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The use of folic acid in the prevention of spinal bifida. Knowledge, attitude, and practice of women of childbearing age in low income rural communities

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folic acid, spinal bifida, childbearing age, prevention

ABSTRACT

Background. Spinal Bifida is a congenital malformation of the spine that typified defect of the neural tube with devastating neurological, psychosocial and developmental burden to the growing child with associated huge financial burden to the parents, community and the country. Past and present studies have shown strong evidence to indicate that folic acid supplementation during the periconceptional period reduces the occurrence of spinal bifida in children.

Aim. To assess the knowledge, attitude, and practice of use of folic acid during the periconceptional period among women of childbearing age in two rural communities in Edo State, Nigeria.

Materials and methods. A prospective cross-sectional study of 170 women between the ages of 15 and 49 years recruited through a multi-stage sampling technique. The survey instrument was a structured interviewer-administered questionnaire. The data was analysed using Statistical Package for Social Sciences (SPSS) version 21 and presented as charts, tables, and associations tested with Chi-square at a statistical level of significance set at $p<0.05$.

Results. One hundred and twenty-two (71.8%) of the respondents showed good knowledge, 147(86.5%) had a positive attitude, and 106 (62.4%) had a good practice of use of folic acid. There was a statistically significant association between respondents' age, marital status, level of education, occupation, and their knowledge of the use of folic acid as well as with their attitude towards the use of folic acid. However, the practice was mainly associated with the socio-demographic variable of each household.

Conclusion. The use of folic acid during the perinatal period for the prevention of

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spinal bifida is found to be absent in about two-fifths of the study population, a number found to be alarming despite the high level of good knowledge and attitude towards the use of folic acid. There is, therefore, an urgent need to step up more advocacy and health education to women of childbearing age to increase the uptake of folic acid for effective reduction of the incidence of spinal bifida.

Introduction

Spinal bifida is part of a group of birth defects called neural tube defects (NTDs) which are caused by the abnormal closure of the embryonic neural tube between 22 and 28 days after conception.[1] The neural tube is the embryonic structure that eventually develops into the baby's brain and spinal cord as well as adjacent tissues. There are two major types of spinal bifida: spinal bifida occulta as seen when the vertebral defect or malformation is covered by skin and hence hidden, and spinal bifida cystic characterized by a cystic protrusion. Spinal bifida cystic is further subdivided into meningocele in which the protrusion contains meninges and cerebrospinal fluid, and may or may not be covered by skin or myelomeningocele is the most severe form where the protrusion which contains spinal cord and nerves is exposed to the exterior.[2] The worldwide incidence of spinal bifida varies between 0.17 and 6.39 per 1000 live-births.[3] In Nigeria, however, the general incidence of neural tube defects has been reported at rates of 2.75 to 7 per 1000 livebirths.[4,5]

Past and ongoing studies have shown that the use of folic acid has significantly reduced the occurrence of spinal bifida and other neural tube defects. The relationship between apparent folate deficiency and spinal bifida was hypothesized as early as 1965. This prompted the conduction of randomized control trials by the medical research council where they found that women with the previous history of NTD-related pregnancies reduced the risk of occurrence by 70% by taking 4000 micrograms of folic acid daily. In 1984, Hungarian randomized control trial found 100% reduction in risk of having the first occurrence of NTD-affected pregnancy among women who took 800 micrograms of folic acid daily [6,7] although the exact mechanism by which folic acid prevents spina bifida, and other NTDs is still not known, its role in the synthesis, repair, and methylation of DNA especially in rapidly growing cells is instructive. The world health organization recommends that all women of childbearing age consume 400 micrograms of folic daily and that women with pregnancies previously affected by NTDs consume 5000 micrograms of folic acid daily.[8] Women should consume these amounts in the periconceptional period as it takes eight weeks to reach the optimal serum level of folic acid.[9]

Methodology

This is an eight-month (June 2017 to January 2018) prospective cross-sectional study involving 170 women of child bearing age attending the Primary Health Care Facility at Usugbenu and Opoji, Edo Central Senatorial District, Edo State, Nigeria. This study was carried out by the use of an interviewer-administered questionnaire with emphasis on the following areas: Knowledge of use of folic acid in the prevention of spinal bifida among women of child bearing age, compliance to use of folic acid among women of childbearing age, and factors that influence use of folic acid among women of child bearing age.

