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Research Article

Factors Influencing Adherence to Folic Acid and Ferrous Sulphate Nutritional Intake among Pregnant Teenagers in Buffalo City Municipality, South Africa

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Abstract

Objective: The purpose of this study was to determine the factors influencing folic acid/ferrous sulphate nutritional intake among pregnant teenagers in Buffalo City Metropolitan Municipality (BCMM), Eastern Cape in South Africa. **Materials and Methods:** This was a cross-sectional, descriptive study involving 300 purposively selected pregnant teenagers aged between 13-19 years, who were attending antenatal clinic in BCMM. A self-designed questionnaire was used for data collection. **Results:** The majority (97.0%) of the participants obtained their supplements from the clinic; took other medications (87.2%); regularly used nutritional supplements (71.7%); agreed that folic acid and ferrous sulphate were important for pregnancy outcomes (96%); should be taken before pregnancy and after birth (68.2%) and nurses had explained the possible pregnancy complications (71.7%). About 84.1% agreed that the medication containers were clearly labelled; and nurses had explained the side effects of folic acid/ferrous folate (60.7%) and the likely action in case of side effects occurred (56%). The majority of the participants also agreed that folic acid and ferrous sulphate are good for the unborn baby (88%) and are harmless to the unborn baby (75.3%). The majority (49.2%) of the participants did not consume dark leafy vegetables, cabbage (35.0%), liver (47.1%), beef/lamb (42.0%), fish (43.3%) and beans/legumes (36.4%). Participants indicated that folic acid and ferrous sulphate made them feel nauseous, inclined to vomit and also caused stomach pain. **Conclusion:** The majority of pregnant teenagers received their nutritional supplements from the health facilities over the counter. The study indicated that nausea, vomiting, forgetting to take the supplements due to busy schedules, non-availability of folic acid and ferrous sulphate in health facilities were the major reasons influencing the intake of folic acid and ferrous sulphate by pregnant teenagers. Also, there is low consumption of iron and folate rich foods by pregnant teenagers in this setting. Health practitioners including doctors, nurses and community health care workers needed to improve health education by including information on nutritional supplements and the importance and use of folic acid and ferrous sulphate during pregnancy.

Key words: Adherence, folic acid, ferrous sulphate, maternal nutrition, food supplements, pregnant teenagers, South Africa

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Folic acid and ferrous sulphate are nutritional supplements that are given to women planning to conceive, during pregnancy and after delivery, in order to prevent Neural Tube Defects (NTDs) (hydrocephalus, spinal bifida and anencephaly) in new born babies^{1,2}. Folic acid and ferrous sulphate do not only reduce the risk of NTDs³, but also reduce anaemia in mothers^{4,5}. Globally, anaemia is a public health problem in pregnancy, affecting 46, 49, 39 and 25% of pregnant women in Africa, Southeast Asia, the Eastern Mediterranean and Americas, respectively⁶. In South Africa, (7-29%) prevalence of anaemia has been reported among pregnant women⁷. Iron deficiency is the main cause of anaemia worldwide⁸ and it has been postulated that iron interventions could prevent about (20-50%) prevalence of anaemia in pregnant women^{6,9,10}. Iron supplements have been recommended by the WHO to supplement the most widely applied micronutrient in a country, with significant success¹¹. Routine maternal nutrient supplementation in low-and middle-income countries is generally restricted to provision of iron-folate supplements³. In South Africa, the introduction of a National-scale fortification of flour has played a vital role in decreasing the NTDs¹² which mostly occur among teenage pregnant and single mothers in rural areas¹.

