ORIGINAL RESEARCH ARTICLE

Assessment of awareness, knowledge, and usage of folic acid among females in Jazan Region, Saudi Arabia

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Gasim Dobie[1], Nouf Al-Hazazi[1], Maram Nahari[1], Areej M. Sabyani[1], Khaled Essawi[1], Abdullah A. Mobarki[1], Waleed Hakami[1], Naema A. Alqahtani[1], Bandar M. Almalki[1], Asma M. Farah[1], Adel M. Hakami[2], Shaqraa Musawi[1], Fatemah A Alhakami[1], Mohamed Y. Alfoud[1], Yara Alyahyawi[1], Aymen M Madkhali[1], Ali Hakamy[3], Rama Chandika[4], Muhammad Saboor[5,6], Amnah Hanin[7], Mohammad S. Akhter[1] and Hassan A. Hamali[1*]*

Department of Medical Laboratory Technology, College of Nursing and Health Sciences, Jazan University, Jazan, Saudi Arabia[1]; Jazan University Hospital, Jazan University, Jazan, Saudi Arabia[2]; Nursing Department, College of Nursing and Health Sciences, Jazan University, Jazan, Saudi Arabia[3]; Department of Clinical Nutrition, College of Nursing and Health Sciences, Jazan University, Jazan, Saudi Arabia[4]; Department of Medical Laboratory Sciences, College of Health Sciences, University of Sharjah, Sharjah, United Arab Emirates[5]; Research Institute for Medical and Health Sciences, University of Sharjah, Sharjah, United Arab Emirate[6]; Pediatric ward, Baish General Hospital, Jazan Health Affairs, Jazan, Saudi Arabia[7]

***For Correspondence:** Email: hhamali@jazanu.edu.sa; gdobie@jazanu.edu.sa

Abstract

Folic acid (FA) plays a crucial role in various biological processes. Insufficient intake of FA during pregnancy can lead to serious clinical complications, including neural tube defect. The current study sought to assess the awareness, knowledge, and usage of FA among young females in Jazan region of Saudi Arabia. This cross-sectional descriptive study involved 472 adult females from October 1 to 9, 2023, in Jazan region, Saudi Arabia. The questionnaire of the study was randomly distributed among females. The data showed that awareness and usage of FA supplementation were poor to fair among females. Furthermore, socio-demographic variables, including age, marital status, monthly income, education levels, number of pregnancies, and current pregnancy status, were found to be associated with awareness and utilization of FA supplementation. The study highlights the need to enhance awareness and knowledge of FA supplementation among females in the Jazan region. Introducing educational programs is essential in Saudi Arabia, particularly in the Jazan region, to enhance the knowledge and awareness of FA within the community. *(Afr J Reprod Health 2024; 28 [12]: 175-185).*

Keywords: awareness; knowledge, usage, folic acid; Jazan region; Saudi Arabia

Résumé

L'acide folique (AF) joue un rôle crucial dans divers processus biologiques. Un apport insuffisant en AF pendant la grossesse peut entraîner de graves complications cliniques, notamment une anomalie du tube neural. La présente étude visait à évaluer la sensibilisation, les connaissances et l'utilisation de l'AF chez les jeunes femmes de la région de Jazan en Arabie Saoudite. Cette étude descriptive transversale a porté sur 472 femmes adultes, menée du 1er au 9 octobre 2023, dans la région de Jazan, en Arabie Saoudite. Le questionnaire de l'étude a été distribué au hasard parmi les femmes. Les données ont montré que la sensibilisation et l'utilisation de la supplémentation en AG étaient faibles à passables chez les femmes. En outre, des variables sociodémographiques, notamment l'âge, l'état civil, le revenu mensuel, le niveau d'éducation, le nombre de grossesses et l'état actuel de la grossesse, se sont révélées associées à la connaissance et à l'utilisation de la supplémentation en AG. L'étude met en évidence la nécessité d'améliorer la sensibilisation et les connaissances sur la supplémentation en AG chez les femmes de la région de Jazan. L'introduction de programmes éducatifs est essentielle en Arabie Saoudite, en particulier dans la région de Jazan, pour améliorer les connaissances et la sensibilisation à l'AF au sein de la communauté. *(Afr J Reprod Health 2024; 28 [28 [12]: 175-185).*

Mots-clés: sensibilisation ; connaissance, usage, acide folique ; région de Jizan ; Arabie Saoudite

