

Assessment of Knowledge and Attitudes Among Pregnant Women's Towards Folic Acid Intake During Pregnancy in a Sample of Women Attending Primary Health Care Centers in Babylon Province

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Abstract

Background: Folic acid (vitamin B9) is one of the important vitamins required for embryonic growth and development, as well as preventing the occurrence of congenital malformations, which are a major health concern in developing countries and around the world because they have a direct impact on the affected babies, their families, and the community. **Objectives:** To assess the knowledge and attitudes of pregnant women toward folic acid intake throughout pregnancy in a sample of women in Babylon Governorate and to assess the association of knowledge, attitude of folic acid with certain sociodemographic and obstetric characteristics. **Methods:** A cross-sectional interview-based study targeting a convenient sample of 265 pregnant women who attended antenatal care unit of five PHCCs in Babylon Governorate/Iraq during a period of three months (from April 1 to July 1, 2021). The respondents were interviewed with a pretested questionnaire, that includes data related to sociodemographic and obstetric history, seven questions related to pregnant's knowledge, and five questions related to pregnant attitudes toward the importance of folic acid intake during pregnancy. Data were analyzed by SPSS, version 26. **Results:** 265 pregnant women were enrolled in this study. The result found that the mean ($\pm$ standard deviation) age was 26.5 ($\pm$ 5.7) years where 58.1% (154) of women were in the age group of 20–29 years and two-third of participants were a resident in urban areas. In addition, 54.5% (144) of women had college and postgraduate education, housewives consisted 51% (134) of the sample, and 45 were employed; only 26 (9.8%) pregnant women were not hearing about folic acid intake during pregnancy. The major source of hearing was doctors. 44.8% (107) of participants had fair level of knowledge; knowledge score was significantly associated with age, residency, and occupation of pregnant women ($P \leq 0.05$); knowledge score had no significant association with educational level, parity, history of abortion and stillbirth, or having children with congenital anomalies. 75 (31.4%) mothers had negative attitude toward using folic acid during pregnancy. Pregnant attitude toward folic acid supplements had no association with sociodemographic and obstetrical history. There was a positive moderate linear correlation between the mother's knowledge and attitude ($r = 0.36$, $P < 0.001$). **Conclusions:** The study found that pregnant women had a fair and good knowledge about using folic acid during pregnancy. In addition, most pregnant women have a positive attitude.

Keywords: Attitudes, folic acid, knowledge

INTRODUCTION

Folic acid is a water-soluble form of vitamin B9. It is also known as folate in its natural form. A nutrient can be found in leafy greens, beans, liver, egg yolks, and citrus fruits.^[1] A coenzyme transports single carbon groups for nucleic acid and amino acid metabolism. Folic acid is required for DNA/RNA synthesis, amino acid conversion, red blood cell formation, and body cell formation and maintenance.

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Folic acid requirements rise during intervals of rapid growth and cell partitioning throughout life.^[2] Folic acid aids neural tube formation during early evolution. Low folic acid consumption during pregnancy will result in poor pregnancy outcomes.^[3] During pregnancy, a well-balanced diet rich in carbohydrates, vitamins, proteins, and minerals is essential.^[4]

folic acid is extremely important because it can help prevent major birth defects such as spina bifida and anencephaly.^[5] Every year, an estimated 300,000 births are affected by neural tube defects (NTDs), which are serious birth defects of the brain and spine that usually result in death or paralysis. These defects can be avoided by taking folic acid during the preconception period and the first trimester of pregnancy.^[6]

The Preventive Services Task Force and the Institute of Medicine at the Centers for Disease Control and Prevention in the United States recommend that all women of childbearing age take 400 µg of folic acid per day, in addition to eating folic acid-containing foods from a varied diet, to help prevent NTDs.^[7] However, because NTDs occur during days 22–28 of fetal development, before most women realize they are pregnant, beginning folic acid supplementation after the first month of pregnancy is considered too late to prevent NTDs. As a result, the US Public Health Service recommended in 1992 that all women who can conceive consume at least 400 µg of folic acid daily as a supplement.^[8] In many countries, folic acid supplementation is now officially recommended for women of childbearing age.^[9]

Maternal folate status is intricate with NTDs, which are common congenital malformation consequences from the failure of neural tube closure during embryogenesis. NTDs are multifactorial disorders with environmental and genetic predispositions. Maternal periconceptional folate intake is the most significant exposure connected with NTDs. It is linked to morbidity and the development of the neural tube, which affects both the brain and the spinal cord, fetal mortality, disability, maladjustment, and economic crisis. However, spina bifida and anencephaly are commonly documented birth defects.^[10]

MATERIALS AND METHODS

Study design

An observational cross-sectional study with analytic element.

Study setting

The study was carried out at five primary health care centers in the rural and urban areas in Babylon Governorate, between April 1 and July 1, 2021. Data collection was performed for two days per week, Sunday and Wednesday, 4h/day; each patient took about 10 min.

Study sampling

In Babylon Governorate, there are five health sectors including 45 primary health care centers. Five primary health care centers (Al Assatitha PHCC, Haleef Al-Quran PHCC, Shuhdaa Nader PHCC, Babylon Training PHCC, and Al Huda PHCC) were chosen randomly by lottery method. A consecutive sample during the time frame of data collection was adopted. The pregnant women who came to primary health care centers were asked to participate in this study. A sample size of 53 pregnant women from each health care center forming a total sample of 265 pregnant women was included in this study, and the reason for this sample size is the time frame.

