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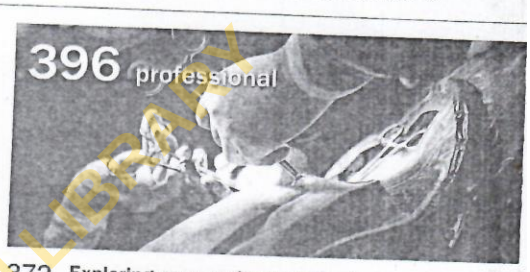

Knowledge and uptake of folic acid among pregnant women attending a secondary health facility in Nigeria

Abstract

Background Folate deficiency is associated with poor pregnancy outcomes and is one of the most common vitamin deficiencies in women, especially those of reproductive age.

Aims This study aimed to determine the level of knowledge and uptake of folic acid among a sample of pregnant women.

Method A descriptive cross-sectional study, using a structured questionnaire, was carried out among 300 pregnant women attending antenatal clinics in one hospital in Oluyoro, Ibadan, Nigeria.

Findings All participants claimed to have heard of folic acid and major source of information was health workers (77.3%). Only 11.8% knew that folic acid can prevent birth defects and just 22.7% knew the best time to start using folic acid. Almost all the women (98.3%) reported using folic acid in the current pregnancy, of whom 54.2% used it as prescribed. Education (P=0.002), marital status (P=0.001), plan of pregnancy (P=0.022), and maternal age (P=0.046) were significantly associated with knowledge of folic acid. Employment status was significantly associated with uptake of folic acid (P=0.004).

Conclusions In this study, knowledge and uptake of folic acid was low among young, single and low education status women. Campaigns promoting periconceptional use of folic acid will be very useful in reaching women of child-bearing age particularly those pregnant and not registered for antenatal care.

Keywords

Folic acid | Knowledge | Uptake

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Folate is an essential micronutrient that cannot be biosynthesised by human body and must be obtained either from diet or from supplements; it is required for fetal body metabolism, growth, and development in pregnant women (Naithani et al, 2016).

The relationship between serious birth defects and their prevention by folic acid is well established. Several studies, including randomised control trials and observational studies, have shown that maternal intake of folic acid supplements before and early in pregnancy reduces the risk of neural tube defects in infants. Children with severe birth defects have a 15-fold increased risk of death during the first year of life, and studies have estimated that approximately 9–10% of such children die during this period (Copp and Greene, 2010).

Women who could become pregnant are advised to eat foods fortified with folic acid or to take supplements in addition to eating folate-rich foods. Taking 400mg of synthetic folic acid supplementation daily has been suggested by the World Health Organization (WHO) (2012). Despite WHO recommendation, the use of iron and folic acid supplementation is still low in many countries, especially those with low resources (Ogundipe et al, 2012).

Many studies have shown poor periconceptional use of folic acid among pregnant women in Nigeria (Anzaku, 2013; Lawal and Adeleye, 2014). To ensure adequate level of folic acid, public health interventions surrounding supplementation and food fortification become necessary. The best public health interventions must target all women of reproductive age.

This study aimed to determine the level of knowledge about the usefulness of folic acid and in a sample of women in the child-bearing age, and to measure the uptake of folic acid in this group.

Materials and methods

The study was cross-sectional in design and a total population survey was conducted. Pregnant women attending antenatal clinics in Our Lady of Apostle Catholic Hospital, Oluyoro, Ibadan gave their consent and were enrolled in the study until the desired sample

size of 300 was reached. Information was obtained on the sociodemographic and obstetric characteristics of the women, and data were also collected on the knowledge and uptake of folic acid.

Selection of study participants

A total population survey of women attending antenatal clinic at the selected health facility was taken. All women registered in the hospital for antenatal care who gave their consent were recruited for participation, irrespective of the time of booking and gestational age.

Data management procedures

Data collected were coded and analysed using SPSS v17.0. Frequencies were used to summarise demographic and obstetrics characteristics, knowledge of folic acid and uptake among participants. Descriptive statistics such as means and standard deviations were used to summarise quantitative variables, such as mean age of participants. Independent sample t-test and ANOVA-f test were used to compare mean knowledge score of the study subjects. A χ^2-test was used to check for association between uptake of folic acid intake and sociodemographic/obstetric characteristics. Statistical significance was set at 5%.

Folic acid awareness in this study was defined as having ever heard of folic acid. Knowledge of folic acid was defined as knowing that folic acid can prevent neural tube defects and knowing the right time to start use of folic acid (before pregnancy) (Ren et al, 2006). Correct answers were scored two points, and the wrong answers were scored one point. A total of four points was the maximum obtainable score for knowledge. Uptake of folic acid use in this study was defined as following the prescription (daily use) from health workers.

