meaning of anemia**		
- Decrease in HB percent	342	79.9
- Increase in HB percent	4	0.9
- Don't know	82	19.2
▪ **Causes of anemia**		
- Know	46	10.7
- Don't know	382	89.3
▪ **Signs and symptoms of anemia**		
- Know	60	14.0
- Don't know	368	86.0
▪ **Consequences of anemia**	80	18.7
- Know	348	81.3
- Don't know		
▪ **Protection from anemia**	38	8.9
- Know	390	91.1
- Don't know		
Range **Mean±SD**	(1-31) **13.70± 7.544**	

Table (5): represents the distribution of the studied subjects according to their knowledge about anemia. The table showed that (19.2 %, 89.3%, 86.0%, 81.3% & 91.1%) respectively of the studied subjects do not know the meaning, causes, signs and symptoms, consequences, and protection from anemia. The table also showed that the knowledge the studied subjects regarding anemia ranged from (1-31) with the mean of 13.70± 7.544.

Table (6) Distribution of the studied subjects according to their sources of knowledge about   iron /folate supplementation and anemia

Variables	The studied subjects (N=428)	
	n	%
▪ **Doctor and nurse**	338	79.0
▪ **Studies**	112	26.2
▪ **Mass media**	104	24.3
▪ **Internet**	54	12.6
▪ **Scientific books and magazines**	26	6.1

Table (6) shows the distribution of the studied subjects according to their sources of knowledge about   iron /folate supplementation and anemia. It showed that more than three quarters (79%) of studied subjects gained their knowledge from doctor and nurse. In compared to only (26.2 % and 24.3 %) respectively of them be gained their knowledge from studies and mass media.

Table (7): Distribution of the studied subjects according to the factors associated with compliance with iron –folate supplements during pregnancy

Variables	The studied subjects (N=428)	
	N	%
▪ **Taking of iron-folate tablets during pregnancy** - Yes - No	252 176	58.9 41.1
▪ **# Reasons for not receiving iron/folate supplements during pregnancy: -**		
- Lack of information that it is a requirement to take.	110	62.5
- Bad taste	64	36.4
- Lack of information to buy more once dose ends	58	33.0
- I did not get them from the hospital or health center	58	33.0
- Diet provides adequate nutrients	46	26.1
- Forgot to buy	20	11.4
- Lack of money to buy	20	11.4
- Side effects (vomiting, heartburn)	10	5.7
- 6	3	3.4
▪ **# Reasons for receiving iron/folate supplements during pregnancy: -**		
- Prevent complications during pregnancy and delivery to mother and fetus	162	64.3
- Protect the fetus from complications	152	60.3
- They protect the mother from anemia	152	60.3
- Follow doctor's advice	114	45.2
- Increase appetite	56	22.2

(# More than one choice allows)

Table (7): shows the distribution of the studied subjects according to the factors associated with compliance with iron–folate supplements during pregnancy. The table revealed that more than one third (41.1%) of the studied subjects not taking iron-folate tablets during pregnancy, this is due to many factors such as, lack of their knowledge (62.5%) followed by its bad taste (36.4%) of the studied subjects reported that. The table also showed that more than half (58.9%) of them taking iron-folate tablets during pregnancy, this is due to many factors reported by the studied subjects such as, its effect to prevent complications (64.3%) during pregnancy and delivery to mother and fetus followed by protection the fetus from complications and protect the mother from anemia (60.3%).

Table (8): Distribution of the studied subjects according to their weekly dietary diversity and frequency of consumption of iron and folate rich foods (Dietary practices)

Variables	Never		Rarely		Twice weekly	
	n	%	n	%	n	%
Dark leafy vegetables like spinach	102	23.8	132	30.8	194	45.3
Cabbage Cabbage	70	16.4	154	36.0	204	47.7
Liver	80	18.7	162	37.9	186	43.5
Beef / Goat	98	22.9	204	47.7	126	29.4
Chicken	54	12.6	74	17.3	300	70.1
Fishes	62	14.5	64	15.0	302	70.6
Beans and legumes such as lentils, beans ,and peas	82	19.2	126	29.4	220	51.4
Citrus fruits such as orange, lemon ,and strawberries	36	8.4	70	16.4	322	75.2
Vegetables such as tomatoes, pepper ,and parsley	24	5.6	48	11.2	356	83.2
Whole grains such as wheat and fortified grains	98	22.9	128	29.9	202	47.2

Table (8): shows the distribution of the studied subjects according to their dietary diversity and frequency of consumption of iron and folate rich foods (Dietary practices). The table showed that the majority (83.2% &75.2% respectively) of them eat vegetables such as tomatoes, pepper ,and parsley ,and citrus fruits such as orange, lemon and strawberries, on the other hand (8.4% & 5.6%) respectively of them never eat this type of foods.