Sample size determination

Fisher's formula was used to calculate sample size as follows:

$$n = Z^2 P (1 - P) / d^2$$

n = sample size

Z = 95% the value that corresponds for the 95% interval of confidence = 1.96

P = prevalence of folic acid intake in Korea^[11]

d = the degree of precision was at 0.005 at 95% confidence interval

$$n = (1.96)^2 (0.5) (1 - 0.5) / (0.005)^2 \\ = 250$$

So the desired sample size was 250 and approximated to 265 to be selected in this study.

Data collection questionnaire (appendix 1)

One tool was used to collect the required data, and this tool was a self-constructed questionnaire form prepared to collect information from the participants regarding selected variables. The data were collected by direct interview with participants, which included three sections:

- 1- Data related to sociodemographic and obstetrical history variables as follows:
 - Age (in years).
 - Residency: rural, urban.
 - Educational level: illiterate, read and write, primary education, intermediate, secondary, college, and postgraduate.
 - Occupation: housewife, employed, student.
 - Parity: primigravida multiparous more than two, grand multipara more than five.
 - Previous miscarriage or stillbirth: absent, present.
 - Have baby with congenital anomalies: yes, no.
- 2- Data related to knowledge of pregnant women to folic acid, which included seven questions, in form of yes, no, and

don't know. Score 1 was given to the right answer, and score 0 was given to wrong answer and don't know. The total scores were categorized as follows:

Scores 0–3 indicate poor score.

Scores 4 and 5 indicate fair score.

Scores 6 and 7 indicate very good score.

That >50% (0–3 knowledge score) was a poor score, 50%–75% (4–5 knowledge score) was a fair score, and that with more than 75% (6–7 knowledge) was a very good score.

3- Data related to attitude of pregnant women to folic acid, which included five questions, in form of agree and disagree. Score 1 was given to right attitude, and score 0 was given to wrong attitude. The total scores were categorized as follows:

Scores 0–2 indicate negative attitude.

Scores 3–5 indicate positive attitude.

That >50% (0–2 attitude score) was a negative score, and that ≥50% (3–5 attitude score) was a positive score.^[12,13]

Ethical considerations

- 1- The ethical committee at the College of Medicine, University of Babylon approved the study protocol under reference number BMS 0228 016 on 20 March 2021.
- 2- The Babylon Health Directorate provided official approval.
- 3- Women's verbal agreements were gained prior to interviewing after the aims of the study were presented to them.
- 4- The data were kept private, and the names of the participants were replaced with identification codes. Unauthorized individuals were not given access to the data.

Pilot study

A pilot study was carried out on a sample consisting of 15 pregnant women selected randomly and interviewed. Those patients were not included in the current study. The purpose of the pilot study was to assess the feasibility of questionnaire and the time required for each interview and to find out if there would be any difficulty/obstacle to conduct the study, so that possible change and correction to the questionnaire were made accordingly. The interview lasted 10–15 minutes. At the end of the interview, some tips were given to pregnant women about the importance of folic acid.

Statistical analysis

Data of the studied sample were entered and analyzed by using SPSS, version 26. Descriptive statistics were presented as frequencies, proportions (%), and means and standard deviation (SD). Analytic statistics such as Chi-square test was used to estimate the association between two categorical variables, and correlation test was used to find the correlation between two continuous variables,

where correlation coefficient between 0.2 and 0.29 meant weak correlation, 0.3 and 0.39 meant moderate correlation, 0.4 and 0.69 meant strong correlation, and ≥0.7 meant very strong correlation. $P \leq 0.05$ was considered to be statistically significant.

Limitations of the study

- Small sample size, due to time frame limitation and the coronavirus disease 2019 (COVID-19) pandemic.
- The other limitation is that this study was conducted at primary health care centers; hence, the findings do not represent the whole population.
- Some difficulties in obtaining accurate answers from pregnant women about some variables.

RESULTS

A sample of 265 Iraqi pregnant women was engaged in this study. The mean ($\pm$ SD) age was 26.5 ($\pm$ 5.7) years (ranged between 16 and 42 years), where 58.1% (154) of women were at the age group of 20–29 years and two-third of participants were resident in urban areas. In addition, 54.5% (144) of women had college and postgraduate education, housewives consisted 51% (134) of the sample, and 45 were employed [Table 1].

Obstetrical and gynecological history of pregnant women shows that only 18.1% (48) of pregnant women were prime gravida, 22.3% (59) of pregnant women recorded a history of abortion and/or stillbirth, and in addition, 7.2% (19) of pregnant women had baby with congenital anomalies [Table 2].

From the total sample (265), only 26 (9.8%) pregnant women were not hearing about folic acid intake during pregnancy and other 239 (90.2%) heard about folic acid; the source of hearing was doctors (61%) [Figure 1].