Introduction

Folic acid (FA), also known as vitamin B9, is an essential nutrient that plays a crucial role in various biological processes, including the production of blood cells, amino acid synthesis, and nuclear division.[1] It is primarily found in various sources, including leafy vegetables, wheat, eggs, dairy

products, and various fruits such as bananas, kiwis, melons, apples, and oranges.[1,2] Its importance is particularly emphasized during pregnancy, as the demand for this vital vitamin significantly increases to support fetal development. Childbearing age women needs sufficient amount of FA. Insufficient intake of FA during pregnancy can lead to FA deficiency, as well as to serious medical complications for infants, including anencephaly and spina bifida, which arise from abnormalities in neural tube defect (NTD) formation.[2,3]

Anencephaly is characterized by a total or partial absence of the brain, while spina bifida involves a bony vertebral defect.[2] These NTDs can adversely affect the brain, spinal cord, and central nervous system, resulting in significant mortality and long-term disabilities.[2,3] To mitigate the risk of NTDs, women of childbearing age, particularly those planning to become pregnant, are recommended to consume a daily dose of at least 400 micrograms (0.4 milligrams) of FA, especially during the first trimester of pregnancy.[4] Moreover, the recommended daily dose of FA during the first trimester is increased to be between 4000 and 5000 micrograms (4–5 milligrams), especially if there is a history of NTDs.[4]

FA supplementation has been demonstrated to notably decrease the incidence of NTDs during pregnancy.[2] NTDs occur during the early developmental phase known as neurulation, occurring within the first 28 days post-conception—often before a woman is even aware that she is pregnant. The incidence of NTDs has declined over the years in many countries due to increased awareness and supplementation of FA.[2,4] In Saudi Arabia, the food fortification initiative of nutrients includes (i) minerals such as iron and calcium, (ii) vitamins such as FA, niacin, riboflavin, and thiamin (iii) and vitamin D to tackle and reduce the incidence of nutritional deficiency and subsequent complications including anemia and NTDs in the Saudi population.[5] This initiative significantly decreased the incidence rate of NTDs from 1.9/100 to 0.76/1000 from 2001 to 2005 and further to 0.44/1000 births from 2001 to 2010.[6,7] However, subsequent reports exhibited a slight increase in NTD incidence from 0.44 to 0.9/1000 births from 2010 to 2013.[8]

To further enhance awareness and knowledge regarding FA supplementation, the Ministry of Health in Saudi Arabia has developed educational strategies targeting women of childbearing age.[9] Despite existing initiatives and studies on the awareness, knowledge, and consumption of FA supplementation across various regions in Saudi Arabia, conflicting and inconsistent reports persist regarding the knowledge, awareness, attitudes, and motivational factors toward FA in different regions, including the Jazan region.[10–21] Despite the low incidence of FA deficiency among adult young females in Jazan region, the need and the increase of FA during pregnancy is a must to avoid many pregnancy complications and NTDs.[22] Consequently, the current study aimed to assess the awareness, knowledge, and usage of FA among young adult women in the Jazan region of Saudi Arabia. Additionally, it seeks to identify any association between socio-demographic variables and the understanding and utilization of FA supplementation. Addressing these gaps in knowledge and awareness regarding essential nutrients would contribute to the development of future public health strategies aimed at improving maternal and infant health outcomes in the region.

Methods

Study design

The current study is a cross-sectional performed from October 1 to 9, 2023, in Jazan City, Jazan region, Saudi Arabia. The study questions were closed-ended and adapted from previous studies with minor modifications.[10–21] A pilot study validated the questions, which were electronically distributed among female students, their families, and the public. The questionnaire comprised three main parts: the first part related to socio-demographic characteristics, the second part assessed knowledge, and the last part focused on awareness. The responses of the study participants were collected and kept anonymous in an Excel spreadsheet. The current study included adult females only and excluded males from the study.

Sample size calculation

The data from Saudi Arabia revealed that 50–61% of women were aware of FA[10,11,20,21,12–19]. A 10% level of significance for a two-sided test with 80% power

and a 6% allowable margin of error in the proportion of awareness about FA. Then, the following formula was used to calculate the sample size in the current study:

$$n = \left(\frac{Z_{1-\propto/2} + Z_{1-\beta}}{\lceil P_1 - P_0 \rceil / \sqrt{P_0 \, (1 - P_0)}} \right)^2$$

where α is the selected level of significance, and Z 1-α /2 is the value 1.645 at a 10% level of significance, 1-β is the selected power, and Z 1-β is the value 0.8416 at 80% power from the standard normal distribution. The absolute value of the difference |P1-P0| is the allowable margin of error taken at 6%. The calculated sample size was 426, and with a 10% non-response rate, the required number of females to participate in the study was 469. A total of 472 responses were received from the participants.