Data were analyzed using SPSS version 21. Descriptive and inferential statistics were used to describe and interpret the data with the level of statistical significance set at $p<0.05$.

Results

Majority of the respondents 90 (52.9%) were between age 30-39, while only 5 (2.9%) were less than 20 years. All the respondents 170 (100%) were females. Those married were 131 (77.1%) while 4 (2.4%) were cohabiting. A total of 84 (49.4%) respondents had secondary education, while 34 (20%) has primary education. Most of the respondents 79(46.5%) were self-employed while 6(3.5%) were students. Most of the respondents had been pregnant 70(41.2%) while a total of 19(11.2%) had not been pregnant before. (Table 1).

Majority 127 (74.7%) have not had Spinal bifida child, while 43 (25.3%) have had a Spinal bifida child in the past (Figure 1). Seventy-nine (46.5%) said they had had a Miscarriage while 91(53.5%) said they had not had any Miscarriage (Figure 2).

In scoring for "KNOWLEDGE," 11 points were considered from the questionnaire, and a score of > 7 points was graded as "GOOD," a score of 5 -7 was graded as "FAIR," while a score of < 5 was graded as "POOR." In scoring for "ATTITUDE," 8 points were considered from the questionnaire, and a score of >4 was graded as "POSITIVE," while a score of ≤ 4 was

graded as "NEGATIVE." In scoring for "PRACTICE," 6 points were considered from the questionnaire, and a score of >3 was graded as "GOOD," a score 2 -3 was graded as "FAIR" while a score of < 2 was graded as "POOR." In scoring for "DETERMINANTS," 5 points were considered from the questionnaire, and if > 2 "NO" were ticked, it was graded as "STRONG" while if ≤ 2 "NO" were ticked it was graded as "WEAK" (TABLE 2).

There was a statistically significant relationship between age group, marital status, level of education, occupation, number of pregnancies had and spinal bifida. However, there was no statistically significant relationship with the number of miscarriage (TABLE 3A). There was a statistically significant relationship between, level of education and occupation. However, there was no statistically significant relationship with age group, spinal bifida child, pregnancies had, marital status and miscarriage (TABLE 3B). There was a statistically significant relationship between age-group, marital status, level of education and number of pregnancies had. However, there was no statistically significant relationship with having spinal bifida child (TABLE 5). There was a statistically significant relationship between age group and occupation, but there is no statistically marital status, level of education, number of pregnancies had, spinal bifida child and miscarriages (TABLE 7).

TABLE 1. Socio-demographic characteristics of respondents.

VARIABLE	FREQUENCY (n=170)	PERCENT (%)
Age group(year)		
< 20	5	2.9
20-29	46	27.1
30-39	90	52.9
40-49	29	17.1
Mean ± SD = 28.41±0.73		
Marital status		
Single	21	12.4
Married	131	77.1
Widowed	14	8.2
Co-habiting	4	2.4
Level of education		
Primary	34	20.0
Secondary	84	49.4
Tertiary	52	30.6
Occupation		

Employed	58	34.1
Unemployed	27	15.9
Self-employed	79	46.5
Student	6	3.5
Pregnancies had		
None	19	11.2
1-3	39	22.9
4-6	70	41.2
7-9	35	20.6
>9	7	4.1

FIGURE 1. Prevalence of spinal bifida.