Table 1: Demographic and socioeconomic description of the studied sample

Variables		Number	Percentage
Age (years)	<20	36	13.6
	20–29	154	58.1
	30–39	61	23
	40–49	14	5.3
Place	Urban	174	66
	Rural	91	34
Educational level	Illiterate	10	4
	Read and write	59	22
	Primary and secondary	52	19.5
	College	108	41
Occupation	Postgraduate	36	13.5
	Housewife	134	51
	Employee	119	45
	Student	12	4
Total		265	100

Pregnant knowledge

Pregnant women answered the simple statements more likely than the most compound and technical questions; they knew more about balanced diet, folic acid intake during pregnancy, and occurrence of birth defects during the first weeks of pregnancy; early intervention may decrease congenital anomalies, the preventive act of folic acid. They knew less about the recent recommendation of folic acid before pregnancy and folic acid nature [Figure 2].

Knowledge score

Findings indicated that the overall knowledge mean score ($\pm$ SD) was 4.66 ($\pm$ 1.7); the rating of score reveals that 47 (19.7%) pregnant women had poor knowledge about using folic acid during pregnancy, 44.8% (107) of participants had fair level of knowledge, and 35.6% (85) of them reported good knowledge [Figure 3].

Knowledge score was significantly associated with age, residency, and occupation of pregnant women ($P \leq 0.05$); knowledge score had no significant association with

educational level, parity, history of abortion and stillbirth, or having children with congenital anomalies [Table 3].

Pregnant attitude

Most women agree that it is possible to avoid congenital anomaly by taking folic acid during pregnancy. In addition, mothers believe that folic acid is important to protect from anemia, other shown in Figure 4.

Attitude score

Findings indicated that the overall attitude mean score ($\pm$ SD) was 2.7 ($\pm$ 1); the rating of score reveals that 75 (31.4%) mothers have a negative attitude toward using folic acid during pregnancy and 164 (68.6%) of them reported a positive level [Figure 5].

The crosstab table shows that mothers' positive and negative attitudes toward folic acid supplements were higher in those between 20 and 29 years with no significant association ($P = 0.097$). The Chi-square test indicated that pregnant attitude toward folic acid supplements had no association with resident, level of education, occupation, parity, history of abortion and stillbirth, or having children with congenital anomalies [Table 4].

There was a positive moderate linear correlation between mother's knowledge and attitude ($r = 0.36$, $P < 0.001$); when mother's knowledge increases, the attitude toward folic acid importance also increases [Figure 6].

DISCUSSION

Folic acid is one of the vital nutrients that is mandatory for improving pregnancy outcomes.^[4]

Starting with the demographical description of the study sample, it demonstrates that the mean age of participants was 26.5 ± 5.7 years (ranged 16–42 years).

Variables		Number	Percentage
Parity	Prim gravida	48	18.1
	Para one	95	35.8
	Para two	60	22.6
	$\geq$ Para three, four, five	62	23.4
Previous miscarriage and or stillbirth	Absent	206	77.7
	Present	59	22.3
Have baby with congenital anomalies	No	246	92.8
	Yes	19	7.2
Total		265	100

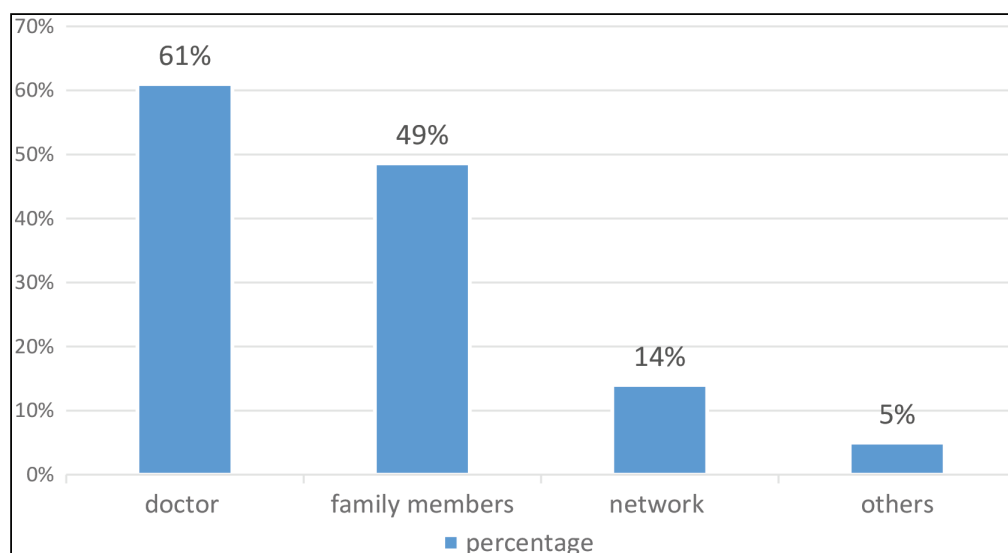


Figure 1: Source of hearing about folic acid intake during pregnancy (others: friends, radio/ TV, and mass media)

