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# Factors Associated with the use of Folic Acid and Iron Supplementation in the Periconceptional and Antenatal Periods of Pregnant Women: A Cross-Sectional Study

## *Gebelerin Prekonsepsiyonel ve Antenetal Dönemlerde Folik Asit ve Demir Preparatı Kullanım Durumları ile İlişkili Faktörler: Kesitsel Bir Çalışma*

Deniz Akyıldız, Hilal Alkan

**ABSTRACT**

***Objective**: The aim of this study is to examine the factors associated with the use of folic acid and iron preparations in the preconceptional and antenatal periods of pregnant women.*
***Methods**: The study was carried out cross-sectionally with 410 pregnant women determined by the nonprobability sampling method in Gaziantep city in Turkiye. Research data were collected with a questionnaire.*
***Results**: In the study, the rate of using folic acid in pregnant women was 29% in the preconceptional period, 92.9% in the antenatal period, and 28% in both periods; The rate of using iron preparation in the antenatal period was 71.5% and using folic acid and iron preparation together was 67.1%. The factors positively affecting the folic acid and iron usage rates of pregnant women were education level, working at a job, income level, being primiparous and planned pregnancy. In addition, the fact that the fetus was male and the fetus was of the desired gender were other factors that positively affected the use of folic acid and iron in the antenatal period.*
***Conclusion**: The results of the study showed that maternal, socio-economic, and fetal gender affect the rates of starting and continuing to use folic acid and iron during pregnancy.*

***Keywords:** Folic acid, Iron, Supplement, Pregnant women, Midwife care*

**ÖZ**

***Amaç**: Bu araştırmanın amacı gebelerin prekonsepsiyonel dönem ve antenetal dönemlerde folik asit ve demir preparatı kullanım durumları ile ilişkili faktörleri incelemektir.*
***Yöntem**: Çalışma kesitsel olarak Türkiye'de Gaziantep ilinde olasılıksız örnekleme yöntemi ile belirlenen 410 gebe ile yürütülmüştür. Araştırma anket formu ile toplanmıştır.*
***Bulgular**: Çalışmada gebelerin folik asit kullanma oranları prekonsepsiyonel dönemde %29, antenetal dönemde %92.9 ve her iki dönemde de kullanma %28; antenetal dönemde demir preparatı kullanma oranı %71.5 ve folik asit ve demir preparatını birlikte kullanma %67.1 idi. Gebelerin folik asit ve demir kullanma oranlarını pozitif olarak etkileyen faktörler eğitim düzeyi, bir işte çalışma, gelir düzeyi, primipar olma ve planlı gebelik idi. Ayrıca fetüsün erkek olması ve fetüsün istenilen cinsiyette olması antenetal dönemde folik asit ve demir kullanımını pozitif olarak etkileyen diğer faktörlerdi.*
***Sonuç**: Çalışma sonuçları gebelerin folik asit ve demir kullanmaya başlama ve gebelikte devam etme oranlarını maternal, sosyo-ekonomik ve fetüs cinsiyetinin etkilediğini göstermiştir.*

***Anahtar kelimeler:** Demir, Ebelik bakımı, Folik asit, Gebe, Takviye*

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## INTRODUCTION

The nutritional requirements for the growth and development of the fetus during pregnancy are provided by the mother. The general health status and nutrition of the mother directly affect the health of the fetus [1]. Pregnancy causes physiological changes that increase the need for essential nutrients in women [2]. Accordingly, the need for folic acid (FA) and iron increases during pregnancy [3]. Pregnant women experience increased micronutrient demand for iron, particularly for fetal growth and metabolism, which cannot be easily met by diet alone due to inadequate intake and low absorption of iron [4]. In addition, the need for folic acid (FA) increases during pregnancy, and FA is necessary for fetal growth, expansion of the uterus, increase in maternal red blood cell volume, and development of the placenta [5].