Table (9): Distribution of the studied subjects according to their level of knowledge about folic acid, iron, anemia, total score of knowledge and level of compliance with iron –folate supplements during pregnancy

Variables	The studied subjects (N=428)	
	n	%
▪ **Level of knowledge about folic acid**		
- Poor knowledge	402	93.9
- Fair knowledge	22	5.1
- Good knowledge	4	0.9
▪ **Level of knowledge about iron**		
- Poor knowledge	214	50.0
- Fair knowledge	138	32.2
- Good knowledge	76	17.8
▪ **Level of knowledge about anemia**	272	
- Poor knowledge	76	63.6
- Fair knowledge	80	17.8
- Good knowledge		18.7
▪ **Total score of knowledge about (folic acid, iron and anemia)**	288	67.3
- Poor knowledge	86	20.1
- Fair knowledge	54	12.6
- Good knowledge		
▪ **level of compliance with iron –folate supplement**		
- Unsatisfactory compliance	310	72.4
- Satisfactory compliance	118	27.6

Table (9): represents the distribution of the studied subjects according to their level of knowledge about folic acid, iron, anemia, total score of knowledge and level of compliance with iron –folate supplements during pregnancy. It was found that (93.9%, 50.0%, & 63.6%) respectively of the studied subjects had a poor knowledge regarding folic acid, iron, and anemia. The table also showed that the total score of knowledge about (folic acid, iron, and anemia among 67.3% of the studied subjects was poor knowledge, also the table represented that 72.4% of them had an unsatisfactory compliance with iron –folate supplement.

Table (10): Relationship between total level of knowledge about anemia with level of knowledge about folic acid, iron and level of compliance with iron –folate supplements during pregnancy

Variables	level score of knowledge about anemia						Total (n=428)		χ^2 P
	(Poor)		(Fair)		(Good)				
	n	%	N	%	n	%	N	%	

Level of knowledge about folic acid									
- Poor knowledge	250	62.2	76	18.90	76	18.21	402	93.9	3.892
- Fair knowledge	18	81.8	0	0	4	8.9	22	5.1	0.421
- Good knowledge	4	100	0	0	0	0	4	0.9	
Level of knowledge about iron									
- Poor knowledge	162	75.7	38	17.8	14	6.5	214	63.6	25.900
- Fair knowledge	80	58	22	15.9	36	26.1	138	17.8	0.000*
- Good knowledge	30	39.5	16	21	30	39.5	76	18.7	
level of compliance with iron –folate supplement									
- Unsatisfactory compliance	266	85.8	38	12.3	6	1.9	310	72.4	96.663
- Satisfactory compliance	22	18.6	48	40.7	48	40.7	118	27.6	0.000*

* Significant at P <0.05.

Table (10): shows the relationship between the total level of knowledge about anemia with the level of knowledge about folic acid, iron and level of compliance with iron –folate supplements during pregnancy. It was obvious that there were no significant differences between level score of knowledge about anemia and the level of knowledge about folic acid, but there were highly statistically significant differences between level score of knowledge about anemia and the level of knowledge about iron and level of compliance with iron –folate supplement during pregnancy ($P < 0.000*$).

Table (11): Correlation between total score of knowledge about anemia with score of knowledge about folic acid, iron and score of compliance with iron –folate supplements during pregnancy

Variables	Score of knowledge about folic acid	Score of knowledge about iron	Score of knowledge about anemia	Score of knowledge about compliance	Total score of knowledge
	r / p	r / p	r / p	r / p	r / p
Score of knowledge about folic acid	-				
Score of knowledge about iron	0.435 / 0.000**	-			
Score of knowledge about anemia	0.551 / 0.000**	0.533 / 0.000**	-		
Score of knowledge about compliance	0.484 / 0.000**	0.375 / 0.000**	0.637 / 0.000**	-	
Total score of knowledge	0.695 / 0.000**	0.674 / 0.000**	0.970 / 0.000**	0.650 / 0.000**	-

**. Correlation is significant at the 0.01 level (2-tailed).

Table (11) represents the correlation between the total score of knowledge about anemia with the score of knowledge about folic acid, iron, and score of compliance with iron–folate supplements during pregnancy. The table showed that there was the highly significant positive correlation between total score of knowledge about anemia with score of knowledge about folic acid, iron and score of compliance with iron –folate supplements during pregnancy ($P < 0.000**$).