Most teenage pregnancies are unplanned and/or unwanted and the girls are immature, both physically and psychologically. Adolescent child bearing is heavily concentrated among the poor and low income teenagers most of whom are unmarried¹³. The South African Department of National Health and Population Development recommends that all women of childbearing age, who are capable of falling pregnant, should consume 0.4 mg folic acid per day to reduce the risk of NTDs on the developing foetus. It is believed that this recommendation will be supported country wide by the medical professionals and health service providers¹⁴. In South Africa, incidences of NTDs are higher in rural areas than in urban areas and they vary in different settings. Extremely high NTD prevalence has been reported in the rural Transkei district of the Eastern Cape Province¹⁵. Lower prevalence is reported in Cape Town, Pretoria and Johannesburg whereas higher prevalence is reported in other areas of the Limpopo province¹⁶.

Women are advised to take folic acid, ferrous sulphate and other supplements and vitamins in the pre-natal and post-natal period. These nutritional supplements are available in public health facilities and are provided for free by the South African Government. Additionally, information on a supplementary diet is provided in order to promote healthy

pregnancy, prevent maternal anaemia and birth defects². Notwithstanding the availability of nutritional supplements in South African public health facilities; coupled with counselling during pregnancy, clinical anecdotal evidence indicates the prevalence of neural tube defects among women during their first trimester. The purpose of this study was to determine the factors influencing folic acid/ferrous sulphate nutritional intake among pregnant teenagers in Buffalo City Municipality (BCM), Eastern Cape Province, South Africa. The findings of the study will be helpful in designing intervention strategies to improve the uptake of nutritional supplements among pregnant teenagers.

MATERIALS AND METHODS

Study design, location and sampling: This was a cross-sectional, descriptive study involving purposively selected 300 pregnant primigravida or multigravida teenagers attending antenatal clinic programmes in the BCMM, Eastern Cape Province, South Africa. The study was conducted in 14 health clinics in BCMM namely: Frère Gate Way Clinic, Moore Clinic, Central Clinic, Day Clinic, Nompumelelo Clinic and 7 clinics in Mdantsane. Participants were included in the study if pregnant from 1-40 weeks; aged 13-19 years; and attending an antenatal programme. However, pregnant teenagers who started antenatal after third trimester and were unbooked for antenatal consultation, were excluded from the study.

Data collection instrument: A self-developed questionnaire was used for data collection. The questionnaire focused on the demographic profiles of the participants: age, ethnic origin, marital status, highest level of education, employment status, religion and source of income. Other sections of the questionnaire solicited participants' information pertaining to availability of the folic acid and/or ferrous sulphate; folic acid and/or ferrous sulphate knowledge; nurses' attitudes toward pregnant teenagers; pregnant teenagers' attitudes toward folic acid and ferrous sulphate and their consumption of iron and folate-rich foods.

Data collection: The aim and nature of the study was explained to the pregnant teenagers waiting for antenatal services at the antenatal clinics. Consent forms were signed by willing pregnant teenagers that expressed a desire to participate in the study. The questionnaires were distributed to them to complete. Participants who had difficulty in understanding English were assisted in *Isixhosa*, the widely spoken local language in the setting. Since in South Africa adolescents between the ages of 13-17 years are not allowed

to give consent on their own, parents or legal guardians were asked to give consent for them, when their assent was sought before data collection.

Ethical considerations: The study was approved by the research ethics committee of the University of Fort Hare (YAK071SKAL01). Permission was obtained from the Provincial Department of Health, the Buffalo City sub-district Department of Health and the selected health clinics before data collection. Participants were made to understand that participation in the study was voluntary and that they were free to withdraw from the study whenever they so desired, without penalty or prejudice. Participants were assured of their safety, confidentiality and anonymity. Verbal and written informed consent was obtained from the participants before the commencement of the data collection.

Data and statistical analysis: Data were analysed using descriptive statistics (frequency and percentages). All statistical analyses were performed with the Statistical Package for Social Science (SPSS) version 21.0 for windows (SPSS Inc., Chicago, IL, USA).

RESULTS

The majority (286; 96.3%) of the participants were Africans, 279(93.3%) single, 155(52.7%) had secondary education as their highest qualification, were unemployed (260; 88.5%) and their source of income was work-related (11; 37.9%) (Table 1).