The prevalence of FA deficiency in pregnancy ranges from 1% to 50% and is reported to be higher in economically poor regions of the world [6,7]. It is known that FA deficiency in pregnant women causes preeclampsia, preterm labor, abortion risk, fetal growth failure, low birth weight, small gestational age, neural tube defect in the fetus, fetal malformation, maternal type 2 diabetes, maternal obesity, placental calcification, and ablatio placenta [8-11].Since it is not possible to meet the increased FA need during pregnancy with nutrients, FA supplementation is recommended in preconceptional and antenatal periods in pregnant women [1]. Similarly, maternal iron deficiency leads to serious complications such as bleeding, preterm labor, premature rupture of membranes, decreased working capacity, maternal death, small gestational age in newborns, low birth weight, poor cognitive development, stillbirth, cardiovascular disease, and iron anemia in the newborn [12,13]. In 2019, global anemia prevalence was 36.5% in pregnant women and among pregnant women, iron deficiency anaemia is also associated with adverse reproductive outcomes [14]. Due to hemodilution, especially in the second and third trimesters, the need for iron in pregnant women is higher than the amount taken in the diet, and it is recommended to be taken as a supplement other than dietary intake [15,16]. Maternal anemias can be evaluated in two groups as acquired and hereditary. Acquired anemias include anemia of deficiency (iron, FA, and vitamin B12), anemia due to bleeding, anemia of chronic disease, acquired haemolytic anemia, and aplastic anemia [17]. The prevalence of anemia in pregnant women was reported as 38% (32.4 million) in the "2025 Global Anemia Prevalence" report of the World Health Organization [18]. In studies conducted in Turkiye, the prevalence of anemia in pregnancy varies between 13.1% and 50.3% [19,20]. Anemia in pregnancy is associated with an increased risk of maternal illness and death, and fetal growth retardation, low birth weight, preterm birth, and an increased risk of perinatal mortality and is responsible for 20-40% of maternal deaths [21,22].

One of the most important interventions to prevent FA and iron deficiency during pregnancy is FA and iron supplementation [23]. The World Health Organization (WHO) recommends that all pregnant women take FA and iron supplements, starting in the preconception period and continuing throughout pregnancy [24]. In accordance with this recommendation, Turkiye has created an Iron Support Program by the Ministry of Health. Even if there is no clinical anemia in pregnant women, considering the daily iron requirement, 40-60 mg of elemental iron daily for six months starting from the second trimester and 400 mcg/day of folic acid supplementation in addition to the diet starting at least 3 months before pregnancy, and it is recommended that this support be continued during the first trimester of pregnancy [25].

Although there is a national program in our country, it is seen that FA and iron supplements are low in pregnancy. In addition, studies examining the initiation of FA in the preconception period are limited [26,27]. However, taking supplements regularly does not show a change, which is affected by socio-demographic and health factors [28]. The aim of this study is to examine the factors associated with the use of FA and iron preparations in the preconception and antenatal periods of pregnant women. The results of this study will contribute to the knowledge about the status of FA and iron supplementation in the preconception and antenatal periods and the affecting factors. In this way, recognizing regional characteristics will contribute to the planning of health services, delivery of services, and regional development. For this purpose, answers to the following questions will be sought; (1) What is the rate of use of FA in the preconception period of pregnant women? (2) What is the rate of FA use in pregnant women in the antenatal period? (3) What is the rate of FA use in pregnant women in both preconception and antenatal periods? What is the rate of iron supplement use in the antenatal period of pregnant women? (4) What is the rate of use of FA and iron supplements in the antenatal period of

pregnant women? (5) What are the factors affecting the use of FA in the preconception period and in both the preconception and antenatal periods? (6) What are the factors affecting the use of FA in the preconception period and in both the preconception and antenatal periods? (7) What are the factors affecting the use of iron supplementation in the antenatal period of pregnant women? and (8) What are the factors affecting the use of FA and iron supplements in the antenatal period of pregnant women?

## MATERIALS AND METHODS

### Study design and participants

This study was carried out analytically and cross-sectionally in two family health centers located in Gaziantep city center between January 1, 2022, and March 1, 2022. Gaziantep is a large province located in the Southeastern Anatolia region of Turkiye. The sample of study consisted of 448 pregnant women selected by nonprobability sampling. The minimum number of pregnant women to be sampled was calculated using the rate of using FA in the antenatal period (66%) in a previous study in our country [29]. At the time the sample size was calculated, the number of pregnant women registered in the two family health centers where the study would be conducted was 400. Based on these data, the minimum number of individuals to be sampled was calculated based on N=448, p=0.66, q=0.34, and t=1.96 (α=0.05) values and found to be 306. A total of 410 pregnant women participated in the study.

Inclusion criteria of the study; it was determined as being over the age of 18, being able to speak and understand Turkish, being literate, not having a mental problem that may cause communication problems, residing in Gaziantep, and agreeing to participate in the research. Pregnant women who wanted to leave the study and did not answer the survey questions were excluded from the study.