Table (12): Relationship between socio-demographic characteristics of the studied subjects and their total score of compliance

Socio-demographic characteristics	Total score of compliance				χ^2 P
	Unsatisfactory compliance (N=310)		Satisfactory compliance (N=118)		
	n	%	N	%	
Age in years:					
▪ < 20 years	52	16.8	0	0	**11.827**
▪ 20- <30 years	222	71.6	106	89.8	**0.003***
▪ 30 - <40 years	36	11.6	12	10.2	

Residence ▪ Rural ▪ Urban	142 168	45.8 54.2	88 130	74.6 25.4	**14.228** **0.000***
Level of education ▪ Illiterate ▪ Read and write ▪ Secondary education ▪ University education	34 80 118 76	11.6 25.8 38.1 24.5	12 16 52 38	10.2 13.6 44.0 32.2	**4.273** **0.233**
Nature of work ▪ Work ▪ Not work	46 264	14.8 85.2	24 94	20.3 79.7	**0.945** **0.331**
Family income ▪ Enough and save ▪ Enough ▪ Not enough and borrow	58 238 14	18.7 76.8 4.5	34 76 8	28.8 64.4 6.8	3.346 0.188

* Significant at P <0.05.

Table (12): represents the relationship between socio-demographic characteristics of the studied subjects and their total score of compliance. It was obvious that there were no significant differences between total score of compliance and the women level of education, nature of work and family income while there was the statistically significant difference between the total score of compliance and the age of pregnant women and their residence (P < 0.003* & P < 0.000*) respectively.

IV. Discussion

Nowadays, iron and folic acid deficiency are two of the most common nutritional deficiencies among women, as well as women who consume a low level of them during pregnancy are at risk for poor pregnancy outcomes such as iron deficiency anemia and neural tubal defects (NTDs). Folic acid supplementation can reduce the annual number of NTDs affected pregnancies by 50 to 70%. Despite this fact, most women are not aware of the benefits of Iron and folic acid intake during pregnancy [19]. Therefore, the aim of this study was to assess the factors affecting the utilization of iron and folate supplementation among pregnant women.

The results of the present study revealed that the age of the studied pregnant woman ranged from 16-38 years with a main age 26-15 ± 4.498years. A study was done by **Mashayekhi et al., (2011),** revealed that the participants aged 15 to 44 years old with a mean age of 26.5 ± 4.9 and half of the subjects aged less than 26 years [20].

Regarding the residence of the studied females, more than half of them were from rural areas. This finding is consistent with a study conducted by **Sadore et al., (2015),** about compliance with iron-folic acid who mentioned that rural dweller constituted the major proportion [21].

As regards the level of education, more than one- third of women had secondary education, and the majority of them had enough family income. This may be attributed to the fact that educational level and socioeconomic conditions of the women play a very important role in their knowledge about folic acid and iron. The finding of this study was inconsistent with Rehan **et al., (2015)** who revealed that knowledge was affected by the women level of education [22]. In addition, this finding was comparable to a study conducted by **Nasr et al., (2012),** among **Lebanese** women who found those women with higher educational level and the more sufficient and stable income had more awareness about the use of iron and folic acid [23]. On the other hand, these findings were in contrast with a study done by **Gebreamalk et al., (2017),** who reported that mother with relatively better monthly income had the lower incident rate of utilizing iron-folic acid supplement [24].

In the current study, it was obvious that there were no significant differences between the total score of compliance and the women level of education. This finding was incomparable to a study done by **Anzaku, (2013),** who found that there was a positive association between the women level of education and their knowledge and practice of iron and folic acid supplementation during pregnancy [25]. In the present study, the majority of women were housewives. This in agreement with a study conducted by **Sador et al., (2015),** who found that the majority of women in his study were   housewives [21]. From the researchers' point of view, this result was accepted because there was little chance for employment among Egyptian society.