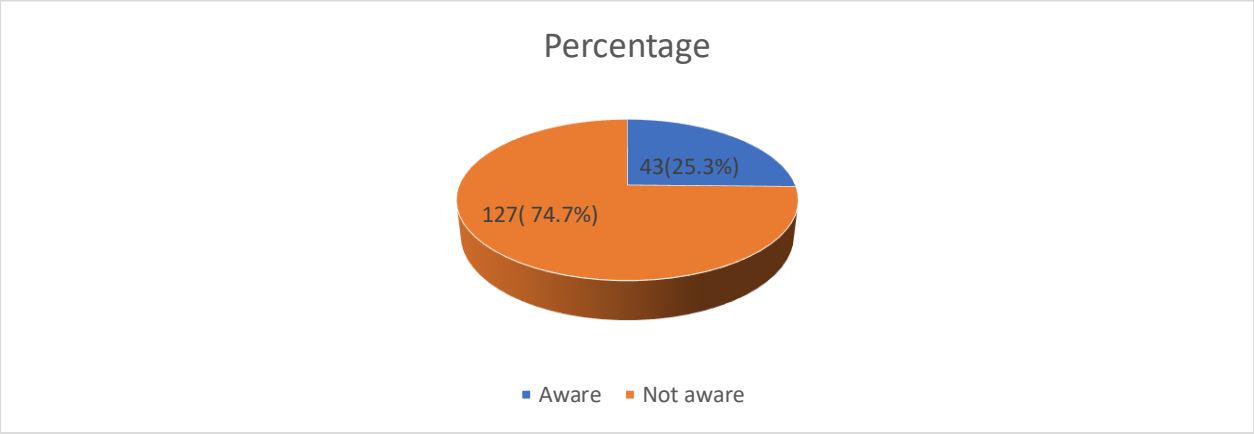

FIGURE 2. Prevalence of Miscarriages.

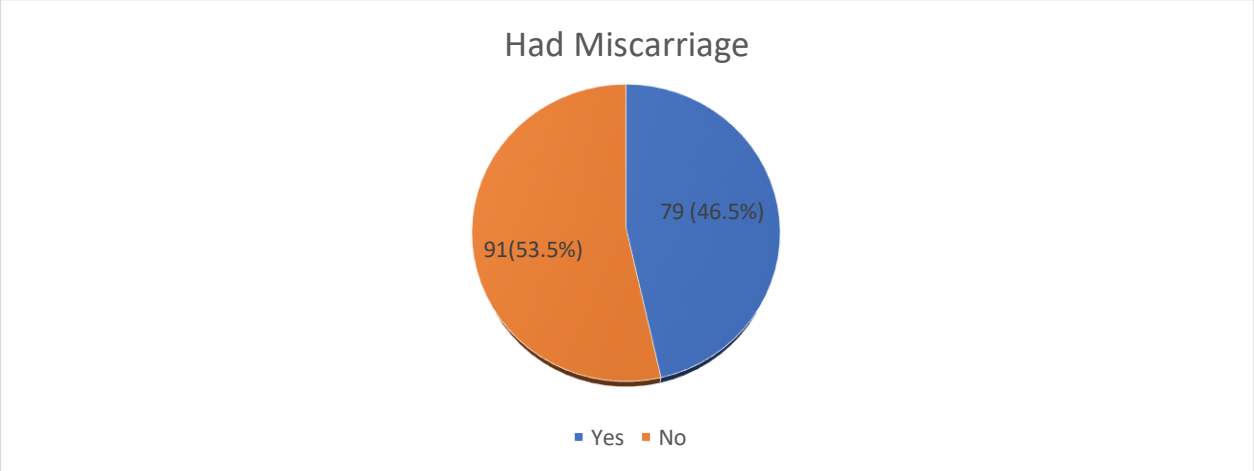

TABLE 2. Respondents knowledge, attitude, practices, and determinants in the use of folic acid in the prevention of spinal bifida.

Variable	Frequency (n=170)	Percent (%)
Knowledge		
Good	122	71.8
Fair	36	21.2
Poor	12	7.1
Attitude		
Positive	147	86.5
Negative	23	13.5
Practice		
Good	106	62.4
Fair	49	28.8
Poor	15	8.8
Determinants		
Strong	9	5.3
Weak	161	94.7

TABLE 3A. Association between socio-demographic characteristics of respondents and their knowledge on the use of folic acid in the prevention of spina bifida.