### Data collection

In the collection of research data, a questionnaire consisting of 55 questions, which was prepared by the researchers by scanning the literature, was used [26,27]. In the questionnaire, the socio-demographic and obstetric characteristics of the pregnant, the information about the folic acid and iron preparation in the preconception period (3 months before pregnancy) and the antenatal period, and whether they used it (yes or no) were questioned. The data were collected by a researcher by face-to-face interview method.

### Description of variables

The dependent variables of the study were the use of FA in the preconception period (yes/no), the antenatal period (yes/no), and both the preconception and antenatal periods (yes/no), as well as the use of iron preparation in the antenatal period (yes/no) and iron preparation and FA are the cases of using together (yes/no). The independent variables are socio-demographic and obstetric characteristics of the pregnant woman and some features of the fetus.

### Data analysis

The data were analyzed on SPSS (Statistical Package for Social Sciences) 22.0 software. Descriptive statistical methods such as frequency and percentage of the Kolmogorov–Smirnov distribution test for normal distribution were employed during the data analysis. A chi-square test and Fisher's exact test were used to compare dependent and independent variables. According to the chi-square results, the independent variables that were significantly correlated with the dependent were used to estimate the crude odds ratios (ORs) with 95% confidence intervals in the multiple logistic regression model. The statistical results were considered significant at the level of $p<0.05$.

### Ethical considerations

The study was approved by the ethics committees of Gaziantep University (Protocol no: 2021/378). Permission was obtained from Gaziantep Provincial Health Directorate for the research. Explanation about the study was given and written informed consent was obtained from all participants. No fees were paid to the women for their participation in the study.

## RESULTS

During the conduct of this study, a total of 448 pregnant women registered in family health centers were evaluated in terms of eligibility for the study. 16 of these pregnant women were not included in the study because they could not speak or understand Turkish, 5 had miscarriages and 17 did not accept to participate in the study. As a result, the study was completed with 410 pregnant women (Figure 1).

It was determined that 29% of the pregnant women used FA in the preconceptional period,

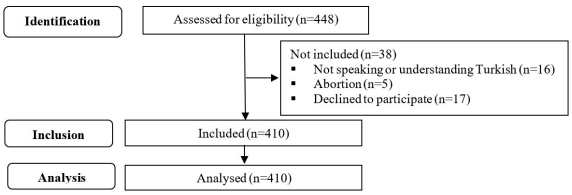


**Figure 1. Diagram of the research process**

92.9% in the antenatal period, and 28% in both preconceptional and antenatal periods. In addition, it was observed that 71.5% of the pregnant women used iron preparations and 67.1% used FA and iron preparations together in the antenatal period. The distribution of socio-demographic characteristics of pregnant women are summarized in Table 1. It was determined that the rates of using FA in the preconceptional period and continuing in the antenatal period were higher in pregnant women who have a high education level and that of their spouses, work in a job that brings income, have a high-income level, have a planned pregnancy and are primiparous (Table 1).

In the multiple regression analysis with all presented variables included in the model (Table 2), it was determined that having high income (OR = 0.91, 0.61-1.35), primiparous (OR = 0.65, 0.40-1.05), having higher education (OR = 0.90, 0.66-1.23), working in an income-earning job (OR = 1.84, 1.11-3.07), and planned pregnancy (OR = 1.96, 1.06-6.29) increased the rate of using FA supplementation in the preconceptional period. Similarly, those with higher education (OR = 0.90, 0.66-1.23), employed (OR = 1.88, 1.12-3.14), high-income (OR = 1.01, 0.68-1.50), primiparous (OR = 0.66, 0.41-1.07) and planned pregnancy (OR = 1.19, 0.18-1.02), the rate of starting FA use in the preconceptional period and continuing in the antenatal period was higher.

In the chi-square analysis, it was determined that the educational status of them and their spouses, working in an income-generating job, and being primiparous affected the use of FA and iron together with FA in the antenatal period of the pregnant women who participated in the study ($p<0.05$) (Table 3).

It was determined that the planned pregnancy, the gender of the fetus, and the desired gender affected the use of FA and iron together with FA in the antenatal period of the pregnant women who participated in the study ($p<0.05$). In addition, it was found that while women with anemia used more iron during pregnancy, anemia did not affect the use of FA (Table 4).