The majority (290; 97.0%) of the participants obtained their supplements from the clinic; and they take other medications (260; 87.2%). However, the majority (215; 71.7%) of the participants regularly use nutritional supplements (Table 2).

The results pertaining to folic acid and ferrous sulphate knowledge (Table 3) indicate that the majority of the participants agreed that folic acid and ferrous sulphate are important for pregnancy (96%), should be taken before pregnancy and after birth (68.2%); that a shortage/deficiency, there of results in a baby being born with birth defects (65.3%). However, the majority disagreed that folic acid and ferrous sulphate are taken once, daily, after meals (91.6%) and that they prevent spinal abnormalities (91.3%).

The nurses attitudes toward pregnant teenagers (Table 4), indicate that slightly more than half of the participants (51.5%) disagreed that the waiting time was less than 2 h, while 74.9% agreed that the nurses treated

Table 1: Demographic characteristic of the participants

Variables	Frequency	Percentage
Ethnic origin		
African	286	96.3
Coloured	8	2.7
White	3	1.0
Marital status		
Married	20	6.7
Single	279	93.3
Education		
None	5	
Primary	20	8.5
Secondary	155	52.7
Tertiary	114	38.8
Employment		
Employed	34	11.5
Unemployed	260	88.5
Religion		
Christianity	294	99.3
Muslim	2	0.7
Income source		
Family	1	3.5
Grant	11	37.9
Work	17	58.6

Table 2: Folic acid and ferrous sulphate access and use

Variables	Frequency	Percentage
Folic acid and ferrous sulphate source		
Clinic	290	97.0
Hospital	7	2.3
Over the counter	2	0.7
Other medications		
Yes	38	12.8
No	260	87.2
Regular uptake/use of folic acid and ferrous sulphate		
Yes	215	71.7
No	85	28.3

the participants with respect. About 71.7% agreed that the nurses explained about pregnancy complications and that participants' were able to ask questions about their pregnancy (86.8%). The majority of the participants agreed that the nurses responded when requested to assist (71.9%), they cared about patients' well-being (87.1%), provided treatment when patients were in need of it (79.4%) and they treated patients' with empathy (61.7%).

The majority of participants (69.1%) agreed that they were addressed by their names by the nurses and a language they understood (79.2%). Also, 71% agreed that the nurses ensured their comfortability in the facility and listened when they talked (72.6%), had patience (71.2%) and educated them on taking medication at home (88.3%). About 84.1% agreed that the medication containers were clearly labelled, nurses did explain the side effects of folic acid and ferrous folate (60.7%) and the likely action in case side effects occurred (56%).

Table 3: Folic acid and ferrous sulphate knowledge

Statement	Agreed		Disagreed	
	No.	%	No.	%
Folic acid and ferrous sulphate importance	12	4.0	288	96.0
Folic acid and ferrous sulphate are taken before pregnancy and 3 months after	204	68.2	95	31.8
Folic acid and ferrous sulphate results in a baby being born with birth defects	196	65.3	104	34.7
Folic acid and ferrous uptake once, daily after a meal	25	8.4	273	91.6
Folic acid and ferrous sulphate prevent spinal abnormalities	26	8.7	274	91.3