Results

Sociodemographic characteristics

The mean age of the study participants was 30.0 ± 4.6 years. More than one-third of the respondents were in the age group 25–29 years (35.3%) or aged 30–34 years (35.0%). The majority of the study participants had tertiary education and above (65.7%). Most of the study participants were employed (83.3%), and majority were married (93.0%). The study participants were predominantly Yoruba (76.3%). The predominant religion of the study participants was Christianity (77.0%) (*Table 1*).

Table 1. Socio-demographics and obstetrics characteristics (n=300)

Characteristics	Frequency
Age (years)	
≤24	35 (11.7%)
25–29	106 (35.3%)
30–34	105 (35%)
≥35	54 (18%)
Education	
Secondary school or below	103 (34.3%)
Tertiary	197 (65.7%)
Employment status	
Employed	250 (83.3%)
Unemployed	50 (16.7%)
Marital status	
Married	279 (93%)
Others	21 (7%)
Ethnicity	
Yoruba	229 (76.3%)
Hausa	2 (0.7%)
Ibo	57 (19%)
Others	12 (4%)
Religion	
Christianity	231 (77%)
Islam	69 (23%)
Parity	
0	126 (42%)
1	78 (26%)
2	59 (19.7%)
≥3	37 (12.3%)
Gestational age at booking	
<13 weeks	94 (31.3%)
13–24 weeks	172 (57.3%)
≥25 weeks	34 (11.3%)
Was this pregnancy wanted?	
Yes	298 (99.3%)
No	2 (0.7%)
Did you plan to have this pregnancy?	
Yes	254 (84.7%)
No	46 (15.3%)

Obstetric characteristics

Table 1 also showed that majority of the participants (42.0%) were primigravid. More than half (57.0%) of the participants reported booking for antenatal care in the second trimester of their current pregnancy, while 31.3% reported booking in the first trimester. Almost all (99.3%) of the respondents reported that they wanted their current pregnancy. More than four-fifths (84.7%) of the study subjects reported that they planned their current pregnancy.

Awareness and knowledge

All participants (100%) reported to have heard of folic acid (*Table 2*). The major source of information about

Table 2. Awareness and knowledge of folic acid (n=300)

Characteristics	Frequency
Ever heard of folic acid?	
Yes	300 (100%)
No	0 (0%)
Use folic acid before current pregnancy?	
Yes	9 (3%)
No	291 (97%)
Duration of use	
3 months before pregnancy	6 (66.7%)
1 week before pregnancy	3 (33.3%)
Source of information*	
Pharmacist	14 (4%)
Family/friends	39 (11.1%)
TV/radio/internet	9 (2.6%)
Doctor/nurse/hospital	272 (77.3%)
Newspaper/magazine/books	18 (5.1%)
Benefit of taking folic acid*	
Maintains blood	128 (24%)
Prevents birth defects	63 (11.8%)
Protects against anaemia	87 (16.3%)
Bones development	101 (18.9%)
Growth and development of embryo	154 (28.9%)
Adverse effects of insufficient intake of folic acid*	
Swelling at the back of neck	31 (25%)
Inability of the lips to close	14 (11.3%)
Inadequate blood quantity	79 (63.7%)
Aware of food sources rich in folic acid	
Yes	182 (60.7%)
No	118 (39.3%)
Food are rich in folic acid *	
Fish	56 (30.8)
Fruits	90 (49.5)
Liver	53 (29.1)
Milk	36 (19.8)
Green leafy vegetables	90 (49.5)

* Multiple response question

folic acid was health workers (77.3%), which included doctors and nurses in hospitals. A further 2.6% heard from the media (TV/radio/internet).

Table 2 also revealed that more than one-third (45%) of the participants agreed that a woman should start using folic acid in the first trimester of pregnancy, or responded that a woman should start using folic acid before pregnancy. Many of the study participants (28.9%) reported that folic acid is good for the growth and development of the embryo, and 11.8% said that it can prevent birth defects. Approximately three-fifths (60.7%) of participants reported that they were aware of food sources rich in folic acid. Out of the 182 respondents that reported being aware of food sources rich in folic acid, about half (49.5%) said that fruits contain folic acid.

Uptake

Table 2 revealed that all the study participants (100.0%) reported that they had ever taken folic acid while 98.3% (n=295) reported that they were using folic acid at the time (*Table 3*). Only 9 respondents (3%) reported that they used folic acid before pregnancy; the earliest at 3 months (n=6, 66.7%) before pregnancy and the latest at 1 week (n=3, 33.3%) before pregnancy. A little less than half of the participants (47.1%) reported that they started using folic acid in the first trimester of their current pregnancy. More than half (54.2%) of the study participants reported that they used their folic acid tablets daily as prescribed by the doctor. The majority of the participants (52.0%) reported that they ate vegetables every other day. More than half (63.0%) of the participants reported that they eat fruits daily.