In the multiple regression analysis, the use of FA and iron in antenatal period increased significantly with having high education (OR = 0.86, 0.50-1.48; OR = 1.06, 0.68-1.65, respectively), working in a job that brings income (OR = 2.07, 0.52-8.61; OR = 2.52, 0.93-6.83, respectively), being primiparous (OR = 0.37, 0.07-1.73; OR = 1.57, 0.67-3.70, respectively), fetus being male (OR = 0.35, 0.03-3.71; OR = 0.19, 0.02-1.23, respectively) and the desired gender of the fetus (OR = 0.68, 0.21-2.11; OR = 1.04, 0.39-2.74, respectively). Similar patterns of associations were seen for iron and FA supplementation, results for these outcomes are presented in Table 5. In addition, women who experienced anemia during pregnancy had significantly higher iron usage rates in the antenatal period (OR = 9.94, 2.84-34.77).

## DISCUSSION

This study was carried out to examine the factors associated with the use of FA and iron preparations in the preconception and antenatal periods of pregnant women. WHO recommends that all pregnant women take FA and iron supplements, starting in the preconceptional period and continuing throughout pregnancy [24]. On the other hand, in our study, the rate of using FA in the preconceptional period was 29%. Similarly, in a study in the literature, it was reported that 37% of pregnant women used FA during the preconceptional period [30]. In a systematic review including the findings of 34 studies, it is seen that the use of FA in the preconceptional period varies between 0.9% and 50% [31]. These findings indicate the need for more training on FA use in the preconceptional period. In a study, it was determined that only 22.2% of women using FA during pregnancy knew the right time to use it and only 12.8% had knowledge about FA [32]. These findings are important in terms of showing the importance of education on the use of FA in preconceptional care.

In our study, it was determined that most pregnant women used FA in the antenatal period. In a similar study, it is seen that the use of FA during pregnancy is 77.27% [30]. On the other hand, in our study, it was determined that only 28% of the pregnant women started to use FA during the preconceptional period and continued to use it during the antenatal period. These findings show that the use of FA during pregnancy is at a good level, and the rates of starting to use FA in the early period are low.

**Tablo 1. Distribution of Pregnant Women Using FA According to Their Socio-demographic and Obstetric Characteristics (n = 410)**

| Variables | Periconceptional period receiving FA, % (n = 119) | p-value* | Receiving FA periconceptional + antenatal periods, % (n = 115) | p-value* |
|---|---|---|---|---|
| Woman's age, n (%) | | | | |
| 18-30, 253 (%61.7) | 27.7 | 0.763** | 36.5 | 0.408** |
| 31-40, 149 (%36.3) | 31.5 | | 31.5 | |
| 41-50, 8 (2.0) | 25.0 | | 12.5 | |
| Woman's educational level, n (%) | | | | |
| Primary, 46 (11.2) | 15.2 | **0.003**** | 15.2 | **0.005** |
| Secondary, 63 (15.4) | 19.0 | | 17.5 | |
| High, 101 (24.6) | 25.7 | | 25.7 | |
| University, 200 (48.8) | 37.0 | | 35.5 | |
| Woman's employment status, n (%) | | | | |
| Employed, 144 (35.1) | 41.7 | **0.000** | 40.3 | **0.000** |
| Housewives, 266 (64.9) | 22.2 | | 21.4 | |
| Income level, n (%) | | | | |
| Low, 57 (13.9) | 29.8 | **0.044** | 29.8 | **0.034** |
| Middle, 270 (65.9) | 25.6 | | 25.2 | |
| High, 83 (20.2) | 39.8 | | 36.1 | |
| Partner's educational level, n (%) | | | | |
| Primary, 29 (7.1) | 6.9 | **0.002**** | 6.9 | **0.002**** |
| Secondary, 51 (12.4) | 15.7 | | 15.7 | |
| High, 107 (26.1) | 31.8 | | 30.8 | |
| University, 223 (54.4) | 33.6 | | 32.3 | |
| Partner's employment status, n (%) | | | | |
| Yes, 398 (97.1) | 28.9 | 0.739 | 27.9 | 0.746** |
| No, 12 (2.9) | 33.3 | | 33.3 | |
| Parite, n (%) | | | | |
| Primipar, 128 (31.2) | 39.1 | **0.003** | 37.5 | **0.004** |
| Multipar, 282 (68.8) | | | 23.8 | |
| History of recurrent miscarriage, n (%) | | | | |
| Yes, 10 (2.4) | 50.0 | 0.139 | 50.0 | 0.152** |
| No, 400 (97.6) | 28.5 | | 27.5 | |
| History of birth with anomaly, n (%) | | | | |
| Yes, 3 (0.7) | 0.0 | 0.266 | 0.0 | 0.563** |
| No, 407 (99.3) | 29.2 | | 28.3 | |
| History of low birth weight newborn birth, n (%) | | | | |
| Yes, 8 (2.0) | 12.5 | 0.298 | 12.5 | 0.451** |
| No, 402 (98.0) | 29.4 | | 28.4 | |
| Pregnancy planning status, n (%) | | | | |
| Yes, 297 (72.4) | 79.8 | **0.033** | 65.3 | **0.047** |
| No, 113 (27.6) | 20.2 | | 34.7 | |