The present study revealed that more than half of the women were multigravida and nearly half of them were multipara. This is the same line with a study done by **Shoaib et al., (2017),** who found that the number of times a woman has been pregnant were significantly related to the utilization of iron and folic acid [26]. Another study performed by **Rehan et al., (2015),** found that, there was a significant positive correlation between knowledge and practice of women regarding utilization of supplementation during pregnancy and their number of pregnancies [22].

As regarding the first time of follow up visits. The present study indicated that more than one-half of women were starting to follow up at the first trimester. From the researchers' point of view, this result was acceptable because the first trimester considers as a most suitable time in which health providers are discussing compliance with iron- folic acid supplement, encouraging the pregnant women to take the tablets as prescribed, and educating them on health benefit of taking iron folic acid supplement. This comparable with **Sador et al., (2015)**, who reported that mothers' frequency of visiting antenatal clinic for four and more times were considered to have significant effects on compliance with iron-folic acid supplement compared to mothers who had visited antenatal clinic for less than four times [21]. Therefore, promoting mothers to visit antenatal clinic at least four times can improve their status of compliance with iron-folic acid supplementation.

In the current study **figure (1)** showed that more than half of the studied subject suffering from mild anemia and more than one quarter of them had moderate anemia, while less than one-quarter of them had normal hemoglobin level. This is reflecting their needs for increasing their demands for iron and folic acid [27].

Regarding knowledge of the studied subjects regarding iron and folic acid supplementation and practice during their pregnancy, this study revealed that the majority of the studied subjects do not know the meaning, source, outcomes of shortage, daily requirements and time of taking iron and folic acid. This finding is in agreement with a study performed by **Lin et al., (2017),** who found that there was a wide deficiency of knowledge, awareness and the using of iron and folic acid supplements among a large proportion of the sample, while the most of their respondents indicated that they had heard about iron and folic acid [28].

Furthermore, a study was done by **Holy et al., (2013),** who reported that the majority of the subjects failed to know the proper time for iron and folic acid supplementation [29]. Another study performed by **EL-Mani, (2013)**, who revealed that as regards to the source of iron and folic acid, the knowledge of participants about good dietary sources of iron and folic acid was limited [30]. These findings also are in the same line with a study done **by Nivedita and Shanthini, (2016),** who stated that there was a lack of knowledge of pregnant women regarding iron and folic acid rich foods and the importance of iron and folic acid supplementation during pregnancy. These indicated that their knowledge about sources of iron and folic acid was poor [10].

Concerning knowledge about anemia, more than three-quarters of women know the meaning of it but the majority of them do not know the causes, signs and symptoms, consequences and protection from anemia. A similar study was done by **Yadav et al.,** (2014)**,** in **Kamataka** also showed that the level of knowledge regarding anemia and healthy diet was poor among pregnant women [14].

Concerning the sources of pregnant women knowledge about iron and folic acid supplementation and anemia, the present study showed that more than half of them gained their knowledge from doctors and nurse compared to less than one-fifth of them gained their knowledge from studies and mass media. These results were in the same line with a study done **by Koken et al., (2013),** who stated that the source of information were relatives, friends, media, television, magazine but doctors were the most frequent source of information and internet [31]. The similar findings reported by **Nosrat et al., (2012),** who found that physicians and newspaper, magazine books and media were the most common sources of information about iron and folic acid [32]. This can be explained that health care providers play a crucial role in changing women's attitude toward iron and folic acid and its intake.

Regarding the factors affecting the compliance of iron and folic acid during pregnancy, the results of the present study revealed that there were statistically significant differences between the total score of compliance and the age of pregnant women and their residence. These results may be due to that the advanced age can contribute to the development of correct attitude and practices of pregnant woman toward the compliance of iron and folic acid; furthermore, the older women may be more concerned about their health and pregnancy outcomes and had better experiences in the prevention and treatment of iron deficiency anemia. This result was in accordance with a study done by **sador et al., (2015),** who revealed that the participants' age has a significant association with compliance. Women who were ≥25 years old were 2.9 times more likely to be compliant to iron and folic acid supplementation than women with younger age were<25 years [21].

Furthermore, the present study found that more than two-fifth of women not taking iron and folic acid tablets during pregnancy, and this attributed to many factors such as lack of their knowledge followed by its bad taste. Therefore, there was a need for increased women knowledge and ensure that they are informed about the benefits of iron and folic acid and they are able to take decisions about folic acid consumption. This result is agreement with **Alkaabi et al., (2017)**, who found that the awareness and knowledge of the use of iron and folic acid supplements among women remain low [33]. However, further efforts are required to educate and encourage women of childbearing age to take preconception iron and folic acid supplements.