Table 4: Nurse's attitude towards pregnant teenagers

Statements	SD		D		NS		A		SA	
	No.	%	No.	%	No.	%	No.	%	No.	%
Waiting time less than 2 h	60	20.1	94	31.4	75	25.1	61	20.4	9	3.0
The staff treats me politely/with respect	14	4.7	25	8.4	29	9.7	173	57.9	58	19.4
Explanation of pregnancy and complications	19	6.4	36	12.1	29	9.8	155	52.2	58	19.5
Ability to ask questions about my pregnancy	11	3.7	12	4.0	16	5.4	170	57.2	88	29.6
The staff responds when requested to assist	13	4.4	24	8.0	47	15.7	187	62.5	28	9.4
Staff concerned about our health and welfare	7	2.4	12	4.1	19	6.5	195	66.3	61	20.8
Provision of all the needed treatment	13	4.3	14	4.7	35	11.7	167	55.7	71	23.7
The patients are treated with empathy	6	2.0	28	9.5	79	26.8	153	51.9	29	9.8
The patients are addressed by name	16	5.4	30	10.2	45	15.3	152	51.7	51	17.4
Staff addressing us in our language	13	4.4	21	7.1	28	9.4	161	54.0	75	25.2
Staff ensures comfort in the facility	10	3.4	22	7.4	54	18.2	156	52.5	55	18.5
Staff listens attentively while we talk	9	3.0	15	5.0	47	15.7	181	60.5	47	15.7
Staff shows patience when dealing with us	14	4.7	28	9.5	43	14.5	160	54.0	51	17.2
Explanation on taking medication at home	9	3.0	9	3.0	17	5.7	162	54.2	102	34.1
The container of medication is clearly labelled	12	4.1	13	4.4	22	7.5	151	51.2	97	32.9
Explanation of side effects of the treatment	26	8.7	58	19.3	34	11.3	146	48.7	36	12.0
Explanation of action in case of side effects	23	7.7	67	22.3	42	14.0	128	42.7	40	13.3

SD: Strongly disagree, D: Disagree, NS: Not sure, A: Agree, SA: Strongly agree

Table 5: Pregnant teenager's attitude towards folic acid and ferrous sulphate

Statements	SD		D		NS		A		SA	
	No.	%	No.	%	No.	%	No.	%	No.	%
Folic acid and ferrous sulphate are more beneficial	11	3.7	29	9.7	104	34.8	130	43.5	25	8.4
Folic acid and ferrous sulphate are good for unborn baby	10	3.3	8	2.7	18	6.0	145	48.5	118	39.5
Folic acid and ferrous sulphate are harmless	9	3.0	13	4.4	52	17.4	156	52.2	69	23.1
Folic acid and ferrous only when I feel ill	95	31.9	142	47.7	27	9.1	30	10.1	4	1.3
Folic acid and ferrous are slow-acting poisons	73	24.6	107	36.0	82	27.3	29	9.8	7	2.4
Folic acid and ferrous always have unpleasant effects	21	7.0	83	27.8	107	35.8	72	24.1	16	5.4
Voluntary uptake folic acid and ferrous	62	20.7	129	43.1	27	9.0	65	21.7	16	5.4

SD: Strongly disagree, D: Disagree, NS: Not sure, A: Agree, SA: Strongly agree

The results relating to pregnant teenagers' attitude towards folic acid and ferrous sulphate (Table 5) shows that about half of the respondents agreed that folic acid and ferrous sulphate are beneficial (155; 51.9%), while 104(34.8%) were not sure and 40(13.4%) disagreed. The majority of the participants agreed that folic acid and ferrous sulphate are good for the unborn baby (263; 88%) and are harmless to the unborn baby (225; 75.3%). Majority of the participants disagreed about taking folic acid and ferrous sulphate only when they were ill (237; 79.6%) and that they were slow acting poisons (180; 60.6%). About 107(35.8%) of the participants were not sure if folic acid and ferrous sulphate had an unpleasant effect or not (104; 34.8%).

The results pertaining to the weekly consumption of iron and/or folate-rich food are shown in Table 6. The majority (49.2%) of the participants do not consume dark leafy vegetables, cabbage (35.0%), liver (47.1%) and beef/lamb (42.0%). About 18.3% participants consumed chicken 3 times weekly, while fish (43.3%) and beans/legumes (36.4%) are not that regularly consumed. The majority eat some citrus fruit (23.2%) and vegetables (19%) weekly.