*FA: Folic acid, Values with p < 0.05 and p < 0.001 were shown in bold.*
**P-value calculated with chi-square test, **P-value calculated with Fisher's exact test.*

**Table 2. Associations of Predictors of Periconceptional and Antenatal Periods FA Supplementation From the Multiple Regression Analysis (n = 410)**

| Variables | Periconceptional period receiving FA, % (n = 119) | | Receiving FA periconceptional + antenatal periods, % (n = 115) | |
|---|---|---|---|---|
| | Adjusted OR* (95% CI) | p-value | Adjusted OR* (95% CI) | p-value |
| Woman's high educational level | 0.90 (0.66-1.23) | **0.026** | 0.90 (0.66-1.23) | **0.046** |
| Woman's employed status | 1.84 (1.11-3.07) | **0.018** | 1.88 (1.12-3.14) | **0.016** |
| High income level | 0.91 (0.61-1.35) | **0.046** | 1.01 (0.68-1.50) | **0.035** |
| Partner's high educational level | 0.78 (0.57-1.09) | 0.152 | 0.79 (0.57-1.10) | 0.177 |
| Primipar | 0.65 (0.40-1.05) | **0.041** | 0.66 (0.41-1.07) | **0.025** |
| Planned pregnancy | 1.96 (1.06-6.29) | **0.036** | 1.19 (0.18-1.02) | **0.039** |

*FA: Folic acid, OR: Odds Ratio, CI: Confidence Interval.*
**All variables are in the adjusted model.*

Studies show that iron use during pregnancy is between 22.3% and 84.98% [28,30,33]. Similarly, in our study, it was determined that 71.5% of the pregnant women used iron preparations in the antenatal period. However, in our study, it was observed that 67.1% of the pregnant women used FA and iron preparations together. On the other hand, in a study conducted in Nepal, the rate of using FA and iron in the antenatal period was 95.8%, while in another study conducted in Srilanka, this rate was 80.1% [34,35]. This shows that the combined use of FA and iron during pregnancy is lower in our country. Based on this finding, it can be said that it is important to carry out education and information studies on the use of FA and iron in pregnant women in the antenatal period and to determine the factors that lead to low use.

In our study, women with a planned pregnancy used FA 1.9 times more in the preconceptional period than those who were not planned. Similarly, Lima et al., also determined in their study that planned pregnancies use FA at a higher rate in the pre-pregnancy period [30]. These findings are important in showing that planned pregnancies significantly affect FA supplementation. In addition, in our study, it was determined that the rate of FA use in the preconceptional period of pregnant women was approximately 0.9 times higher in those with university degree, 1.8 times in those working in an income-bringing job, and 0.6 times in primiparas. Similarly, in a study conducted in Nigeria, it is seen that women with low education level and low socio-economic status use FA less frequently in the preconception period [36]. In a cohort study of 61,252 women in Ireland, it was determined that FA use during the periconceptional period was higher in those with a higher socioeconomic status, university graduates, and primiparas [37]. Education and social levels would seem to play important roles in both usage and awareness of benefits of periconceptional intake of FA because pregnancy tends more likely to be planned by women in these categories [36]. It is also possible that women with higher economic status and better education have greater access to information, which may have increased their use of FA.

The education level, income level, working in a job that brings income and the number of pregnancies are the factors that increase FA consumption during pregnancy [26,30,38]. Similarly, in our study, it was determined that among pregnant women, those with higher education used FA 0.86 times, those who worked in an income-generating job twice, and those who were primiparous 0.3 times more in the antenatal period. Higher FA consumption during pregnancy can be explained by the fact that women's income and educational status have easier access to information and better purchasing power for FA. In addition, the lower rate of FA use in multiparous women may be due to the thought that nothing bad will happen in multiparas with experience. This is important in terms of questioning the experience of FA supplementation in the previous pregnancies of multiparous women in the preconceptional and antenatal period and demonstrating the importance of education about the importance of FA.

