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Evaluation of Women's Knowledge Levels About Folic Acid; An Example of a University Hospital

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Abstract: Folic acid decreases physiologically during pregnancy and this situation predisposes to congenital anomalies such as neural tube defects and spina bifida. The aim of our study was to measure the level of knowledge of women of reproductive age and female health care workers about the use of folic acid in the preconceptional period, to draw attention to the correct timing and adequate dose of folic acid to prevent neural tube defects, and to identify problems related to reducing the incidence of neural tube defects and to develop solutions. In this study, we conducted a questionnaire study questioning the level of knowledge about folic acid among women aged 18-49 years and female health care workers who applied to Van Yüzüncü Yıl Dursun Odabaş Medical Center Family Medicine outpatient clinics and statistical analyses were evaluated in SPSS (Version 20) program. Of the 400 women who participated in our study, 47% were health workers and 53% were patients. To the question "Have you heard of folic acid before?" 78.3% of the participants answered "Yes" and 21.9% answered "No". In the study, it was observed that the level of knowledge about folic acid and folic acid use was higher in younger age groups, healthcare workers, single women, university graduates, those with higher income levels and those with fewer parities. It was concluded that the level of knowledge and awareness of folic acid is not at an adequate level and folic acid awareness of women of reproductive age should be increased. ©2024 NTMS.

Keywords: Folic acid; Pregnancy; Neural Tube Defect.

1. Introduction

Neural tube defects (NTDs) are congenital malformations that result from the failure of the fetal spinal canal to close after conception for a number of reasons [2]. If the neural tube does not close in the intrauterine period until the end of the 4th week, conditions such as meningocele, meningomyelocele, myeloschisis, anencephaly, encephalocele, which are generally called Neural Tube Defects (NTD), occur. Hereditary and environmental factors play a role in the etiology of NTDs. Folate deficiency is one of the most important preventable causes of NTDs [3]. Folic acid supplementation alone has been shown to reduce the recurrence of NTDs by up to 71% in pregnant women [4]. Folic acid should be started 2 months before conception and folic acid supplementation should continue until the end of the first trimester of pregnancy [5]. Folic acid intake of 400 µg/day during the preconceptional period reduces the likelihood of neural tube defects by 50-70% by assisting DNA synthesis and repair during organogenesis [6].

NTDs are one of the most common congenital anomalies. They increase the likelihood of a pregnancy

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ending in miscarriage. They also cause infant mortality, severe congenital anomalies and disability. NTDs account for 10% of all neonatal deaths and are responsible for 41.000 deaths and 2.3 million disabilities annually. Worldwide, NTDs occur in 0.5-2 per 1000 pregnancies and in approximately 2-3% of live births. It has been reported that the incidence of NTDs in developing countries is up to four times higher than in developed countries due to low standard of living, poor pregnancy follow-up and low number of terminations [7].

The prevalence of NTD is 0.7-1 per 1000 live births in the United States of America (USA) and 0.4-1.6 per 1000 live births in European countries. Considering that the prevalence rate in Turkey is 3 per 1000 live births, it is seen that the prevalence rate is higher in Turkey compared to other western countries [2].

Rehabilitation and treatment of NTDs is both difficult and costly. It imposes a heavy financial and moral burden on families and society. The mortality and morbidity of surgical treatment of NTDs is also very high. Relatives also face many psychosocial and economic difficulties during treatment. Therefore, it is clear that it would be wiser to conduct studies for the prevention of NTDs rather than the diagnosis and treatment of NTDs [8].

In this study, it was aimed to determine the level of knowledge of women of reproductive age about the use of folic acid in the preconceptional period, to increase awareness, to draw attention to the success of folic acid in preventing neural tube defects when used at the right time and at the right dose, to emphasize the importance of physicians and other health professionals in informing women, to identify problems, to develop solutions and to contribute to the formation of healthier generations.

2. Material and Methods

The study was conducted on 400 women of reproductive age (18-49 years) and female healthcare workers who applied to the Medical Center Family Medicine Outpatient Clinics between February 2021 and May 2021 and volunteered to participate in the study. The questionnaires used in previous studies on similar topics in the literature were examined and the 11-question questionnaire form was applied to the participants by face-to-face interview technique. This study was conducted after the approval of Van Yüzüncü Yıl University Non-Interventional Clinical Research Ethics Committee. Permission was also obtained from the relevant department to conduct a survey in the outpatient clinic (Date: 10.12.2021, Decision No: 2021/13-09). After the data were collected, the SPSS program was used in the calculations and the level considered statistically significant was taken as 5% (p=0.05).