An open-ended question to solicit participants' information on why they did not take folic acid and ferrous sulphate indicated that folic acid and ferrous sulphate made them feel nauseous, caused vomiting and stomach ache. The participants reported forgetting at times to take their

Table 6: Consumption of iron and folate rich foods

Food items	Days (week)															
	Never		1		2		3		4		5		6		7	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Dark green leafy vegetables	147	49.2	73	23.4	32	10.7	30	10.0	7	2.3	5	1.7	1	0.3	7	2.3
Cabbage	105	35.0	68	22.7	57	19.0	30	10.0	12	4.0	14	4.7	4	1.3	10	3.3
Liver	137	47.1	76	26.1	26	8.9	27	9.3	10	3.4	7	2.4	3	1.0	5	1.7
Beef/lamb	120	42.0	63	22.0	42	14.7	22	7.7	14	4.9	9	3.2	5	1.8	11	3.9
Chicken	38	13.1	39	13.5	44	15.2	53	18.3	31	10.7	36	12.4	20	6.9	29	10.0
Fish	127	43.3	62	21.2	34	11.6	28	9.6	15	5.1	13	4.4	7	2.4	7	2.4
Beans and legumes	108	36.4	56	18.9	52	17.5	29	9.8	12	4.0	18	6.1	6	2.0	16	5.4
Citrus fruits	35	11.8	32	10.8	39	13.1	44	14.8	26	8.8	30	10.1	22	7.4	69	23.2
Other vegetables	39	13.0	41	13.7	30	10.0	44	14.7	24	8.0	35	11.7	30	10.0	57	19.0

supplements when at school. Other reasons they provided were the nutritional supplements being out of stock in the clinics during visits for check-ups, late taking due to non-availability of the medication and late antenatal booking.

DISCUSSION

The findings of this present study showed that the majority of pregnant teenagers get their folic acid and ferrous sulphate supplements from the local clinics (97%) and health facilities are easily accessible. Previous studies^{17,18} have shown that lack of money to pay health services and distance to health services are major problems faced by mothers. The difference could be due to the fact that the previous study was conducted in Indonesia in rural areas where the health facilities were situated away from most of residential areas; and were not easily accessible. Besides, in BCMM health facilities, nutritional supplements are provided free of charge and thus more accessible from a monetary perspective.

The majority of the participants in this present study take folic and ferrous sulphate regularly (71.7%). Bannink *et al.*¹⁹ conducted a study among pregnant rural women attending the antenatal clinic in Uganda and reported folic acid intake during pregnancy at 13.2%; attributable to the limited education and understanding about the importance of early folic acid intake. The high prevalence of folic acid intake found in this present study could be explained in the light of the facts that the study was conducted in semi-urban and urban settings; where health facilities are easily accessible. Also, given that the majority of the participants had secondary education, the possibility of understanding the importance of taking supplements during pregnancy could not be ruled out. Education, accessibility of health facilities, support and poverty are factors that impact greatly on the intake of nutritional supplements^{7,17,19}.

Consistent with other studies²⁰⁻²², the present study demonstrated that vomiting and nausea are the important reasons reported by pregnant teenagers for non-intake of folic acid and ferrous sulphate. Interestingly, the majority of pregnant teenagers understand the importance of folic acid and ferrous sulphate during pregnancy (96%) and the prescription, there of (91.6%). These findings support a previous study which states midwives highly rated the importance of nutrition during pregnancy²³. The 4.0% that do not know the importance of folic acid and ferrous sulphate suggests that a gap still exists in education about the importance and need for nutritional supplements and directions on how to take them.

The finding of the current study; indicated that pregnant teenagers are not aware of the consequences of not taking folic acid and ferrous sulphate during and after pregnancy. The midwives and nurses seem to have scanty information about the efficacy and benefits of folic acid and ferrous sulphate during the periconceptual stage and after giving birth. Similarly, a study conducted in Australia²³ reported that the majority of the midwives (93%) provided general nutritional advice to pregnant women.