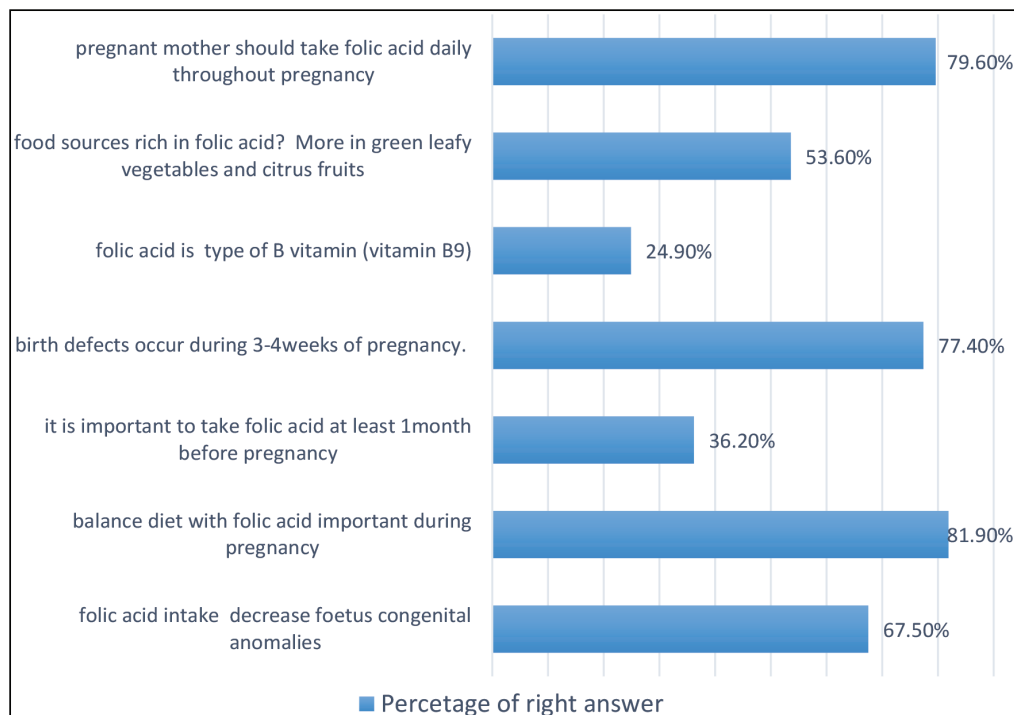


Figure 2 : Percentage of right answer about knowledge-related seven questions

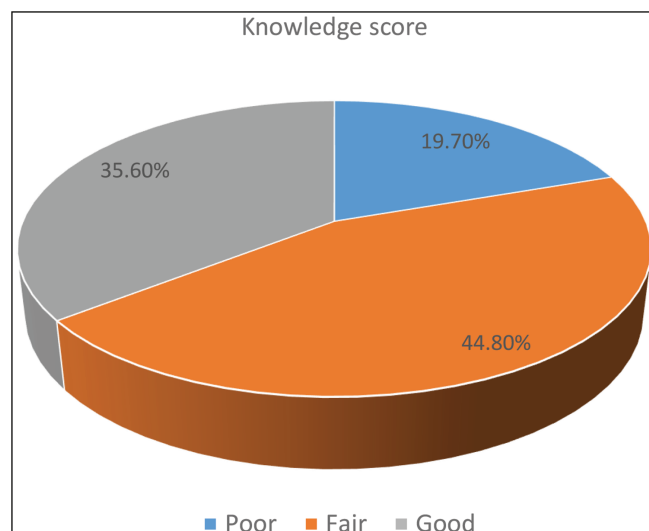


Figure 3: Distribution of knowledge score

This result agreed with both^[14] in Pakistan and^[15] in Cairo, Egypt, who discovered that the mean age of their study participants was 29.55 ± 8.38 and 26.84 ± 6.14 years; also, these results disagreed with^[16] that in Iraq, who found that the mean age of their study participants was 19.85 ± 6.373 years; this difference may relate to majority of our sample had college and post-graduate of educational level and urban residence in reverse to study done by Ali. Correspondingly, moreover, as concerns the educational level of the contestants, about 54.5% of pregnant women have college and postgraduate education; housewives consisted 51% of the sample.

This result agreed with a study done in Iraq by Ali and Lefta^[16] but disagreed with Eswi (2014), who established that about one-third of her contestants were established secondary school learning and disagreed with a study done in Turkey by Köken, *et al.*,^[17] who found that 32% graduated from primary school and 72% of the sample graduated from secondary school.

According to the obstetrical history of pregnant women, it was shown that only 18.1% (48) of pregnant women were prime gravida, 22.3% (59) of pregnant women recorded history of abortion and/or stillbirth, and in addition, 7.2% (19) of pregnant women had a baby with congenital anomalies. These results are very similar to a study done by Al-Hossani, *et al.* (2010) in Abu Dhabi, United Arab Emirates, nearly one-third of the interviewed women were primigravida followed by 23.8% of those who had two parity and more. And these results were not similar to the study done by Eswi, *et al.*^[15] in Cairo, Egypt, who revealed that more than half of the pregnant women got pregnant more than two times but similar to that (11%) had previous child with congenital anomalies.