Concerning to the dietary diversity and frequency of consumption of iron and folic acid rich foods, in the present study, it was found that the majority of the studied subjects eat vegetable such as tomatoes and parsley, also citrus fruits such as orange, lemon ,and strawberries, on the other hand, 8.4% and 5.6% of them never eat this type of foods. In the same context, **Nosrat et al., (2012)**, mentioned that 37.6% subjects identified natural foods rich in iron and folic acid. This may suggest that iron and folic acid intake through diet in the

population could be due to the impact of health care recommendations [31]. The results of the current study also were similar to a study done by **Nisar et al., (2014)**, who concluded that the majority of the urban women were able to describe the supplements and reported the benefits of the supplements as improving the appetite, curing anemia, needing to be taken once daily and continued throughout pregnancy improving maternal health and the health and growth of the fetus /baby, preventing delivery complications and taking a good diet along with the supplements such as vegetables and meat [34].

In the present study, regarding the level of knowledge about and the level of compliance with folic acid and iron supplements during pregnancy, it was found that the majority of the studied subjects had a poor knowledge regarding folic acid and iron supplements during pregnancy and anemia. In addition to that, nearly three-quarters of them had an unsatisfactory compliance with iron and folic acid supplement. Taye et al., (2014), who showed that knowledge of women about anemia, iron, also documented this and folic acid was poor [35]. The finding of the present study was in agreement with a study performed by **Sadore et al., (2015),** who stated that the pregnant mothers who had good knowledge of anemia, iron, and folate supplementation during pregnancy were 3-5 times more likely to be compliant with iron-folate supplementing during pregnancy compared to those who had poor knowledge. Therefore, as knowledge of the mother related to the use of iron and folic acid enhanced, they would choose to take the supplement properly. Furthermore, pregnant mothers who were counseled on iron-folic acid supplement during pregnancy four times likely complied than those who were not counseled on iron and folic acid supplement [21].

Furthermore, the present study revealed that there were highly statistically significant differences between the level score of knowledge about anemia and the level of knowledge about iron and the level of compliance with iron-folate supplement during pregnancy. This finding is consistent with a study done by **Shewasinad and Negash, (2015),** showed that women's lacking comprehensive knowledge of anemia is associated with low compliance of iron-folic acid supplementation [27]. In addition, the present study showed that there was a highly significant positive correction between the total score of knowledge about anemia, folic acid, iron and compliance with iron and folic acid supplements during pregnancy.

However, there is a crucial need to overcome the factors that hinder this compliance through developing a program to increase the pregnant women awareness about these factors to prevent the effect of iron and folic acid deficiencies on pregnancy outcome.

V. Conclusions

The compliance rate to iron/folate supplements was low among pregnant women. Nearly three-quarters of the studied subjects had an unsatisfactory level of compliance with iron–folate supplement. Lack of information followed by bad taste was the most common reasons for not receiving iron/folate supplements during pregnancy. The dietary diversity of the pregnant women was the high meaning there was access to a variety of foods. The frequency of consumption of foods such as beef / goat was however low with high frequency of consumption of vegetables such as tomatoes, pepper and parsley and citrus fruits such as orange, lemon ,and strawberries.

Recommendations

Based on the findings of the present study, the following recommendations were suggested: -
1. Health professionals at antenatal clinics should sensitize pregnant women on the need to continuously intake of iron/folate supplements throughout pregnancy to prevent anemia and its complications.
2. In-services educational training should be done to the health professionals and community health workers concerning anemia, nutrition during pregnancy and counseling skills to be applied when they meet the pregnant mothers.
3. Increase antenatal clinics attendance by pregnant women through the offering of outreach services to enhance access to the supplements or engaging of community health workers in the distribution of the supplements.
4. Health professionals should encourage pregnant women to start antenatal visits and iron/folate supplementation early.
5. The Ministry of Health should ensure that there is the continuous and timely supply of the supplements to the health facilities. This will enable all pregnant women to access the supplements from the health facility during their ANC visits.

References

[1]. Worldwide prevalence of anemia 1993–2005.WHO Global database on anemia. Geneva: World Health Organization; 2008 Available at. http:// whqlibdoc.who.int/publication/2008/9789241596657 _eng.pdf.Accessed on 7 April 2017.