DEMOGRAPHIC	KNOWLEDGE OF RESPONDENT			
VARIABLE	GOOD (%)	FAIR (%)	POOR (%)	TOTAL (%)
Age group (years)				
< 20	1(20)	2(40)	2(40)	5(100)
20-29	27(58.7)	14(30.4)	5(10.9)	46(100)
30-39	74(82.2)	12(13.3)	4(4.5)	90(100)
40-49	20(70)	8(27.6)	1(2.4)	29(100)
Total	122(71.7)	36(21.2)	12(7.1)	170(100)

X^2 = 20.280 p=0.002

Marital status				
Single	8(38.1)	6(28.6)	7(33.3)	21(100)
Married	98(74.8)	28(21.4)	5(3.8)	131(100)
Widowed	12(85.7)	2(14.3)	0(0)	14(100)
Cohabiting	4(100)	0(0)	0(0)	4(100)
Total	122(71.7)	36(21.2)	12(7.1)	170(100)
X^2 = 29.775 p<0.001				
Level of education				
Primary	22(64.6)	4(11.8)	8(23.6)	34(100)
Secondary	56(66.6)	26(31)	2(2.4)	84(100)
Tertiary	44(84.7)	6(11.5)	2(3.8)	52(100)
Total	122(71.7)	36(21.2)	12(7.1)	170(100)
X^2 = 25.662 p<0.0001				
Occupation				
Employed	48(82.8)	8(13.8)	2(3.4)	58(100)
Unemployed	13(48.2)	8(29.6)	6(22.2)	27(100)
Self-employed	58(73.4)	18(22.8)	3(3.8)	79(100)
Student	3(50.1)	2(33.3)	1(16.6)	6(100)
Total	122(71.7)	36(21.2)	12(7.1)	170(100)
X^2 =18.262 p= 0.006				

Table 3B. Socio-demographic characteristics of respondents and knowledge on the use of folic acid in the prevention of spinal bifida.

DEMOGRAPHIC VARIABLES	**KNOWLEDGE OF RESPONDENT**			
Pregnancies had	**GOOD (%)**	**FAIR (%)**	**POOR (%)**	**TOTAL (%)**
None	11(57.9)	3(15.8)	5(26.3)	19(100)
1-3	24(61.5)	11(28.2)	4(10.3)	39(100)
4-6	53(75.7)	15(21.4)	2(2.9)	70(100)

7-9	28(80)	7(20)	0(0)	35(100)
>9	6(85.7)	0(0)	1(14.3)	7(100)
Total	122(71.7)	36(21.2)	12(7.1)	170(100)
X^2 =19.714 p=0.011				
Had Spinal bifida child				
Yes	39(90.7)	3(7)	1(2.3)	43(100)
No	83(65.3)	33(26)	11(8.7)	127(100)
Total	122(71.7)	36(21.2)	12(7.1)	170(100)
X^2 =10.182 p =0.006				
Had a Miscarriage				
Yes	61(77.2)	15(19)	3(3.8)	79(100)
No	61(67.1)	21(23.1)	9(9.8)	91(100)
Total	122(71.7)	36(21.2)	12(7.1)	170(100)
X^2=3.169,p=0.205				

TABLE 4A. Sociodemographic characteristics of respondents and attitude on the use of folic acid in the prevention of spina bifida.

DEMOGRAPHIC VARIABLE	ATTITUDE OF RESPONDENT		
Age group (years)	**POSITIVE (%)**	**NEGATIVE (%)**	**TOTAL (%)**
< 20	3(60)	2(40)	5(100)
20-29	38(82.6)	8(17.4)	46(100)
30-39	82(91.1)	8(8.9)	90(100)
40-49	24(82.8)	5(17.2)	29(100)
Total	147(86.5)	23(13.5)	170(100)
X^2 = 5.579 p=0.134			
Marital status			
Single	15(71.4)	6(28.6)	21(100)
Married	114(87)	17(13)	131(100)