In our study, in addition to the literature, women with male babies and women with the desired gender used FA at a higher rate. Again, in our study, it was determined that iron intake in the antenatal period and the combined use of FA and iron were higher in

**Table 3. Distribution of Pregnant Women Using FA and Iron in the Antenatal Period According to Their Socio-demographic and Obstetric Characteristics (n = 410)**

| Variables | Receiving FA, % (n = 381) | p-value* | Receiving iron, % (n = 293) | p-value* | Receiving FA + iron, % (n = 275) | p-value* |
|---|---|---|---|---|---|---|
| Woman's age, n (%) | | | | | | |
| 18-30, 253 (%61.7) | 92.5 | 0.806 | 71.1 | 0.801** | 66.4 | 0.499 |
| 31-40, 149 (%36.3) | 94.0 | | 72.5 | | 69.1 | |
| 41-50, 8 (2.0) | 87.5 | | 62.5 | | 50.0 | |
| Woman's educational level, n (%) | | | | | | |
| Primary, 46 (11.2) | 84.8 | **0.009** | 69.6 | **0.016** | 60.9 | **0.045** |
| Secondary, 63 (15.4) | 87.3 | | 68.3 | | 61.9 | |
| High, 101 (24.6) | 93.1 | | 68.3 | | 62.4 | |
| University, 200 (48.8) | 96.5 | | 74.5 | | 72.5 | |
| Woman's employment status, n (%) | | | | | | |
| Employed, 144 (35.1) | 97.9 | **0.004** | 79.2 | 0.011 | 77.1 | **0.002** |
| Housewives, 266 (64.9) | 90.2 | | 67.3 | | 61.7 | |
| Income level, n (%) | | | | | | |
| Low, 57 (%13.9) | 93.0 | 1.000** | 64.9 | 0.486 | 61.4 | 0.614 |
| Middle, 270 (65.9) | 93.0 | | 72.2 | | 68.1 | |
| High, 83 (20.2) | 92.8 | | 73.5 | | 67.5 | |
| Partner's educational level, n (%) | | | | | | |
| Primary, 29 (7.1) | 82.8 | **0.047** | 65.5 | **0.029** | 51.7 | **0.040** |
| Secondary, 51 (12.4) | 88.2 | | 63.5 | | 64.7 | |
| High, 107 (26.1) | 93.5 | | 63.6 | | 60.7 | |
| University, 223 (54.4) | 95.1 | | 75.3 | | 72.6 | |
| Partner's employment status, n (%) | | | | | | |
| Yes, 398 (97.1) | 92.7 | 1.000** | 71.1 | 0.522** | 66.6 | 0.224 |
| No, 12 (2.9) | 100.0 | | 83.3 | | 83.3 | |
| Parite, n (%) | | | | | | |
| Primipar, 128 (31.2) | 96.9 | **0.038** | 31.3 | **0.012** | 67.2 | **0.040** |
| Multipar, 282 (68.8) | 91.1 | | 27.3 | | 36.0 | |
| History of recurrent miscarriage, n (%) | | | | | | |
| Yes, 10 (2.4) | 100.0 | 1.000** | 50.0 | 0.157** | 50.0 | 0.308** |
| No, 400 (97.6) | 92.8 | | 72.0 | | 67.5 | |
| History of birth with anomaly, n (%) | | | | | | |
| Yes, 3 (0.7) | 100.0 | 1.000** | 100.0 | 0.561** | 100.0 | 0.554** |
| No, 407 (99.3) | 92.9 | | 71.3 | | 66.8 | |
| History of low birth weight newborn birth, n (%) | | | | | | |
| Yes, 8 (2.0) | 100.0 | 1.000** | 50.0 | 0.232** | 50.0 | 0.448** |
| No, 402 (98.0) | 92.8 | | 71.9 | | 67.4 | |
| Chronic disease, n (%) | | | | | | |
| Yes, 59 (14.4) | 93.2 | 1.000** | 76.3 | 0.377 | 71.2 | 0.467 |
| No, 351 (85.6) | 92.9 | | 70.7 | | 66.4 | |