[2]. El- Ashiry A, El-Ghazaly S and Habil I. Prevalence and determinants of anemia in third trimester pregnancy in Fayoum Governorate-Egypt. Acta Medica Mediterranea; 2014, 30: 1045.

[3]. WHO. Daily iron and folic acid supplementation during pregnancy. Library of Evidence for Nutrition Actions (LENA), 2017; 16:49.

[4]. Soliman G, Azmi Mand Soha El-S. Prevalence of Anemia in Egypt (Al-Gharbia Governorate). The Egyptian Journal of Hospital Medicine ,2007; 28: 295– 305

[5]. Rahman M, Abe S, Rahman M, Kanda M, Narita S, Bilano V, et al. Maternal anemia and risk of adverse birth and health outcomes in low- and middle-income countries: systematic review and meta-analysis. American Journal of Clinical Nutrition; 2016; 103(2):495-504.

[6]. Soma-Pillay P, Nelson-Piercy C, Tolppanen H and Mebazaa A. Physiological changes in pregnancy. Cardiovasc J Afr, 2016; 27(2):89-94.

[7]. Rodger M, Sheppard D, Gandara E and Tinmouth A. Haematological problems in obstetrics. Best Prac Res ClinObstetGynaecol, 2015; 29(5):671–684.

[8]. Balasubramanian T, Aravazhi M and Sampath S. Awareness of Anemia among Pregnant Women and Impact of Demographic Factors on their Hemoglobin Status. Int J Sci Stud, 2016; 3(12):303-305.

[9]. ManishaMaskey N, Jha S, Poudel D and Yadav. Anemia in pregnancy and its associated factors: A study from Eastern Nepal. Nepal Journal of Epidemiology, 2014; 4(4):386-92.

[10]. Nivedita K and Shanthini F. Knowledge, attitude and practices of pregnant women regarding anemia, iron rich diet and iron supplements and its impact on their hemoglobin levels. Int J ReprodContraceptObstet Gynecol. 2016; 5:425-31.

[11]. Haider B, Olofin I, Wang M, Spiegelman D, Ezzati M and Fawzi W. Anaemia, prenatal iron use, and risk of adverse pregnancy outcomes: systematic review and meta-analysis. BMJ, 2013; 346:3443.

[12]. WHO. Daily iron and folic acid supplementation in pregnant women. Geneva;2012.(http://www.who.int/nutrition/publications/micronutrients/guidelines/daily_ifa_supp_pregnant_women/en/).

[13]. National Family Health Survey (NFHS – III) 2005, 2006.

[14]. Yadav R, Swamy M and Banjade B. Knowledge and practice of anemia among pregnant women attending antenatal clinic in Dr. Prabhakar Kore hospital, Karnataka-A cross sectional study. IOSR Journal of Dental and Medical Sciences, 2014; 13(4):74-80.

[15]. Payghan B, Swapna S and Mayuri R. A comparative study of Nutritional awareness among urban –Rural pregnant mothers, Research and reviews. Journal of Medical and Health sciences.2014;3(4):95-9.

[16]. WHO/UNICEF/MI. Fortification of flour with iron in countries of the Eastern Mediterranean, Middle East and North Africa. World Health Organization Eastern Mediterranean Regional Office, Alexandria, Egypt, Report: WHO-EM/NUT/202/E/G; 1997. Available at: WHO EMRO). [Last accessed on 2014 Dec 12]

[17]. Rathore I. Iron-Deficiency Anaemia – From the Prospect of Community Health Nursing. International Journal of Nursing Education and Research; 2017 ISSN Print: 2347-8640 .ISSN Online: 2454-2660.

[18]. Dinga L. Factors association with adherence to iron / folate supplementation among pregnant women attending antenatal clinic at Thika district hospital in Kiambu country, Kenya. Master of Science in Applied Human Nutrition in the Department of Food Science, Nutrition and Technology, Faculty of Agriculture, University of Nairobi,2013.

[19]. Riazi H, Bashirian S and Amini L. Awareness of Pregnant Women about Folic Acid Supplementation in Iran. Tehran University of Medical Sciences. Iran.2012; 159-163.

[20]. Mashayeki S, Dilmaghanizadeh M and Sattair M. A survey on the Consumption Knowledge and Attitude of Pregnant Women toward the Effect of Folic Acid on Pregnancy Outcome in TABRIZ. University of Medical Sciences.Iran Journal of Child Neurology.2011; 5(1): 35-39.