3. Results

44% (n=176) of the participants were in the 18-25 age group, 41.8% (n=167) in the 26-35 age group, and 14.3% (n=57) in the 36-49 age group. 56.8% (n=227) of the participants were married and 43.3% (n=173) were single. 61% (n=244) of the participants were university graduates, 14.3% (n=57) were high school graduates, 9% (n=36) were middle school graduates, 9.3% (n=37) were primary school graduates, and 6.5% (n=26) were illiterate. 78.5% (n=314) of the participants earn TL 10000 or less, 21.5% (n=86) earn TL 10000 or more. The sociodemographic characteristics of the participating in the study is given in Table 1.

Table 1: The sociodemographic characteristics of the participating in the study.

Features	Categories	N=400	%
Age	18-25 Age	176	44.0
	26-35 Age	167	41.8
	36-49 Age	57	14.3
Marital Status	Married	227	56.8
	Single	173	43.3
Education	Illiterate	26	6.5
Status	Primary School	37	9.3
	Middle School	36	9.0
	High school	57	14.3
	University	244	61.0
Monthly	TL 10000 or less	314	78.5
Income	TL 10000 or more	86	21.5
Participant	Patient	212	53.0
Type	Health workers	188	47. 0

While 47% (n=188) of the participants were health workers, 53% (n=212) were patients. The occupational distribution of the participants in the patient category is as follows; housewife 69.3% (n=147), civil servant 10.8% (n=23), insured worker 6.1% (n=13), other occupational group 13.7% (n=29). The occupational distribution of the participants in the health worker category is as follows; doctor 42% (n=79), intern doctor 25.5% (n=48), midwife/nurse 18.6% (n=35), janitorial staff 3.2% (n=6) data entry staff 5.9% (n=11), other occupational group 4.8% (n=9).

Of the participants, 78.3% (n=313) answered the question "Have you heard of folic acid before?" as "Yes". Of those who had heard of folic acid, 51.1% (n=160) learned about it during their education, 8.6% (n=27) from family physicians, 24.9% (n=78) from gynecologists and obstetricians, 9.3% (n=29) from family/friends and 6.1% (n=19) from TV/radio/news/internet. The rate of hearing about folic acid and the source of hearing about folic acid among the participants in the study are given in Table 2 and Table 3.

Table 2: Hearing of folic acid among study participants.

Features	Categories	N=400	%
Hearing of Vitamin Folic Acid	No	87	21.8
	Yes	313	78.3

Table 3: Study participants' source of hearıng folic acid.

Features	Categories	N=313	%
Folic Acid Hearing Source	My Education Life	160	51.1
	My Family Physician	27	8.6
	From my Obstetrics and Gynecology Specialist	78	24.9
	Family/Friends	29	9.3
	TV/Radio/Newspaper /Internet	19	6.1

To the question "Did you use a folic acid-containing preparation in your previous/current pregnancy?", 51.9% (n=107) of 206 individuals with a history of pregnancy answered "Yes" and 48.1% (n=99) answered "No". When the reasons for not using folic acid were asked to the 99 people who answered "No" to this question, 75.8% (n=75) answered because they did not know, 6.1% (n=6) because no one recommended it, 7.1% (n=7) because I had an unplanned pregnancy, 5.1% (n=5) because it caused nausea and vomiting/I did not like using tablets and 6.1% (n=6) because I believed that the need for folic acid was met with a balanced diet. Table 4 shows the folic acid use status of the participants during pregnancy. The reasons for not using folic acid during pregnancy are given in Table 5.

Table 4: Use of folic acid during pregnancy among the participants in the study.

Features	Categories	N=206	%
Folic Acid Use in Pregnancy	No	99	48.1
	Yes	107	51.9

Table 5: Reasons for not using folic acid during pregnancy among study participants.

Features	Categories	N=99	%
Reasons not to use folic acid during pregnancy	Because I don't know	75	75.8
	Since no one suggested it	6	6.1
	Because of my unplanned conception	7	7.1
	Because it causes nausea and vomiting / because I don't like using tablets	5	5.1
	Because I believe that folic acid needs are met with a balanced diet	6	6.1

Of the 107 participants who answered "Yes" to the question "Did you use a preparation containing folic acid vitamin in your previous/current pregnancy?", 60.7% (n=65) answered the question "When did you start using folic acid in your pregnancy?" as "I started after I learned that I was pregnant", while 39.3% (n=42) answered "I started when I planned to become pregnant". Of the 107 participants who used folic acid during pregnancy, 84.1% (n=90) answered "Yes" and 15.9% (n=17) answered "No" to the question "Did/do you use it regularly?".