Widowed	14(100)	0(0)	14(100)
Cohabiting	4(100)	0(0)	4(100)
Total	147(86.5)	23(13.5)	170(100)
X^2 = 6.912 p=0.075			
Level of education			
Primary	24(70.6)	10(29.4)	34(100)
Secondary	73(86.9)	11(13.1)	84(100)
Tertiary	50(96.2)	2(3.8)	52(100)
Total	147(86.5)	23(13.5)	170(100)
X^2 = 11.512 p=0.003			
Occupation			
Employed	52(89.7)	6(10.3)	58(100)
Unemployed	17(63)	10(37)	27(100)
Self-employed	72(91.1)	7(8.9)	79(100)
Student	6(100)	0(0)	6(100)
Total	147(86.5)	23(13.5)	170(100)
X^2 =15.667 p=0.001			
Pregnancies had			
None	15(78.9)	4(21.1)	19(100)
1-3	29(74.4)	10(25.6)	39(100)
4-6	64(91.4)	6(8.6)	70(100)
7-9	33(94.3)	2(5.7)	35(100)
>9	6(85.7)	1(14.3)	7(100)
Total	147(86.5)	23(13.5)	170(100)
X^2 = 9.111 p=0.058			

TABLE 4B. Sociodemographic characteristics of respondents and attitude on the use of folic acid in the prevention of spinal bifida.

DEMOGRAPHIC VARIABLE	ATTITUDE OF RESPONDENT		
Had Spinal bifida child	**POSITIVE (%)**	**NEGATIVE (%)**	**TOTAL (%)**
Yes	38(88.4)	5(11.6)	43(100)
No	109(85.8)	18(14.2)	127(100)
Total	147(86.5)	23(13.5)	170(100)
X^2 =0.178, p=0.673			
Had a Miscarriage			
Yes	70(88.6)	9(11.4)	79(100)
No	77(85.6)	14(15.4)	91(100)
Total	147(86.5)	23(13.5)	170(100)
X^2=0.576, p=0.448			

TABLE 5A. Socio-demographic characteristics of respondents and practice on the use of folic acid in the prevention of spinal bifida.

DEMOGRAPHIC VARIABLE	PRACTICE OF RESPONDENT			
	GOOD (%)	**FAIR (%)**	**POOR (%)**	**TOTAL (%)**
Age group (years)				
< 20	1(20)	2(40)	2(40)	5(100)
20-29	22(47.8)	16(34.8)	8(17.4)	46(100)
30-39	64(71.1)	22(24.4)	4(4.4)	90(100)
40-49	19(65.6)	9(31)	1(3.4)	29(100)
Total	106(62.4)	49(28.8)	15(8.8)	170(100)
X^2 = 17.821 p=0.007				
Marital status				
Single	8(38.1)	5(23.8)	8(38.1)	21(100)
Married	82(62.6)	44(33.6)	5(3.8)	131(100)
Widowed	12(85.7)	0(0)	2(14.3)	14(100)

Cohabiting	4(100)	0(0)	0(0)	4(100)
Total	106(62.4)	49(28.8)	15(8.8)	170(100)
X^2 = 35.461 p<0.001				
Level of education				
Primary	13(38.2)	17(50)	4(11.8)	34(100)
Secondary	53(63)	26(31)	5(6)	84(100)
Tertiary	40(77)	6(11.5)	6(11.5)	52(100)
Total	106(62.4)	49(28.8)	15(8.8)	170(100)
X^2 =17.314, p=0.002				
Occupation				
Employed	43(74.2)	9(15.5)	6(10.3)	58(100)
Unemployed	10(37)	15(55.6)	2(7.4)	27(100)
Self-employed	49(62)	23(29.1)	7(8.9)	79(100)
Student	4(66.7)	2(33.3)	0(0)	6(100)
Total	106(62.4)	49(28.8)	15(8.8)	170(100)
X^2 =15.131 , p=0.019				
Pregnancies had				
None	8(42.1)	3(15.8)	8(42.1)	19(100)
1-3	25(64.1)	10(25.6)	4(10.3)	39(100)
4-6	41(58.5)	27(38.6)	2(2.9)	70(100)
7-9	28(80)	7(20)	0(0)	35(100)
>9	4(57.1)	2(28.6)	1(14.3)	7(100)
Total	106(62.4)	49(28.8)	15(8.8)	170(100)
X^2 = 37.809 p=0.000				

TABLE 5B. Socio-demographic characteristics of respondents and practice on the use of folic acid in the prevention of spinal bifida.