Knowledge score by sociodemographic and obstetric characteristics

Table 4 shows that the overall mean knowledge score of the participants was 2.89 ± 0.68. Mean knowledge score increased across the age categories and this was statistically significant (f=3.11, P<0.05). The mean knowledge score increased significantly across the education group, with those that had secondary education and below having a mean knowledge score of 2.71 ± 0.63 and those that had tertiary education having a mean knowledge score of 2.97 ± 0.70 (t=-3.122, P<0.05). In this study, participants that were employed had a higher mean knowledge score of 2.90 ± 0.68 than those that were unemployed (mean knowledge score of 2.80± 0.70). However, the difference observed was not significant (t=0.980, P>0.05). Those that were married in the study had a higher mean knowledge score of 2.90 ± 0.67 than those that were not married (2.42 ± 0.68) (t=3.299, P<0.05).

The mean knowledge score increased across the gravidity group but this was not statistically significant (t=-1.421, P>0.05). Among the study participants, those who planned their pregnancy had a higher mean knowledge score (2.93 ± 0.68) than those that reported that their pregnancy was unplanned (mean knowledge score= 2.67 ± 0.70, t=-2.307, P<0.05). Mean knowledge of folic acid decreased across the group according to the time of booking for antenatal care, with the participants who booked in the first trimester having the highest mean knowledge score (2.96 ± 0.67), and those who booked in the third trimester having the lowest mean knowledge score (2.71 ± 0.58). This, however, was not statistically

significant (f=1.524, P>0.05). Respondents that used folic acid daily had higher knowledge score than those who did not use daily. Although, this finding was not statistically significant. These data can be seen in *Table 4*.

Uptake by sociodemographic and obstetric characteristics

The highest proportion of participants reporting daily folic acid use (58%) was among those with secondary education and below (χ^2=0.817, *P*>0.05) (*Table 5*). Among the study participants that were employed, the proportion that used folic acid daily was 58% (χ^2=8.181, *P*<0.05). The proportion of primigravid women that used folic acid daily was 52% and the proportion of multigravid women used folic acid daily was 55% (χ^2=0.265, *P*>0.05).

About two-thirds (66%) of women who reported not planning their pregnancy used folic acid daily, while more than half (52%) of study participants that reported planning their current pregnancy used folic acid daily (χ^2=2.838, *P*>0.05) (*Table 5*). The proportion of participants aged less than 25 years that used folic acid daily was 56%, while folic acid was taken daily by 51% of study participants aged between 25–29 years, 55% of those aged 30–34 years and 58% of study participants aged 35 years or more (χ^2=0.887, *P*>0.05).

Folic acid was taken daily by a little less than half (49%) of study participants who reported booking for antenatal care in the first trimester; 54% of study participants who reported booking for antenatal care in the second trimester and more than two-thirds (68%) of study participants who reported booking for antenatal care in the third trimester (χ^2=3.512, P>0.05 (*Table 5*).

Table 3. Uptake of folic acid

Variable	Frequency
Drugs being used in current pregnancy*	
Folic acid	295 (98.3%)
Iron	288 (96%)
Calcium	283 (94.3%)
Multivitamin	83 (27.6%)
Gestational age of commencing folic acid	
<13 weeks	140 (47.1%)
13–24 weeks	145 (48.8%)
≥25 weeks	12 (4%)
Frequency of use of folic acid	
Daily	160 (54.2%)
Others	135 (45.8%)
Number of meals vegetables are eaten	
1 meal/week	25 (8.3%)
2–3 meals/week	101 (33.7%)
4–6 meals/week	69 (23%)
>6 meals per week	105 (35%)
Frequency of consumption of vegetables	
Daily	104 (34.7%)
Every other day	156 (52%)
Once a week	36 (12%)
Less than once a week	4 (1.3%)
Number of times fruits are taken weekly	
Daily	189 (63%)
Every other day	100 (33.3%)
Once a week*	7 (2.3%)
Less than once a week	4 (1.3%)

* Multiple response question

Discussion

Folic acid supplementation is highly effective in optimising folate status, but supplementation is currently not an effective strategy in primary prevention of folate deficiency because of poor compliance with drug regimen.