Ethical consideration

The ethical approval was obtained from the Scientific Research Ethics Committee, Jazan University (number REC-45/03/787). The study participants were informed about the study's aims and questions before starting to answer the questionnaire.

Statistical analysis

The responses of the study participants were collected and saved in a Microsoft Office 2019 Excel spreadsheet. Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 22.0 software (SPSS Inc., IBM, Chicago, Illinois, USA). Data were reported as frequencies and percentages. A p-value of <0.05 was considered statistically significant.

Results

Socio-demographic characteristics

A total of 476 adult participants (4 males and 472 females) completed the questionnaire. The males were excluded from the study, resulting in a final count of 472 female participants, whose socio-demographic characteristics are shown in Table 1. Out of the 472 females in the study, 30.7% aged 21–30 years, followed by 27.5% aged 31-40. Of the 472 females, 265 females were married (56.1%), 187 females were unmarried (39.6%), and divorced females were 20 (4.2%). Approximately 68.6% of the females participated in the study were living in urban areas. Regarding education, 75.4% of participants held a bachelor's degree. Additionally, 44.3% of females reported having never been pregnant, whereas 35.6% indicated being pregnant more than three times. During the survey time, 8.5% of the participating females were pregnant. Monthly income in Saudi riyals (SAR) showed that 33.9% earned between 5000 and 10000 SAR, followed by 25.8% earning less than 5000 SAR, 23.1% earning between 10000 and 15000 SAR, and 17.2% earning more than 15000 SAR.

Awareness and usage of folic acid supplementation

The awareness and usage of FA supplementation indicated that 47.9% of females were unaware of FA supplementation, while 87.7% were aware of the manifestations associated with pregnancy for both mother and fetus (Table 2). Furthermore, 36.2% of females reported using FA supplementation, while the remainder did not.

Association of socio-demographic variables with awareness and usage of folic acid among females

The association study of socio-demographic variables with awareness and usage of FA is shown in Table 3. Socio-demographic variables such as age, marital status, monthly income, number of pregnancies, and current pregnancy were highly significant (P<0.01) concerning females' awareness of FA. Adjusted odds ratios (AORs) indicated that older females (41–50 years) had greater odds of awareness compared to younger females (19–20 years; AORs: 7.91, 95% CI: 1.14–54.50). Additionally, married females demonstrated significantly higher odds than unmarried females (AORs: 78.40, 95% CI: 8.12–91.29, *P<0.01).* Females with a monthly income between 5000 and 10000 SAR had increased odds of awareness compared to those gaining less than 5000 SAR (AORs: 2.02, 95% CI: 0.54–7.54). Furthermore, females who had experienced three or more pregnancies exhibited higher odds of awareness regarding FA supplementation compared to those who had never been pregnant (AOR: 19.19, 95% CI: 4.67–23.38) (Table 3).

Table 1: Socio-demographic variables (frequency and percentage) of the study participants (n=472)

Variable		Frequency (472)	%
Age	19-20	80	16.9
	21-30	145	30.7
	31-40	130	27.5
	41-50	117	24.8
Residence	Rural	148	31.4
	Urban	324	68.6
Education	Secondary	171	36.2
	BSc	271	57.4
	Postgraduate	30	6.4
Specialty	Buss. Admin. Account	15	3.2
	Computer and IT	16	3.4
	Sciences and Human studies	37	7.8
	Health Sciences	82	17.4
	Others	322	68.2
Marital Status	Unmarried	187	39.6
	Divorced	20	4.2
	Married	265	56.1
Income	<5000	122	25.8
Saudi Riyals	5000-10000	160	33.9
	10000-15000	109	23.1
	>15000	81	17.2
No. of Pregnancies	0	209	44.3
	1	40	8.5
	2	55	11.7
	>3	168	35.6
Are you Pregnant	No	432	91.5
	Yes	40	8.5

Table 2: Awareness and usage of folic acid supplementation among females.