DEMOGRAPHIC VARIABLE	PRACTICE OF RESPONDENT			
	GOOD (%)	FAIR (%)	POOR (%)	TOTAL (%)
Had Spinal bifida				
Yes	32(74.4)	10(23.3)	1(2.3)	43(100)
No	74(58.3)	39(30.7)	14(11)	127(100)
Total	106(62.4)	49(28.8)	15(8.8)	170(100)
X^2 =4.717, p=0.095				
Had a Miscarriage				
Yes	56(70.9)	22(27.8)	1(1.3)	79(100)
No	50(54.9)	27(29.7)	14(15.4)	91(100)
Total	106(62.4)	49(28.8)	15(8.8)	170(100)
X^2=11.326,p=0.003				

TABLE 6A. Socio-demographic characteristics of respondents and the determinants on the use of folic acid in the prevention of spinal bifida.

DEMOGRAPHIC VARIABLE	DETERMINANTS OF RESPONDENT		
	STRONG (%)	WEAK (%)	TOTAL (%)
Age group (years)			
< 20	1(20)	4(80)	5(100)
20-29	6(13)	40(87)	46(100)
30-39	2(2.2)	88(97.8)	90(100)
40-49	0(0)	29(100)	29(100)
Total	9(5.3)	161(94.7)	170(100)
X^2 = 10.981 p=0.012			
Marital status			
Single	3(14.3)	18(85.7)	21(100)
Married	6(4.6)	125(95.4)	131(100)

Widowed	0(0)	14(100)	14(100)
Cohabiting	0(0)	4(100)	4(100)
Total	9(5.3)	161(94.7)	170(100)
X^2 = 4.526, p=0.210			
Level of education			
Primary	2(5.9)	32(94.1)	34(100)
Secondary	3(3.6)	81(96.4)	84(100)
Tertiary	4(7.7)	48(92.3)	52(100)
Total	9(5.3)	161(94.7)	170(100)
X^2 =1.117 p= 0.572			
Occupation			
Employed	2(3.4)	56(96.6)	58(100)
Unemployed	4(14.8)	23(85.2)	27(100)
Self-employed	2(2.5)	77(97.5)	79(100)
Student	1(16.7)	5(83.3)	6(100)
Total	9(5.3)	161(94.7)	170(100)
X^2 =80.26 p=0.045			

TABLE 6B. Socio-demographic characteristics of respondents and the determinants on the use of folic acid in the prevention of spinal bifida.

DEMOGRAPHIC VARIABLE	DETERMINANTS OF RESPONDENT		
	STRONG (%)	WEAK (%)	TOTAL (%)
Pregnancies had			
None	3(15.8)	16(84.2)	19(100)
1-3	2(5.1)	37(94.9)	39(100)
4-6	4(5.7)	66(94.3)	70(100)
7-9	0(0)	35(100)	35(100)
>9	0(0)	7(100)	7(100)

Total	9(5.3)	161(94.7)	170(100)
X^2 =6.549, p=0.162			
Had Spinal bifida child			
Yes	0(0)	43(100)	43(100)
No	9(7.1)	118(92.9)	127(100)
Total	9(5.3)	161(94.7)	170(100)
X^2 =3.218, p=0.073			
Had Miscarriage			
Yes	4(5.1)	75(94.9)	79(100)
No	5(5.9)	86(94.1)	91(100)
Total	9(5.3)	161(94.7)	170(100)
X^2=0.016, p=0.900			

Discussion

This research was carried out to assess the knowledge, attitude, and practice of use of folic acid in the prevention of spinal bifida among women of childbearing age in ECLGA of Edo State. The research also assessed the relationship between socio-demographic factors and knowledge and use of folic acid in the prevention of spinal bifida. A total of 170 women, all of childbearing age, were interviewed. The mean age is 32 years with the highest proportion of participants 90(52.9%) consisting of those within the age group 30-39 years.