Overall, 90.2% of the interviewed pregnant women in the present study had heard about folic acid, which is analogous to the consistent rate detected in a Japanese study in 2018 (91.2%).^[18] In Abu Dhabi, the study done by Al-Hossani in 2010 reported that 79.1% of pregnant women in the reproductive age group had heard about folate.^[19]

Concerning the sources of knowledge, the most common source of hearing (61%) was doctor; these findings are

Table 3: Association knowledge score with sociodemographic characteristics and obstetric history

Sociodemographic characteristics and parity		Knowledge score			P value
		Poor (n = 47)	Fair (n = 107)	Good (n = 85)	
Age groups	<20	13 (27.7%)	13 (12.1%)	7 (8.2%)	0.02*
	20–29	21 (44.7%)	57 (53.3%)	59 (69.4%)	
	30–39	10 (21.3%)	30 (28%)	15 (17.6%)	
	40–49	3 (6.4%)	7 (6.5%)	4 (4.7%)	
Place	Urban	20 (42.6%)	48 (44.9%)	20 (23.5%)	0.006*
	Rural	27 (57.4%)	59 (55.1%)	65 (76.5%)	
Educational level	Illiterate and read and write	14 (29.8%)	34 (31.8%)	17 (20%)	0.18*
	Primary and secondary	14 (29.8%)	12 (11.2%)	16 (18.8%)	
	College	14 (29.7%)	18 (16.8%)	17 (20%)	
	Postgraduate	5 (10.6%)	43 (40.2%)	35 (41.2%)	
Job	Employee and student	14 (29.8%)	42 (39.3%)	59 (69.4%)	<0.001*
	Housewife	33 (70.2%)	65 (60.7%)	26 (30.6%)	
Parity	Primi	10 (21.3%)	16 (15%)	14 (16.4%)	0.25*
	Para one	17 (36.2%)	36 (33.6%)	32 (37.6%)	
	Para two	12 (25.5%)	19 (17.8%)	22 (25.9%)	
	≥Para three, four, five	8 (17%)	36 (33.6%)	17 (20%)	
Previous miscarriage and or stillbirth	Absent	37 (78.7%)	83 (77.6%)	68 (80%)	0.92*
	Present	10 (21.3%)	24 (22.4%)	17 (20%)	
Have baby with congenital anomalies	No	42 (89.4%)	100 (93.5%)	79 (92.9%)	0.661*
	Yes	5 (10.6%)	7 (6.5%)	6 (7.1%)	

*Chi-square test, significant ≤ 0.05 .

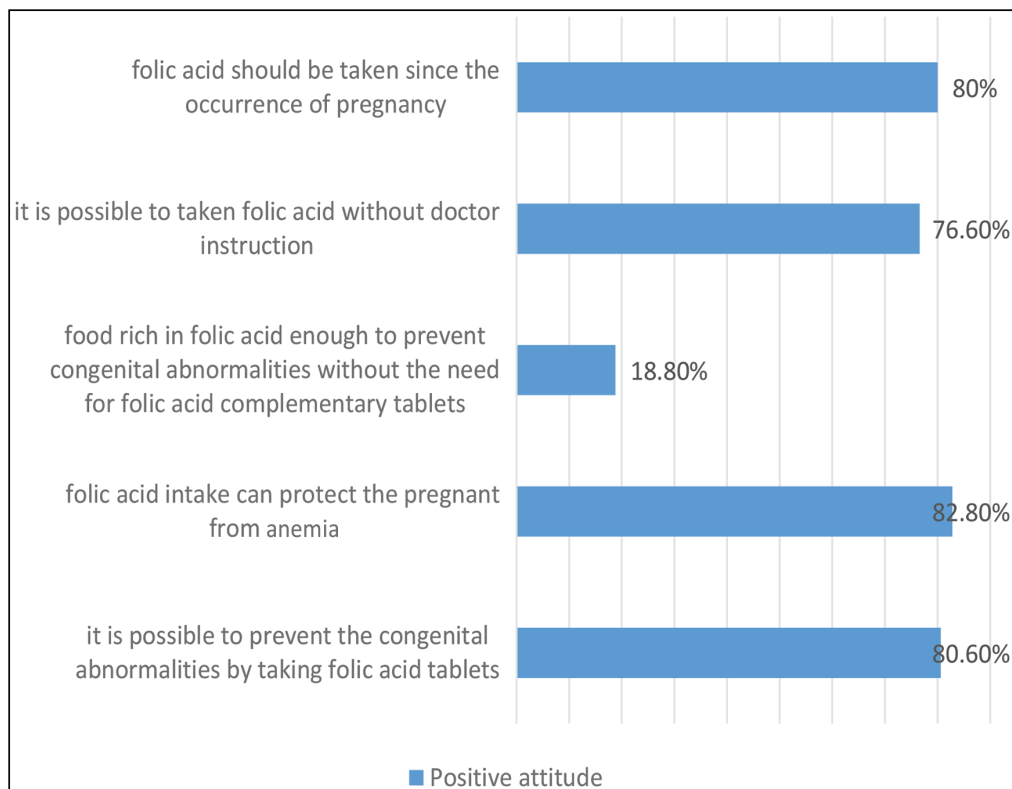


Figure 4: Percentage of positive attitude related to five questions of attitude score

consistent with Nosrat, *et al.* (2012) in Iran, who discovered that the most commonly cited sources of information were obstetrician,^[20] similar to a study conducted by Eswi, *et al.* in Cairo, Egypt.^[15]

These findings differ from those of a study conducted in Poland in 2021, where 53% of those polled said they learned about folic acid from the internet,^[21] and a 2018 study in Japan found that the internet was the most

common source of folic acid information.^[18] And these results do not agree with the result of AL-Sharwany, 2017.^[22] Folic acid information sources indicated that 56

(48%) of them obtain information from other sources for expecting TV, scientific journals...etc. This could be due to cultural differences, as well as differences in the sample's level of education.