More than half of the pregnant teenagers (51.5%) agreed that the waiting period in the health facility was more than 2 h, suggesting that the nurses had enough time to provide health and nutrition education to the pregnant teenagers. These findings contradict the findings of Arrish *et al.*²³ who stated that although healthcare practitioners perceived the importance of nutritional education, barriers to providing education to clients included lack of time, resources and relevant training. It should be noted that the participants in this current study spent more than 2 h in the health facility; the nurses had enough time to educate their clients and they exercised patience, as the majority of pregnant teenagers attested to the positive and warm attitude of nurses towards them. This could possibly be

explained in the light of constant interaction between the nurses and the clients on antenatal care at the clinics triggering a mutual, cordial and understanding relationship among them. However, scant literature exists to compare the nurses' attitude towards folic acid and ferrous sulphate intake versus that of the clients. Future studies on this aspect are warranted.

The attitude and knowledge of the pregnant teenagers about folic acid and ferrous sulphate supplements, influences the intake/non-intake of the supplements. The majority of pregnant teenagers (51.9%) in this current study; agreed that folic acid and ferrous sulphate are beneficial for their pregnancy and their unborn babies. The WHO²⁴ stated that folic acid and ferrous sulphate do not only reduce the risk of NTDs, but also reduce anaemia in mothers; and the standard dose that has been endorsed for pregnant woman is regarded as safe in pregnancy. The findings of the current study contradict the findings of Eswi *et al.*²⁵ that more than half of the pregnant woman do not know what folic acid is and its importance during pregnancy and (57%) did not received any folic acid supplements during pregnancy. This difference could possibly be explained in the light of the fact that in the current study, the pregnant teenagers knew that folic acid and ferrous sulphate are beneficial for their unborn babies, thus predisposing them to take folic acid and ferrous sulphate.

In this study, pregnant teenagers consumed various sources of iron, folate and vitamin C rich food plus dark green leafy vegetables; however, with very low meat. Given the high prices of meat in the market, many of the pregnant teenagers being unemployed (88.5%), could not afford to buy meat. These findings support Dinga²⁶ who stated that flesh foods are expensive. Iron and folate rich food consumption is thought to serve as an ideal dietary solution to improve iron intake. Folic acid fortification in food and preconception of folic acid consumption is still a cost effective way to reduce the incidence and prevalence of NTDs^{2,26}. Food and flour fortification was introduced to improve folic acid intake, especially in child bearing age. Beans and legumes have a low average of consumption as well. The consumption of vitamin C and vegetables is very high among the pregnant teenagers, which is encouraging because Vitamin C improves folic acid absorption²⁷.

The limitations of this study should be considered while interpreting the findings. Only pregnant teenager women between 13-19 years were included in the study; notwithstanding the fact that in South Africa, teens get pregnant even at age of 12 years. Besides, the study was conducted in selected clinics in BCMM semi urban and urban settings, thus limiting the generalizability of the findings to

other health clinics located in rural areas. Therefore, there is a need to conduct a similar study in other clinics in the BCMM; BCM to compare the findings of this present study with pregnant teenagers in rural areas. Regardless of the limitations of this study, the study identified some factors influencing folic acid and ferrous sulphate intake among the teenagers in the BCMM, which information is lacking and the findings will improve health care practices and standard policies set out for antenatal care provision to expectant mothers, thus improving their pregnancy outcomes.

CONCLUSION

The majority of pregnant teenagers receive their nutritional supplements from the local clinics in BCMM rather than from hospitals and over the counter. The study indicated that nausea, vomiting, forgetting to take the supplements due to busy schedules, non-availability of folic acid and ferrous sulphate at health facilities are the major reasons for non-adherence to folic acid/ferrous sulphate intake by pregnant teenagers in our sample.

SIGNIFICANT STATEMENTS

This study revealed that there is low consumption of iron and folate rich foods among the pregnant teenagers in BCMM. The study further demonstrated that pregnant teenagers are not aware of the consequences of failing to take folic acid and ferrous sulphate during and after pregnancy. Seemingly, midwives and nurses have scanty information about the efficacy and benefits of folic acid and ferrous sulphate during the periconceptual stage and after birth. The study highlights; the need for health practitioners to improve health education on the importance of folic and ferrous sulphate use during pregnancy.

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