To the question "How much dose should folic acid be taken before pregnancy?" 9.5% (n=38) of the participants answered "All pregnant women should take 400 mcg", 29.5% (n=118) answered "Pregnant women with risk factors should take 4 mg, the rest should take 400 mcg", 2.5% (n=10) answered "I think the need is met by diet" and 58.5% (n=234) answered "I do not know".

Of those who answered "Yes" to the question "Have you heard of folic acid vitamin before?", 45.4% (n=142) were in the 18-25 age group, 44.7% (n=140) were in the 26-35 age group, and 9.9% (n=31) were in the 36-49 age group. Of those who answered "Yes" to the question "Can neural tube defects (anencephaly, spina bifida, etc.) seen in newborn babies be prevented with folic acid vitamin used before pregnancy?" 46.2% (n=115) were in the 18-25 age group, 46.2% (n=115) in the 26-35 age group and 7.6% (n=19) in the 36-49 age group. Of those who answered the question "How much dose of folic acid should be taken before pregnancy?" as "Pregnant women with risk factors should take 4 mg, the rest should take 400 mcg", 54.2% (n=64) were aged 18-25 years, 41.5% (n=49) were aged 26-35 years, and 4.2% (n=5) were aged 36-49 years.

Of those who answered "Yes" to the question "Have you heard of folic acid vitamin before?" 85% (n=147) were single. 71.2% (n=84) of the respondents who answered "Pregnant women with risk factors should take 4 mg and the rest should take 400 mcg" to the question "What dose of folic acid should be taken before pregnancy?" were single. Among university graduates, 71.9% (n=225) had heard of folic acid before. The comparıson of the educatıonal status of the study participants and the use of folic acid during pregnancy is given in Tablo 6**.**

Of those who knew how much folic acid should be taken before pregnancy, 97.5% (n=115) were university graduates. 83.1% (n=207) of those who answered "Yes" to the question "Can neural tube defects (anencephaly, spina bifida, etc.) seen in newborn babies be prevented with folic acid vitamin used before pregnancy?" were university graduates. In response to the question "When should folic acid be started and how long should it be used to prevent congenital anomalies?", 91.1% (n=185) of those who answered "It should be started at least 1 month before fertilization and used in the first 3 months of pregnancy" were university graduates. Among those who used folic acid during pregnancy, 53.3% (n=57) were university graduates. 78.6% (n=33) of those who started to use folic acid in the preconceptional period were university graduates. The comparison of the educational status of the participants with their folic acid use in the preconceptional period is given in Table 7.

Table 6: The comparison of the educational status of the study participants and the use of folic acid during pregnancy.

Education Level		Did you use a preparation containing folic acid during your previous/current pregnancy?		P
		Hayır	Evet	P=0.001
Illiterate	N	23	2	
	%	23.2%	1.9%	
Primary School	N	23	13	
	%	23.2%	12.1%	
Middle School	N	23	11	
	%	23.2%	10.3%	
High school	N	17	24	
	%	17.2%	22.4%	
University	N	13	57	
	%	13.1%	53.3%	

Table 7: The comparison of the educational status of the study participants and the use of folic acid in the preconseptional period of pregnancy.

Education Level		When did you start taking folic acid during your pregnancy?		P
		I started after I found out I was pregnant	I started when I was planning to conceive	P=0.001
Illiterate	N	2	0	
	%	3.1%	0%	
Primary School	N	11	2	
	%	16.9%	4.8%	
Middle School	N	10	1	
	%	15.4%	2.4%	
High school	N	18	6	
	%	27.7%	14.3%	
University	N	24	33	
	%	36.9%	78.6%	

Of those who had heard of folic acid vitamin before, 57.2% (n=179) were healthcare workers. In response to the question "From whom/where did you learn about folic acid?", 90.6% (n=145) of those who answered "During my education" were healthcare workers. Most of the respondents who answered "From my family physician/ Gynecologist/ Family/ Friends/ TV/Radio/Newspaper/Internet" to this question were from the "patient" group. 67.9% (n=169) of the respondents who answered "Yes" to the question "Can neural tube defects (anencephaly, spina bifida, etc.) in newborn babies be prevented with folic acid vitamin used before pregnancy?" were healthcare professionals. In response to the question "When should folic acid be started and how long should it be used to prevent congenital anomalies?", 73.9% (n=150) of the healthcare workers answered "It should be started at least 1 month before fertilization and used in the first 3 months of pregnancy". Among healthcare workers who had been pregnant before, 85.7% (n=36) had used folic acid during pregnancy. However, 43.3% (n=93) of the patients who had ever been pregnant used folic acid during pregnancy. Among patients who did not use folic acid during pregnancy, 97.3% (n=73) did not use folic acid because they did not know. While 52.4% (n=22) of those who started using folic acid in the preconceptional period were healthcare professionals, 78.5% (n=51) of those who started using folic acid after learning that they were pregnant were from the patient group. Table 8 shows the comparison of folic acid use in the preconceptional period of pregnancy between healthcare professionals and patients who participated in the study.