According to pregnant women knowledge about folic acid and its importance, results of the current study found that the majority of the study sample (77.40%) knew that taking folic acid will decrease fetus congenital anomaly.

Related to a study in China, where it was established that 88.47% of women of childbearing age knew that folic acid could prevent birth defects,^[23] also Zhan, *et al.* in Gaozhi, Beijing, found that 84.91% of women knew that folic acid could prevent birth defects.^[24] Analogous to a study by Lawal and Adeleye (2014) in Nigeria, in which 30% of women accepted that folic acid can avoid birth defects,^[25] also this product is lower than levels of awareness conveyed by Al-Hakeem (2012) in Saudi Arabia.^[8]

In this study, 24.90% of pregnant women knew that folic acid is a type of B vitamin, which is similar to the result of a study done in Saudi Arabia, done by Albader, *et al.* in 2019, their results found that 36.7% of women knew that folic acid is a vitamin.^[26] In addition, similar to study in Poland, 14.0% of them knew that it is a type B vitamin,^[21] also similar to Alblowi and Alomayri (2018), it shows that 31.7% of the participants knew that folic acid is a B vitamin.^[27]

In the present study, a low percentage of the women (36.20%) knew that it is important to take folic acid at least one month before pregnancy, though this is lesser than

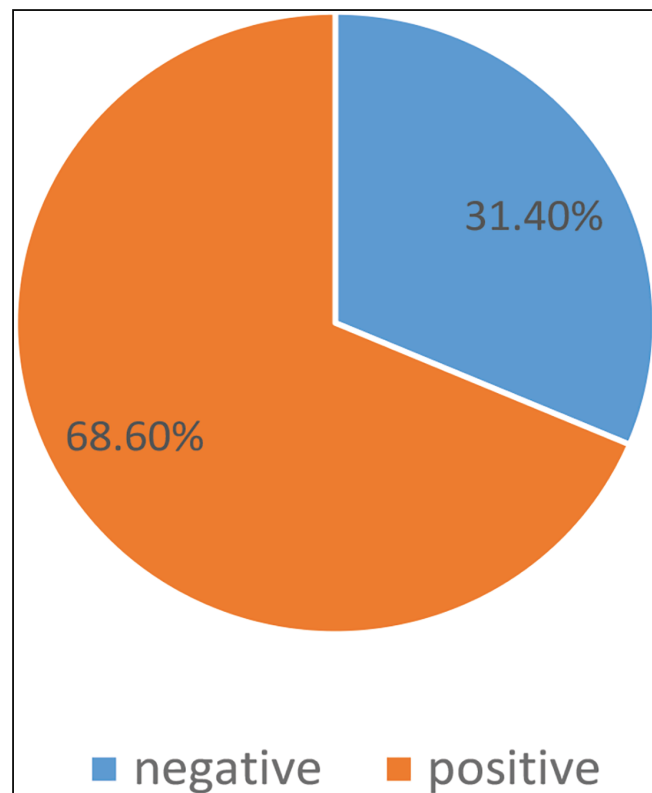


Figure 5: Distribution of attitude score

Table 4: Association of attitude score with sociodemographic characteristics and obstetric and gynecological history

Sociodemographic characteristics and parity		Attitude score		P value
		Negative (n = 75)	Positive (n = 164)	
Age groups	<20	15 (20%)	18 (11%)	0.097*
	20–29	35 (46.7%)	102 (62.2%)	
	30–39	19 (25.3%)	36 (22%)	
	40–49	6 (8%)	8 (4.9%)	
Place	Urban	28 (37.3%)	60 (36.6%)	0.91*
	Rural	47 (62.7%)	104 (63.4%)	
Educational level	Illiterate and read and write	14 (18.7%)	51 (31.1%)	0.123*
	Primary and secondary	16 (21.3%)	33 (20.1%)	
	College	36 (48%)	56 (34.1%)	
	Postgraduate	9 (12%)	24 (14.6%)	
Occupation	Employee and student	33 (44%)	82 (50%)	0.38*
	Housewife	42 (56%)	82 (50%)	
Parity	Primi	14 (18.7%)	26 (15.9%)	0.61*
	Para one	30 (40%)	55 (33.5%)	
	Para two	14 (18.7%)	39 (23.8%)	
	≥Para three, four, five	17 (22.7%)	44 (26.8%)	
Previous miscarriage and or stillbirth	Absent	57 (76%)	131 (79.9%)	0.49*
	Present	18 (24%)	33 (20.1%)	
Have baby with congenital anomalies	No	71 (94.7%)	150 (91.5%)	0.38*
	Yes	4 (5.3%)	14 (8.5%)	

*Chi-square test, significant ≤ 0.05 .

the 80.5% reported in Italy by Lauria, *et al.*^[28] analogous to the 23.6% and 29.2% reported by Lawal and Adeleye (2014).^[25]

In the current study, 53.60% of pregnant women knew that food sources of folic acid are more in green leafy vegetables and citrus fruits. This was agreed with a study done in Poland in 2021 by Zadarko-Domaradzka, *et al.* (2021)^[21] and with the result of AL-Sharwany (2017). It was found that 60.4% knew that it occurs in green leafy vegetables and fruits.^[22]

The present study shows that 79.60% of pregnant women should take folic acid daily throughout pregnancy. These results agree with the result done in Poland, 65.3% knew that pregnant mothers should take folic acid daily throughout pregnancy.