Variable	Total respondents (n=472)	
	Frequency (n)	Percentage (%)
Have you ever heard of folic acid (FA) supplements		
No	226	47.9
Yes, previously pregnant	220	46.6
Yes, now pregnant	26	5.5
Total	472	100.0
Have you ever heard FA deficiency complications to the mother and fetus during pregnancy		
No	57	12.1
Not Sure	1	0.2
Yes	414	87.7
Total	472	100.0
Do you take folic acid supplement or vitamin containing folic acid regularly? (at least once in a week)		
No	251	53.2
I Don't Know of the content of my current supplementation	50	10.6
Yes	171	36.2
Total	472	100.0

Table 3: Association of sociodemographic variables with awareness of folic acid among females.

Variable		OR (95% CI)	AOR (95% CI)
Age	19-20	-	-
	21-30	4.32 (1.92-9.69) **	8.53 (0.97-74.46)
	31-40	21.00 (9.24-47.74) **	4.96 (0.78-31.61)
	41-50	23.91 (10.36-55.15) **	7.91 (1.14-54.50)
Residence	Rural	-	-
	Urban	1.06 (0.72-1.56)	0.63 (0.21-1.84)
Education	Secondary	-	-
	BSc	1.11 (0.76-1.64)	1.05 (0.39-2.82)
	Postgraduate	0.45 (0.19-1.05)	2.34 (0.24-22.57)
Specialty	Buss. Admin. Account	-	-
	Computer and IT	1.2 (0.27-5.25)	24.86 (4.78-35.24)
	Sciences and Human studies	2.93 (0.83-10.32)	14.29 (0.77-263.68)
	Health Sciences	0.41 (0.12-1.39)	9.86 (0.46-207.19)
	Others	2.67 (0.89-7.97)	4.73 (0.63-35.75)
Marital Status	Un-married	-	-
	Divorced	79.71 (8.96-709.12) **	23.02 (0.86-615.36)
	Married	80.19 (10.46-90.04) **	78.40 (8.12-91.29) **
Income	<5000	-	-
	5000-10000	3.83 (2.31-6.34) **	2.02 (0.54-7.54)
	10000-15000	4.12 (2.37-7.16) **	0.83 (0.23-3.01)
	>15000	1.54 (0.85-2.79)	1.01 (0.210-4.86)
No. of Pregnancies	0	-	-
	1	14.53 (3.54-18.59) **	11.96 (2.02-19.58)
	2	13.19 (2.82-17.74) **	16.35 (3.86-21.45)
	3	10.72 (1.88-15.86) **	19.19 (4.67-23.38)
Are you pregnant	No	-	-
	Yes	3.00 (1.46-6.16) **	0.92 (0.21-3.98)

***P*<0.01

Table 4: Association of sociodemographic variables with the usage of folic acid among females

Variable		OR (95% CI)	AOR (95% CI)
Age	19-20	-	-
	21-30	2.37 (1.25-4.51) **	1.53 (0.72-3.28)
	31-40	2.75 (1.43-5.27) **	1.14 (0.51-2.56)
	41-50	2.78 (1.43-5.38) **	1.23 (0.53-2.88)
Residence	Rural	-	-
	Urban	0.94 (0.63-1.42)	1.07 (0.68-1.68)
Education	Secondary	-	-
	BSc	1.89 (1.25-2.85)**	1.77 (1.11-2.82) *
	Postgraduate	0.93 (0.38-2.24)	0.87 (0.31-2.41)
Specialty	Buss. Admin. Account	-	-
	Computer and IT	2.50 (0.59-10.61)	3.18 (0.62-16.22)
	Sciences and Human studies	0.72 (0.21-2.49)	0.44 (0.11-1.72)
	Health Sciences	0.66 (0.21-2.04)	0.73 (0.21-2.59)
	Others	0.86 (0.30-2.49)	0.62 (0.19-2.05)
Marital Status	Un-married	-	-
	Divorced	1.31 (0.45-3.82)	2.41 (0.71-8.17)
	Married	3.66 (2.38-5.63) **	7.02 (2.89-17.04) **

Income	<5000	-	-
	5000-10000	0.98 (0.60-1.60)	0.64 (0.36-1.13)
	10000-15000	1.15 (0.67-1.96)	0.67 (0.36-1.26)
	>15000	0.88 (0.49-1.60)	0.90 (0.45-1.79)
No. of Pregnancies	0	-	-
	1	3.69 (1.84-7.41) **	0.88 (0.31-2.43)
	2	2.52 (1.36-4.66) **	0.69 (0.26-1.84)
	3	2.26 (1.46-3.51) **	0.61 (0.24-1.48)
Are you pregnant	No	-	-
	Yes	2.09 (1.49-5.64) **	2.51 (1.14-5.54)*

*P<0.05, **P<0.01

Table 5: Knowledge, timing, and recommended dose of folic acid deficiency during pregnancy (multiple answers).