While 79.7% (n=63) of physicians and 52.1% (n=25) of trainee physicians answered the question "How much dose should folic acid be taken before pregnancy?" as "Pregnant women with risk factors should take 4 mg and the rest should take 400 mcg", 48.6% (n=17) of midwives/nurses, 66.7% (n=4) of janitorial staff and 81.8% (n=9) of data entry staff answered as "I don't know". When the income level of the participants in our study was compared with their level of knowledge about folic acid, 86% (n=74) of those with an income of TL 10000 and above answered "Yes" to the question "Have you heard of folic acid vitamin before?". 59.3% (N=16) of those with an income of TL 10000 and above started to use folic acid in the preconceptional period.

Table 8: The comparison of the use of folic acid in the preconceptional period of pregnancy with health workers and patients who participated in the study.

		When did you start taking folic acid during pregnancy?		P
Participant Type		I started after I found out I was pregnant	I started when I was planning to conceive	P=0.001
Patient	N	51	20	
	%	78.5%	47.6%	
Health Worker	N	14	22	
	%	21.5%	52.4%	

Of the pregnant women who participated in our study, 64.5% (n=62) answered "No" and 35.5% (n=44) answered "Yes" to the question "Did you use a preparation containing folic acid vitamin in your previous/current pregnancy?". However, 79.5% (n=35) of the pregnant women who used folic acid started to use folic acid after they learned that they were pregnant. It was observed that the rate of folic acid use during pregnancy decreased as the number of live births increased among the women who participated in our study.

4. Discussion

Worldwide, knowledge and awareness of folic acid varies by country. The rates of knowledge and awareness of women about folic acid are 95% in the UK, 80% in Switzerland, 79% in Spain, 64% in Norway, 50% in Ukraine, 49% in Portugal and 84% in the USA. Although this rate was found to be 71% in studies on the level of folic acid knowledge in our country, it varies between 18% and 46% from study to study. In our study, we found that the rate of hearing about folic acid in women of reproductive age in our region was 78.3%. However, considering that 57.2% of those who had heard about folic acid before were healthcare workers, it can be said that social awareness is low. This shows that the awareness of folic acid in our country is lower compared to women living in the UK, Switzerland, Spain and the USA.

In a study conducted by Somunkıran et al. in our country, it was found that 10.9% of women with planned pregnancies started to use folic acid in the preconceptional period. It was found that most of the women (78.6%) who used folic acid in the preconceptional period were healthcare workers. In our study, most of the women who were healthcare workers stated that they learned about folic acid during their education, while most of the other participants learned about folic acid from gynecologists and obstetricians. At the same time, the level of knowledge about folic acid among the women who participated in our study who were health care workers was found to be higher than the other occupational groups. In addition, most of the women who did not use folic acid during pregnancy stated that they did not use it because they did not know.

In a study conducted by Jihyun Kim et al. on pregnant women in Korea, folic acid awareness was found to be higher in pregnant women with higher education level. According to the results of our study, 71.9% of those who had heard of folic acid before were university graduates. The group with the highest rate of folic acid use during pregnancy was university graduates with 53.3%. In addition, 83.1% of those who knew that neural tube defects (anencephaly, spina bifida, etc.) seen in newborn babies could be prevented with folic acid vitamin used before pregnancy and 97.5% of those who knew how much dose of folic acid should be taken before pregnancy were university graduates.

D. A. Forster et al. found that the rate of folic acid supplementation during pregnancy was 84.8% in the group with high socioeconomic status and 65.8% in the group with low socioeconomic status. In our study, it was observed that the rate of hearing about folic acid vitamin, the rate of starting to use folic acid in the preconceptional period and the rate of those who knew how much dose of folic acid should be taken before pregnancy were higher in those who received 10000 TL and above.

In a study conducted by Hedyeh Riazi et al. in Iran, awareness of folic acid was found to be very low in women aged 35 years and older, while the level of knowledge was found to be higher in women aged 20-24 years compared to other age groups. In our study, the rate of having heard of folic acid before, the rate of knowing that neural tube defects (anencephaly, spina bifida, etc.) seen in newborn babies can be prevented with folic acid vitamin used before pregnancy and the rate of knowing how much dose of folic acid should be taken before pregnancy were found to be higher in the 18-25 age group compared to other age groups, while the lowest knowledge rate was found in the 36-49 age group.