Awareness of folic acid was 100% in this study. This finding is similar to another study in Nigeria where authors noted that most women of childbearing age had heard of folic acid (Lawal and Adeleye, 2014). This study finding is higher than studies in Saudi Arabia (Al-Hakeem, 2012), India (Deepti et al, 2013) and Iran (Riazi et al, 2012) that revealed awareness levels of 58%, 36.6% and 26.4% respectively. The high levels of awareness in this study could be because the study was carried out in a secondary health facility, where most of the respondents were literate and had been informed about folic acid in hospital. This study also showed that pre-conceptional use was very low: only 9 (3%) used folic acid before pregnancy. This is lower but comparable to the 15.6% reported by Jou et al (2010) and the 14.9% found by Liang et al (2011).

In relation to the source of information, the study findings revealed that health workers are the major source of information about folic acid. This finding is similar to those reported in other studies (Jou et al, 2010; Al-Hakeem, 2012; Riazi et al, 2012; Deepti et al, 2013; Anzaku 2013; Lawal and Adeleye, 2014). This reinforces the role of health workers in informing, educating and communicating with women about their health.

Although awareness was very high, it did not translate to knowledge. Only 11.8% of women knew about the role of folic acid in preventing birth defects, comparable to a study by Lawal and Adeleye, in which 3.0% of women knew that folic acid can prevent birth defects. This result is lower than levels of knowledge reported by Al-Hakeem (2012) in Saudi Arabia (50.2%), Liang et al (2011) in China (49.7%) and Anzaku (2013) in Nigeria (49.7%). Health workers need to explain to women the importance of folic acid to improve knowledge, and adherence to medication.

Table 4. Knowledge scores by selected sociodemographic and obstetrics characteristics (n=300)

Characteristics	Frequency	Mean knowledge score	*P* value
Maternal age (years)			
≤24	35	2.60 ± 0.69	0.046*
25–29	106	2.93 ± 0.69	
30–34	105	2.85 ± 0.65	
≥ 35	54	3.06 ± 0.68	
Education			
Secondary school and below	103	2.71 ± 0.63	0.002*
Tertiary	197	2.97 ± 0.70	
Employment status			
Employed	250	2.90 ± 0.68	0.328
Unemployed	50	2.80 ± 0.70	
Marital status			
Married	279	2.92 ± 0.67	0.001*
Others	21	2.42 ± 0.68	
Gravidity			
Primigravida	126	2.83 ± 0.73	0.188
Multigravida	174	2.93 ± 0.65	
Plan of pregnancy			
No	46	2.67 ± 0.70	0.022*
Yes	254	2.93 ± 0.68	
Use of folic acid			
Daily	169	2.93 ± 0.69	0.24
Others	135	2.84 ± 0.67	
Gestational age at booking			
First trimester	94	2.96 ± 0.67	0.22
Second trimester	172	2.88 ± 0.71	
Third trimester	34	2.71 ± 0.58	

* Statistically significant at $P<0.05$

A low percentage of the women (22.7%) in this study were aware of the right time to start using folic acid comparable to the 23.6% and 29.2% reported by Anzaku (2013) and, Lawal and Adeleye (2014) respectively. This is however lower than the 34.6% reported by Liang et al (2011) and 80.5% reported by Lauria et al (2014).

Less than half (40.3%) of the study respondents reported that they would prefer to take folic acid in food rather than as tablets, while 56% said that they would prefer to have folic acid included as part of the other drugs that they take during pregnancy. About half of the women use their folic acid supplements as prescribed, which is more than the 31% reported by Barbour et al, 2012; while a fair percentage tends to obtain the needed folic acid from daily intake of fruit and vegetables. The percentage of women reporting intake of folic acid in food is comparable with the proportion reported among cases and control in the study of Yin et al (2011).

This study showed that majority (98.3%) of women were using folic acid supplements in their pregnancy. This is consistent with other studies (Auriel et al, 2011; Abdullahi et al, 2014; Lauria et al, 2014).

Although the majority of the women were taking folic acid in their pregnancy, most started at second trimester, at which time the protective effect of folic acid against birth defect is reduced. This finding is low compared to that reported by Jou et al (2011), who found that many of the women used folic acid early in pregnancy.

Level of education was closely associated with knowledge of the importance of folic acid (*Table 6*). This finding is similar to the studies by Al-Hakeem (2012) among Saudi Arabia women and Hisam et al (2014). A low level of maternal education has been identified as possible risk factors for neural tube defects during pregnancy (Almeida et al, 2010) due in part to poor knowledge about the importance of folic acid among women with low education. In contrast, women with a high level of education are more likely to have more access to information, health facilities and services.