Domain	Variable	Frequency	%
	Anemia	148	31.4
	Birth of low-weight child	43	9.1
Knowledge	Congenital abnormalities	184	39.0
	Death after birth	8	1.7
	Neural tube defects or spinal bifid	89	18.9
	Three months before pregnancy or during the first trimester	79	16.7
Timing of folic acid supplementation to prevent NTDs	During the second trimester	0	0
	During the third trimester	242	51.3
	I don't know	151	32.0
Recommended dosage of folic acid supplement during pregnancy	1 mg once a day	11	2.3
	40 mcg twice a day	13	2.8
	400 mcg once a day	187	39.6
	I don't know	261	55.3

Table 6: Sources and information of folic acid.

	Variable	Frequency	%
	Fruits	93	19.7
	Leafy vegetables	123	26.1
Natural sources for getting folic acid	Red meat	38	8.1
	Rice and starch	6	1.3
	I don't know	212	44.9

The association study of the socio-demographic variables with the usage of FA is shown in Table 4. Socio-demographic variables such as age, marital status, education, number of pregnancies, and current pregnancy were highly significant (P<0.01) with females' usage of FA. The AOR depicted that older females (41–50 years) had higher odds than those younger females (19–20 years; AOR: 1.23, 95% CI: 0.53–2.88). Females with a BSc education had higher chances compared to those with other qualifications of FA usage (AOR: 1.77, 95% CI: 1.11–2.82). In addition, married females had greater odds compared to those for unmarried females (AOR: 7.02, 95% CI: 2.89–17.04, P<0.01), and the number of pregnancies among females had higher odds of the usage of FA (Table 4).

Knowledge of folic acid deficiency during pregnancy among females

Of the females, 39% indicated that FA deficiency leads to congenital abnormalities, while 31.4% indicated that it caused anemia, followed by 18.9% who identified NTD as the effect (Table 5). However, since the questions permitted multiple responses, none of the females selected more than one answer.

Timing and recommended dose of folic acid supplementation to prevent the development of pregnancy complications

Among the females surveyed, 83.3% provided incorrect responses, with 51.3% selecting the use of FA supplementation during the third trimester and 32.0% stating that they did not know (Table 5). Only 16.7% selected the correct timing of use, either three months before pregnancy or during the first trimester. Of the females, 39.6% knew that 400 mcg once a day is the recommended dose, while 55.3% confessed that they did not know (Table 5).

Source of folic acid

The source of FA was not known by 44.9% of females, while 26.1% identified leafy vegetables as a source (Table 6).

Source of information regarding folic acid

The two primary sources of information were Obstetrics and Gynecology and the Internet and social media, with 36.2% and 32.2%, respectively (Table 7). Other sources included Family and Friends, the Saudi Ministry of Health, and School and College.

Discussion

The current study reported low to fair awareness (52.1% aware compared to 47.9% not aware) of FA supplementation among adult females in the Jazan region. This 47.9% is comparable to a nationwide study in Saudi Arabia, which reported low awareness of FA among females (45.7%).[18] However, the awareness is significantly lower than the levels reported in Jeddah City (81.1%), Qassim City (88.4%), Sakaka City (89.3%), Riyadh City (91.0%), and Hail City. Although awareness of FA was low to fair, 87.7% of females recognized that FA plays a role in preventing the development of NTDs during pregnancy, which is slightly higher than the results reported in Riyadh City (81.0%), and Sakaka City (74.8%) and more favorable than other reports in Saudi Arabia.[15,19,23–25]

Furthermore, a study in Riyadh in 2012 involving 4000 women showed 58% awareness of FA supplementation during pregnancy, and 50.2% identified the role of FA in preventing congenital anomalies, including NTDs.[26] In comparison to neighboring countries, a study in Abu Dhabi, UAE, among 277 pregnant women, showed that 70.1% were aware of FA, but only 46.6% knew that it prevented NTDs.[27] In Cairo, Egypt, among 660 pregnant women, 62.4% were aware of FA, and 39.2% knew its role in preventing congenital anomalies.[28] The reasons for differences in the awareness and knowledge between this study and others could be attributed to marital status, education level, and living area. In the current study, 31.4% of females reside in rural areas of the Jazan region, 39.6% are unmarried, and 36.2% have only secondary education. Indeed, the area of residence is a key factor in accessing better resources and educational services.[15,27] Moreover, women in urban areas have been reported to have better awareness compared to those in rural areas.[15] The level of education was statistically correlated with knowledge and awareness of FA supplementation.[24,28,29]