In the current study, 67.50% of pregnant women knew that balanced diet with folic acid was important during pregnancy. These results agree with the study done by Al-Hossani, *et al.* (2010), which showed 64% of their sample know that.^[19]

In present study, the finding revealed that 44.80% of the study participants had a fair level of knowledge and (35.60%) had good knowledge. A higher percentage

with a fair and good level of knowledge were those with college and postgraduate level of education. This result is consistent with further studies in developing countries, such as the one conducted by Rehan, *et al.* (2015), who investigated female folic acid awareness in Pakistan. Also, in comparison with a study done in Iraq by Ali and Lefta (2017), the assessment of female knowledge was fair. Also, in the study done by Al-Hossani, *et al.* (2010) in Abu Dhabi, United Arab Emirates, their results show 46.6% reported accurate/partially accurate knowledge. In an alternative study done by Riazi, *et al.* (2012), it institutes that females in his study had an adequate close of knowledge about folic acid. This may be related to majority of samples hearing importance by doctors.^[29]

Concerning the relationship between sociodemographic characteristics and obstetric and gynecological history of participants and their knowledge regarding folic acid, results of the present study revealed that knowledge score was significantly associated with age, 69.4% of pregnant women aged between 20 and 29 years had good knowledge, residency (76.5%), lives in urban area, and occupation, 69.4% have good knowledge and were employed. ($P \leq 0.05$). Knowledge score had no significant association with educational level, parity, history of miscarriage and