In a study conducted by Jihyun Kim et al. on pregnant women in Korea, 65.6% of pregnant women had heard of folic acid, but only 26.4% of these pregnant women used folic acid in the preconceptional period. Mark Maher et al. found that only 40% of women took folic acid in the preconceptional period in a study conducted in London, England. In a study conducted in Ethiopia, Dessie et al. found that approximately 48.4% of women took folic acid supplements at different periods of pregnancy, but only 1.92% took folic acid supplements in the preconceptional period. In our study, 51.9% of women with a history of previous pregnancy used folic acid during their pregnancies. However, only 20.3% of these women took folic acid supplements in the preconceptional period. In addition, it was found that the rate of folic acid use in pregnancy decreased as the number of births of these women increased.

5. Conclusions

In our study, the rates of folic acid use in the preconceptional period were found to be in parallel with other studies in our country and below the rates in western countries.

Among the women who participated in our study, most of those who did not use folic acid during pregnancy did not use it because they did not know, suggesting that the reason for women not using folic acid in the preconceptional period is more likely to be the lack of information and guidance. Moreover, the fact that most of the women who started taking folic acid in the preconceptional period were health workers suggests that if women are counseled to use folic acid in the prenatal period, the rate of folic acid use in the preconceptional period will increase. The fact that most of the women who did not take folic acid during pregnancy were housewives may be due to the fact that these women did not consult a doctor before pregnancy due to their lack of social security or economic freedom. Among the women who participated in our study, the rate of application to family physicians for pre-pregnancy counseling was found to be quite low. When the folic acid knowledge levels of healthcare professionals were compared, it was found that the knowledge level of physicians, intern doctors was higher than that of midwives, nurses, janitorial staff, data entry personnel and other healthcare personnel. This shows that physicians should train allied health personnel.

Increasing awareness and knowledge of folic acid in women of reproductive age can be possible through public health and preventive medicine practices. In order to increase this awareness at the social level, the health personnel that the public will reach in the first place, primarily family physicians, midwives and nurses, should inform the patients. At the same time, regardless of the reason for hospitalization of women of reproductive age, awareness of folic acid should be increased by explaining the importance of folic acid use in the preconsensual period to women and distributing brochures on this subject. Healthcare personnel should be provided with seminars on folic acid to keep their knowledge up to date, women of reproductive age should be counseled about folic acid during home visits or in hospital wards, folic acid levels in the blood should be checked during the follow-up of women who are planning to become pregnant, 4 mg folic acid should be prescribed to women in the risk group who are planning to become pregnant and 400 mcg folic acid should be prescribed to women who are not in the risk group. In addition, the fact that most multivitamin preparations containing folic acid are not covered by the state reduces the rate of folic acid use. Therefore, folic acid should be distributed free of charge by the government to women planning to conceive. Campaigns and promotions should be organized through media organizations and social media to raise public awareness by explaining that the use of folic acid in the preconceptional period prevents congenital anomalies such as neural tube defects.

Limitations of the Study

The limitations of the study are that no sample calculation was made for the study, the questionnaire questions were not a questionnaire for which validity and reliability studies were conducted, but were created by ourselves from the relevant literature, and the samples were collected from a center.

Since the study is based on voluntary participation, it may lead to sampling bias. Because participants who volunteered may have more knowledge about folic acid than those who did not volunteer.

As the study was conducted in a specific medical center, the results of the study may not be generalizable to a wider population. Therefore, they may not generalize to women outside this geographical or health care context.

In the study, participants are asked about their past experiences of folic acid use in previous pregnancies. This raises the possibility of recall bias as participants may not be able to recall past events accurately.

The study relied mostly on self-reported information, including information on educational status, occupation and folic acid use. This increases the likelihood of inadvertent or deliberate misreporting of information.

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Conflict of Interests

The authors declare that there is no potential conflict of interest for the research, authorship, and/or publication of this article. All authors read and approved the final manuscript.

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Author Contributions

Conceived and designed the experiments; COK, NY, EY. Analyzed and interpreted the data; COK, NY, EY. Contributed reagents, materials, analysis tools or data; COK, NY, EY. Wrote the paper; COK, NY, EY. Study of biostatistics; NY.

Ethical Approval

Approval was obtained from the Van Yüzüncü Yıl University Non-Interventional Clinical Research Ethics Committee on 10.12.2021 with decision number 2021/13-09.

Data sharing statement

None.

Consent to participate

None.

Informed Statement

None.

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