*FA: Folic acid, Values with p < 0.05 and p < 0.001 were shown in bold.*
**P-value calculated with chi-square test, **P-value calculated with Fisher's exact test.*

**Table 4. Distribution of Pregnant Women Using FA and Iron in the Antenatal Period According to Their Some Current Pregnancy Characteristics (n = 410)**

| Variables | Receiving FA, % (n = 381) | p-value* | Receiving iron, % (n = 293) | p-value* | Receiving FA + iron, % (n = 275) | p-value* |
|---|---|---|---|---|---|---|
| Pregnancy planning status, n (%) | | | | | | |
| Yes, 297 (72.4) | 93.9 | **0.035** | 76.1 | **0.030** | 38.4 | 0.000 |
| No, 113 (27.6) | 80.3 | | 69.7 | | 0.9 | |
| The gender of the fetus, n (%) | | | | | | |
| Female, 140 (34.1) | 92.1 | **0.000** | 86.4 | **0.000** | 25.3 | **0.012** |
| Male, 154 (37.6) | 94.8 | | 87.1 | | 32.1 | |
| Unknown, 116 (28.3) | 91.4 | | 32.8 | | 26.7 | |
| The sex of the fetus is the desired gender, n (%) | | | | | | |
| Yes, 242 (82.9) | 94.2 | **0.039** | 88.4 | **0.030** | 31.4 | **0.047** |
| No, 50 (17.1) | 70.2 | | 66.0 | | 18.0 | |
| Anemia in pregnancy, n (%) | | | | | | |
| Yes, 127 (31.0) | 91.3 | 0.401 | 95.3 | **0.000** | 27.6 | 0.882 |
| No, 283 (69.0) | 93.6 | | 60.8 | | 28.3 | |
| Smoking in pregnancy, n (%) | | | | | | |
| Yes, 30 (7.3) | 100.0 | 0.115** | 70.0 | 0.854 | 43.3 | 0.053 |
| No, 380 (92.7) | 92.4 | | 71.6 | | 26.8 | |

*FA: Folic acid, Values with p < 0.05 and p < 0.001 were shown in bold.*
**P-value calculated with chi-square test, **P-value calculated with Fisher's exact test.*

**Table 5. Associations of Predictors of Antenatal Period FA and Iron Supplementation From the Multiple Regression Analysis (n = 410)**

| Variables | Receiving FA, % (n = 381) | | Receiving iron, % (n = 293) | | Receiving FA + iron, % (n = 275) | |
|---|---|---|---|---|---|---|
| | Adjusted OR* (95% CI) | p-value | Adjusted OR* (95% CI) | p-value | Adjusted OR* (95% CI) | p-value |
| Woman's high educational level | 0.86 (0.50-1.48) | **0.043** | 1.06 (0.68-1.65) | **0.030** | 1.04 (0.70-1.53) | **0.011** |
| Woman's employed status | 2.07 (0.52-8.61) | **0.021** | 2.52 (0.93-6.83) | **0.022** | 2.09 (0.87-4.99) | **0.015** |
| Partner's high educational level | 0.78 (0.46-1.34) | 0.404 | 0.58 (0.38-0.89) | **0.012** | 0.54 (0.37-0.79) | **0.043** |
| Primipar | 0.37 (0.07-1.73) | **0.042** | 1.57 (0.67-3.70) | **0.041** | 1.10 (0.50-2.40) | **0.041** |
| Planned pregnancy | 1.16 (0.41-3.28) | 0.743 | 1.78 (0.73-4.33) | 0.207 | 1.47 (0.69-3.12) | 0.454 |
| Fetus in male sex | 0.35 (0.03-3.71) | **0.036** | 0.19 (0.02-1.23) | **0.047** | 0.14 (0.02-0.82) | **0.029** |
| Desiring the sex of the fetus | 0.68 (0.21-2.11) | **0.030** | 1.04 (0.39-2.74) | **0.028** | 0.81 (0.35-1.86) | **0.015** |
| Anemia in pregnancy | - | - | 9.94 (2.84-34.77) | **0.000** | - | - |