The correct dose of FA supplementation was known to 39.5% of females, which is better than reported among those in Riyadh City, while it is low compared to a study from Jeddah City, which reported 57.3%.[15,30] The timing of FA intake is crucial, as FA is highly recommended before pregnancy or during the first 3 months of pregnancy.[4] Therefore, the current study reported limited knowledge regarding the timing of FA supplementation. Previous reports have shown that timing is an issue for females.[24,30] The insufficient knowledge of FA supplementation timing reported was very low among 1000 adult females aged 18 to 45 years old .[24] In Jeddah, weak knowledge was among 44% of females with planned pregnancies in the future.[30]

The current study reported a significant association between awareness and usage of FA with several socio-demographic variables, including age, marital status, monthly income, education, number of pregnancies, and current pregnancy. Another study has also reported a significant association with pregnancy experience.[30] Indeed, awareness and usage of FA supplementation are highest among married and pregnant women, which is consistent with a nationwide study in Saudi Arabia.[18,19] However, it is noteworthy that 63.5% of females in the current study are not taking FA supplementation or are unaware of the content of their current

supplementation, which is comparable to previous reports.[8,30] The natural sources of FA were identified by only 26.1% of females, and 44.9% did not know the source of FA, which is very low compared to other reports from Saudi Arabia.[30] Monthly income is found to be associated with FA awareness, which differs from the report from Hail City.[19]

The current study reported that the primary sources of information were mainly obtained from Obstetrics & Gynecology, Internet and social media. Previous reports have indicated that healthcare providers are the most common source of information regarding FA.[15,18,19,30] Future studies in the Jazan region should comprehensively examine the knowledge, awareness, attitudes, motivational factors, and usage of FA among a larger cohort of females to provide a more accurate and detailed understanding of FA supplementation. Additionally, it is crucial to investigate the associations between socio-demographic variables and these factors. Implementing educational programs is imperative in Saudi Arabia, particularly in the Jazan region, to enhance the levels of knowledge, attitude, awareness, usage, and motivational factors related to FA within the communityThe current study reported low to fair awareness (52.1% aware compared to 47.9% not aware) of FA supplementation among adult females in the Jazan region. This 47.9% is comparable to a nationwide study in Saudi Arabia, which reported low awareness of FA among females (45.7%).[18] However, the awareness is significantly lower than the levels reported in Jeddah City (81.1%), Qassim City (88.4%), Sakaka City (89.3%), Riyadh City (91.0%), and Hail City. Although awareness of FA was low to fair, 87.7% of females recognized that FA plays a role in preventing the development of NTDs during pregnancy, which is slightly higher than the results reported in Riyadh City (81.0%), and Sakaka City (74.8%) and more favorable than other reports in Saudi Arabia.[15,19,23–25]

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reports.[8,30] The natural sources of FA were identified by only 26.1% of females, and 44.9% did not know the source of FA, which is very low compared to other reports from Saudi Arabia.[30] Monthly income is found to be associated with FA awareness, which differs from the report from Hail City.[19]

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Future studies in the Jazan region should comprehensively examine the knowledge, awareness, attitudes, motivational factors, and usage of FA among larger cohort of females to provide a more accurate and detailed understanding of FA supplementation. Additionally, it is crucial to investigate the associations between socio-demographic variables and these factors. Implementing educational programs is imperative in Saudi Arabia, particularly in the Jazan region, to enhance the levels of knowledge, attitude, awareness, usage, and motivational factors related to FA within the community.

Conclusion

The current study reveals the need to enhance awareness and knowledge of FA supplementation among females in the Jazan region. This objective can be achieved through various approaches, including awareness campaigns, education during healthcare visits, particularly for childbearing females, and increased educational materials in schools and colleges.

Ethics approval and consent to participate

The current study was approved by the Scientific Research Ethics Committee (number REC-45/03/787), Jazan University.

Competing Interests

The authors declare no conflict of interest.

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Author contributions

All authors contributed significantly to the study.

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