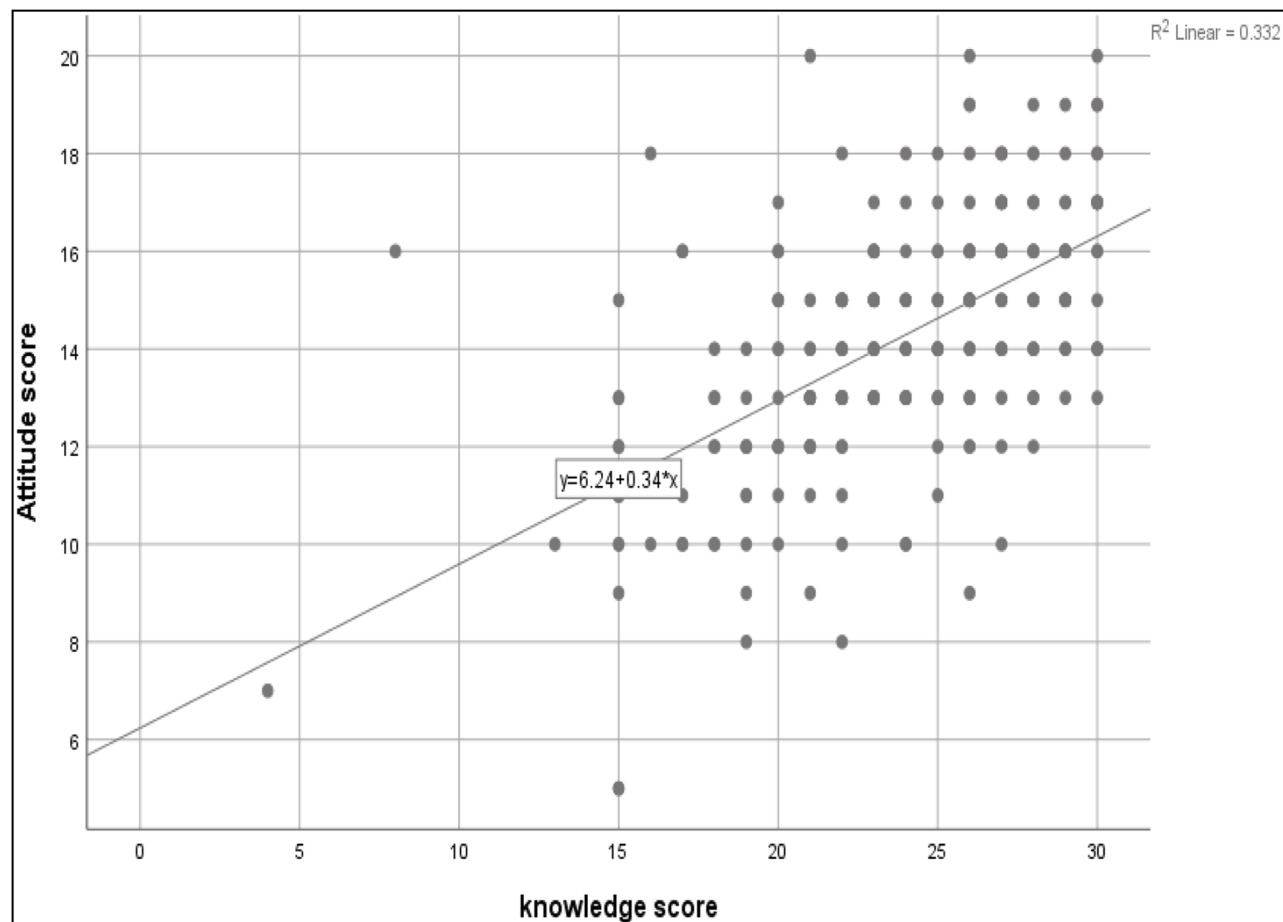


Figure 6: Scatterplot diagram for relationship between knowledge and attitude

stillbirth, or having children with congenital anomalies. These results were similar to a study done in Nigeria in 2017, which revealed there is significant association between age and knowledge of folic acid ($P = 0.046$). In addition, regarding occupation (more knowledge in employment status).^[30]

These results disagreed with a study done in Taiwan in 2010 by Jou, *et al.* (2010), who found that none of the demographic factors exhibited a significant relationship with the knowledge of folic acid.^[31]

In present study, there is no significant association between the level of education and knowledge. This result disagrees with the study done in Nigeria in 2017 (Adebo, *et al.*, 2017) and the study done by Al-Hakeem^[32] among Saudi Arabia women, and Hisam, *et al.* (2014) found that the level of education was closely associated with knowledge and importance of folic acid. Moreover, the current study finding is similar with that of Nosrat, *et al.* (2012); in their study, no relation was found between educational level and the awareness about folic acid.^[8,20,30,33]

Concerning the attitudes toward folic acid throughout pregnancy, the present study revealed that 68.60% of mothers have positive attitudes toward using folic acid during pregnancy. These consequences established with Hisam, *et al.* (2014) as he institutes that 40.25% of his topics had positive attitudes toward folic acid; however, the present results disagreed with Al-Akhfash, *et al.* (2013) among the Saudi residents by 4.4%.^[34] Furthermore, According to Bener, *et al.* (2006), half of Qatari women had negative attitudes. According to Wongkham, *et al.* (2016), 56.51% of pregnant women had favorable attitudes toward folic acid.^[35]

In this study, 80% of women had positive attitude that folic acid should be taken since the occurrence of pregnancy. This finding agreed with a study done by Maher and Keriakos in 2014 in the United Kingdom, who reported that nearly 90% of women agreed to take folic acid from the occurrence of pregnancy. In addition, this result agreed with a study done in Italy by Maher and Keriakos in 2014, which found a higher percentage of women (54.9%) agreed to use folic acid from the diagnosis of pregnancy (Maher and Keriakos, 2014).^[36]

In the current study, 82.80% had a positive attitude for the item folic acid intake can protect the pregnant from folic acid anemia. These results agree with the result by Olewi, *et al.* (2021)^[37] in Iraq (60.0%), and the result of AL-Sharwany (2017)^[22] showed that 68.5% of pregnant women agree that folic acid can protect from folic acid anemia.

The presenting study showed that 80.60% of pregnant women had a positive attitude toward that it is possible to prevent the congenital abnormalities by taking folic acid tablets. This result is similar to the result done in

Cairo, Egypt, in 2014 by Eswi, *et al.*, which found that 88.4% agreed that folic acid could prevent fetal congenital anomalies.^[15]

Considering the association between sociodemographic data and pregnant women's attitudes, the present study illustrates that pregnant women's positive and negative attitudes toward folic acid supplements at age groups between 20 and 29 years were higher than in those at age ≤ 20 years with no significant association ($P = 0.097$). The Chi-square test indicated that pregnant attitude toward folic acid supplements had no association with resident, level of education, occupation, parity, history of miscarriage and stillbirth, or having children with congenital anomalies has no significant association with mothers' attitude. These were similar to the results of Kamau, *et al.* in Kenya.^[38]

As regards the association between pregnant women's knowledge and attitudes, the current study exposed that there was a positive moderate linear correlation between mother's knowledge and attitude ($r = 0.36$, $P < 0.001$); when mother's knowledge increases, the attitude toward folic acid importance also increased. This is similar to the result of a study done by Bener, *et al.* (2006) that found that the more knowledge and education the mother had, the more positive attitudes the mother displayed. Similar to the result by Tenaw, *et al.* (2018) in Ethiopia, who found a positive association between maternal attitude and knowledge.^[39] Since most women trust their health worker, investing in providing women with adequate information will almost certainly result in a positive attitude.^[40]

CONCLUSIONS

- Majority (90.2%) of pregnant women had heard about folic acid, and the major source of knowledge was from doctors.
- Pregnants's knowledge about folic acid intake was fair and had good knowledge about using folic acid during pregnancy.
- Knowledge score was significantly associated with age, residency, and occupation of pregnant women ($P \leq 0.05$) and had no association with educational level, parity, history of miscarriage and stillbirth, or having children with congenital anomalies.
- Most of the pregnant women had a positive attitude.
- Pregnant attitude toward folic acid supplements had no association with resident, level of education, occupation, parity, history of miscarriage and stillbirth, or having children with congenital anomalies.
- There was a positive moderate linear correlation between pregnant's knowledge and attitude.

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Conflicts of interest

There are no conflicts of interest.

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