*FA: Folic acid, OR: Odds Ratio, CI: Confidence Interval.*
**All variables are in the adjusted model.*

women who had a male baby and whose fetus was the desired gender. It is known that the expectation of giving birth to a boy is high in many countries around the world, including Turkiye [39]. Furthermore, the preference for male children is higher especially in the eastern regions of Turkiye [40]. The fact that the province where our study was conducted was located in the Southeastern Anatolia region may have affected gender (male) preference. Studies in the literature reveal that the gender of the fetus has important effects on pregnancy and postpartum period. Women who have a male baby have higher

prenatal attachment levels and positive emotions during pregnancy, and lower depression levels [41-43]. It is also known that the breastfeeding success of mothers with a male baby and breastfeeding with only breast milk is higher than those with a female baby [44,45]. It is thought that this situation is due to the fact that the cultural structure related to gender also affects the pregnancy process. To the best of our knowledge, the finding that the gender of the obtained fetus affects women's intake of FA and iron supplements during pregnancy is important in that it is the first study in the literature.

When the factors affecting the use of iron in the antenatal period of pregnant women were examined, the rates were 1 times higher in those with higher education, 2.5 times in those working in an income-generating job, approximately 1.6 times in those who were primiparous, and 9.9 times higher in those who had anemia during pregnancy. Similarly, in another study, iron consumption during pregnancy increased with the diagnosis of anemia during pregnancy, good economic status, and being nulliparous [28]. Based on these findings, contrary to WHO recommendations, routine use of iron during pregnancy is not common, and it is used at a higher rate in women with anemia. In addition, high education and economic level may have affected the use of iron, as it may facilitate women's access to information and health care.

WHO reported that 41% of women globally suffer from anemia due to iron deficiency caused by low supplementation [46]. It is known that FA and iron supplements taken during pregnancy significantly reduce the prevalence of anemia that develops during pregnancy. In our study, the factors positively affecting the use of FA and iron together in the antenatal period of pregnant women; are women's high education level, working in an income-bringing job, being primiparous, having a male fetus, and being in the gender desired by the mother. In different studies, it has been reported that working in an income-generating job and having a high-income level increase the intake of FA and iron together during pregnancy [35,47]. According to these findings, it is seen that the income level is effective in FA and iron supplements during pregnancy and it is important in terms of showing that these supplements should be supplied free of charge to pregnant women. In addition, its use at a lower rate in multiparous patients reveals the importance of education and follow-up on this issue. In addition, less supplementation by pregnant women with a female baby reveals the negative effects of gender inequality on the pregnancy process.

**Limitations**

There are some limitations to this research. The first of these is the cross-sectional type of study, which limits the causal relationships. Although we have tried to include confounding variables using the literature, literally not all variables may be included. Second, the reliability of the findings depends on the sensitivity of the data collection tool. Third, some medical diagnoses were not determined by diagnostic tests, and information about this was obtained based on the statements of women.

## CONCLUSIONS

This study was carried out to examine the factors associated with the use of FA and iron preparations in the preconceptional and antenatal periods of 410 pregnant women in Gaziantep, Turkiye. Mainly in the study; it was determined that 29% of the pregnant women used FA in the preconceptional period, 92.9% in the antenatal period, 28% in both preconceptional and antenatal periods, 71.5% of the pregnants used iron preparation and 67.1% used FA and iron preparation together in the antenatal period. In the study, the rates of using FA supplementation in the preconceptional period and starting to use FA in the preconceptional period and continuing in the antenatal period were higher among the pregnant women who had higher education, worked in a job that brings income, had a high income level, were primiparous and had planned pregnancy. In addition, the use of FA and iron together with FA and iron in pregnancy was higher in women with higher education, working in an income-generating job, having a primiparous baby, having a male sex, and the desired gender of the fetus, and iron use rates in the antenatal period of women with anemia during pregnancy were significantly higher. was found to be higher. Based on these results, midwives and nurses providing primary health care services should counsel pregnant women on the benefits of folic acid and iron use starting from the preconceptional period, and health institutions should develop policies in this regard. In addition, it may be recommended to conduct randomized controlled intervention studies to increase the use of FA and iron during pregnancy..

**Author contribution**

Study conception and design: DA, HA; data collection: HA; analysis and interpretation of results: DA; draft manuscript preparation: DA, HA. The author reviewed the results and approved the final version of the manuscript.

**Ethical approval**

The study was approved by the ethics committees of Gaziantep University (Protocol no: 2021/378).

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**Conflict of interest**

The authors declare that there is no conflict of interest.

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Araştırma fikri ve tasarımı: DA, HA; veri toplama: HA; sonuçların analizi ve yorumlanması: DA; araştırma metnini hazırlama: DA, HA. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

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