Majority of the participants were married 131(77.1%) as compared to singles 21(12.4%), widows 14(8.2%), cohabiting (2.4%). Up to 84(49.4%) had secondary education, 52(30.6%) had tertiary education, and 34(20.0%) had primary education. We observed that the majority of the respondents 71.8% had good knowledge about the use of folic acid in the prevention of spinal bifida. This is in sharp contrast to a study done on awareness of mothers about birth defects in Ibadan, in which only 15.8% knew that birth defects could be prevented.[10] In another study in Ibadan, only 11.8% knew that folic acid could prevent birth defects although as much as 98.3% were using folic acid in the current pregnancy.[11] 64.6% awareness of folic acid was reported in Jos.[12] In Port Harcourt, 94.4% knew about folic acid, but only 24.1% knew folic acid could prevent birth defects.[13] The high awareness in this study is quite encouraging. It could be explained by the proximity of the respondents to a tertiary health facility (Irrua Specialist Teaching Hospital) which gives them access to health education through campaigns or interactions with resident health personnel. Also, there is routine education of women during antenatal visits, as most respondents stated.

We also observed that certain socio-demographic factors had a demonstrable influence on knowledge of folic acid use in the prevention of spinal bifida. Age, marital status, level of education, occupation, previous pregnancy and having babies with spinal bifida in the past were significantly associated with knowledge of the use of folic acid whereas factors like religion and number of miscarriages were not. These observations are by earlier observations.[11, 14-18] On the aspect of attitude towards the use of folic acid, most of the respondents 86.5%. Showed a positive attitude. Sociodemographic factors significantly associated with this positive attitude were level of education (p=0.003), occupation (p=0.001).

More than half of the respondents 62.4 had a good practice which compares favorably with the

result of the study done in Jakarta, Indonesia where 64% of respondents claimed to have been compliant with the use of folic acid.[33] In another study done in Canada, 71% were compliant with the use of folic acid,[35] while only 22.3% of the women in a study in Denmark showed compliance[19]. The differences between our observation and between the results in previous reports could be due to the difficulty in measuring the actual practice of use of folic acid by women of childbearing age, for example in the Jakarta study[20]; two parallel results were obtained from the same respondents using qualitative and quantitative tools.

There was a statistically significant relationship between age (p=0.007), number of miscarriages (p=0.003), marital status (p=0.000), level of education (p=0.002), number of pregnancies had (0.000). A number of pregnancies had the highest statistical significance.

Determinants of use of folic acid showed statistically significant relationship with certain sociodemographic factors such as with age group such as women between 30-39 years had strong score while women less than 20 years had weak score reason for which may be due to teenage unplanned pregnancy, ignorance and late antenatal booking which is in keeping with the study done in South-western Nigeria.[17] In our study, the occupation had the highest statistical significant relationship (p=0.045). This shows that employment empowers these women making them better placed to use folic acid. Also, employment is also related to an older age.

Conclusion

We concluded that

1. The knowledge of the use of folic acid among women of childbearing age in ECLGA is good. Furthermore, attitude and practice of use of folic acid match the knowledge and compares unfavourably with the levels reported from other places.
2. The level of knowledge, attitude, and practice on the use of folic acid among women of childbearing age in ECLGA are dependent on age, marital status, level of education, occupation, number of pregnancies, previous child with spinal bifida.

Recommendation

We recommend that:

1. The government and health institution should work closely with stakeholders in the health sector to create more public enlightenment campaigns to increase awareness about spinal bifida and use of folic acid either in their diet or as medication in its prevention especially among women of childbearing age
2. Communities should organize forums where a health worker enlightened member about the benefits of the use of folic acid by women of childbearing age while also answering any questions they may have.

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