There was no significant association between folic acid use and various sociodemographic variables except employment status (*Table 6*). Women who were employed used folic acid more appropriately. Although there was no association between folic acid use and education in this present study, women that had more years of education used folic acid more appropriately as prescribed than women of lower education status. This could be because these educated women have better access to information and healthcare services.

Although there was no association between folic acid uptake and plan of pregnancy, women who planned their pregnancy were found to use folic acid more appropriately, as prescribed by health professionals (*Table 6*). This finding is different from those reported by Almeida et al (2010) and Herrman et al (2011), who found that use of folic acid supplementation was impaired by plan of pregnancy and awareness about folic acid.

Maternal age did not affect folic acid uptake in the present study. However, women who were older used folic acid more appropriately than older women, a finding is similar to Taye et al (2015). Additionally, women who booked antenatal care in the second trimester tended to use folic acid as recommended; this may be due to the fact that many of the respondents booked in the second trimester. In general, women should be encouraged to register early for antenatal care.

Table 5. Association between uptake of folic acid with selected sociodemographic and obstetrics characteristics (n=300)

Characteristics	Daily use	Non daily use	Total	*P* value
Education				
Secondary school and below	59 (58%)	43 (42%)	102	0.366*
Tertiary	101 (52%)	92 (48%)	193	
Employment status				
Employed	143 (58%)	104 (42%)	247	0.004
Unemployed	17 (35%)	31 (65%)	48	
Gravidity				
Primigravida	64 (52%)	58 (48%)	122	0.607*
Multigravida	96 (55%)	77 (45%)	173	
Plan of pregnancy				
No	29 (66%)	15 (34%)	44	0.092*
Yes	131 (52%)	120 (48%)	251	
Maternal age (years)				
≤24	19 (56%)	15 (44%)	34	0.829*
25–29	53 (51%)	51 (49%)	104	
30–34	57 (55%)	47 (45%)	104	
≥35	31 (58%)	22 (42%)	53	
Gestational age at booking				
First trimester	45 (49%)	47 (51%)	92	0.172*
Second trimester	92 (54%)	77 (46%)	169	
Third trimester	23 (68%)	11 (32%)	34	

* Statistically significant at $P<0.05$

Conclusion

Without knowing the why folic acid supplements are prescribed, it could be less likely that women of reproductive age would follow prescription/adhere to medication. However, while increase in awareness is clearly important, behavioural change will and should be the ultimate aim in increasing folate uptake periconceptionally.

It has been known for some time that optimising blood folate around the time of conception and in the early weeks of pregnancy can significantly reduce the chance of pregnancy affected by neural tube defects and other child malformations. The crucial message is the need for periconceptional folic acid, as once a pregnancy has been confirmed it is probably too late for folic acid to be protective.

Despite recommendations that women who book antenatal care should take folic acid, knowledge about the importance and correct timing of folic acid supplements is poor among the women and only a little more than half of the women are following the recommendations. Vulnerable groups of women, such as those of low educational status, young women and primigravid women should be the target of message or

Table 6. Linear regression of characteristics significantly associated with knowledge of folic acid

Variable	Regression coefficient, b	Non daily use Lower	Total Upper	*P* value
Age	1.580	-0.017	0.155	0.115
Education	2.189	0.018	0.348	0.029*
Marital status	-1.981	-0.632	-0.002	0.049*
Plan of pregnancy	1.661	-0.034	0.398	0.098

*Predictors of knowledge of folic acid

information about folic acid (its importance and role, timing and proper usage). In the absence of fortification programmes, further research is needed to identify successful approaches to increase intake of folic acid.

Recommendations

Health workers and the Government have to make use of the media to sensitise women of reproductive age on the importance of folic acid. The Nigerian Government should join all other governments to enforce mandatory

Key points

- Folate deficiency is one of today's most common vitamin deficiencies in women, especially those of reproductive age. Women who consume low levels of folate are at risk of poor pregnancy outcomes
- Periconceptional use of folic acid is very low among women of reproductive age due to poor knowledge of the importance of folic acid and its protective role against birth defects
- Many pregnant women have heard of folic acid during antenatal care but many of them do not follow prescription of daily use
- There is need for continuous awareness of the importance of folic acid and best time of use when it is effective

fortification of folic acid to reach a wider population. In the absence of mandatory fortification, national campaigns to increase knowledge and use of folic acid among women should be intensified and adequately funded by the Government.

Since many women do not hear about folic acid until booking for antenatal clinics, campaigns (through media, public health education) promoting the use of folic acid supplements will be very useful in reaching women of child-bearing age and pregnant women not registered for antenatal care. These campaigns will also improve the knowledge of those already registered for antenatal care and will therefore bring about behavioural change. BJM

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