[21]. Sadore A, Gebrestsadik L and Hussen M. Compliance with Iron-Folate Supplement and Associated Factors among Antenatal Care Attendant Mothers In Misha District, South Ethiopia: Community Based Cross-Sectional Study. Journal of Environmental and Public Health.2015:10 (1155):1-7.

[22]. Rehan M, Mamood N and Mazhar S. Knowledge, Attitude and Practices Regarding Periconceptional Folic Acid Supplementation in a Tertiary Care Hospital. Ann.Pak.Inst.Med. Sci. 2015; 11(4):172-175.

[23]. Nasr H, Jalloul M, Sabbah M. and Adib S. Awareness and Intake of Folic Acid for the Prevention of Neural Tube Defects among Lebaness Women of Child Bearing Age. Matern Child Health J.2012; 16:258-265.

[24]. Gebreamalk B, Dadi A and Atnafu A. High Adherence to Iron/ Folic Acid Supplementation during Pregnancy Time among Antenatal and Postnatal Care Attendant Mothers in Governmental Health Centers in Akaki Kality Sub City, Addis Ababa, Ehiopia: Hierarchical Negative Binomial Poisson Regression. Plos One.2017; 12(1):1-11.

[25]. Anzaku A. Assessing Folic Acid Awareness and Its Usage for the Prevention of Neural Tube Defects Among Pregnant Women in Jos, Nigeria. J Basic Clin Report Sci.2013; 2:13-7.

[26]. Shoaib M, Choudry M, Tariqa, Siddiqa I, Khaliq M, Noordni M, Ahmed S and Iftikhar W. Folic Acid and Nural Tube Defects- Knowledge and Practices of Mothers From Pakistan. Journal of Surgery and Emergency Medicine. 2017; 1(5):1-5.

[27]. Shewasinad S and Negash S. Adherence and Associated Factors of Prenatal Iron Folic Acid Supplementation among Pregnant Women Who Attend Ante Natal Care In Health Facility at Mizan-Aman Town, Bench Maji Zone, Department of Medicine. Addias Ababa University, Ethiopia. J Preg Child Health. 2017; 4 1-21.

[28]. Lin Q, Yang L, Li F, Qin H, Lim Chan J, Deg T and Hu X. A village- Based Intervention: Promoting Folic Acid Use among Rural Chinese Women. MDPI. Nutrients. 2017; 9 (174): 2-9.

[29]. Holy M, Eideh A, Epuru S, Jamous D and Ashankyty I. Awareness of Folic Acid Intake among Women in the Child Bearing Age in Hail Region-Saudi Arabia. Scientific Research. University of Hail.2013; 4:49-55.

[30]. El-Mani S. Knowledge, Behavior and Practice Of Pregnant Women In Wollongong Regarding Folic Acid And Iodine Nutrition After The Introduction of A Mandatory Of The Degree Of Master Science Research. University of Wollongong. Faculty of Health and Behavioral Science.2013: 49-65.

[31]. Koken G, Derbebt A, Erof O, Saygin N, Ayik H and Karaca M. Awareness and Use Of Folic Acid Among Reproductive Age and Pregnant Women. J Turkish-German Gynecol Assoc.2013; 14:87-91.

[32]. Nosrat S, Sedehi M and Golalipour M. Knowledge and Practice of Urban Iranian Women towards Folic Acid Intake for Neural Tube Defect Prevention. J Pak Med Assoc.2012; 62 (8):785-789.

[33]. Alkaabi M, Alsenaid L and Mirghani H. Awareness and Knowledge of the Use and Benefits of Folic Acid Supplements in Women in the United Arab Emirates. College of Medicine and Health Sciences. United Arab Emirates University.2017:1-5.

[34]. Nisar Y, Alam A, Aurangzeb B and Dibley M. Perceptions of Antenatal Iron-Folic Acid Supplements In Urban and Rural Pakistan: A Qualitative Study. Pregnancy and Child Birth. Biomed Central (BMC) LTD. 2014.14: 344.

[35]. Taye B, Abeje G and Mekonen A. Factors Associated With Compliance Of Prenatal Iron Folate Supplementation Among Women In Mechg Distric, Western Amhara: A Cross-Sectional Study. Pan African Medical Journal. 2015; 20(43):1-5.