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RESEARCH ARTICLE

EFFECT OF NURSING INTERVENTION ON WOMEN'S KNOWLEDGE ABOUT FOLIC ACID INTAKE

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ABSTRACT

Background: Folic acid deficiency has been implicated in a wide variety of fetal congenital anomalies.

The study aimed: To investigate the effect of nursing intervention on knowledge about folic acid intake among women at reproductive age through designing, implementing and evaluating educational program about folic acid.

Subjects and methods: A quasi-experimental design was used. The study was conducted at 8MCHcenters at Menoufia governorate- Egypt. Multi stage random sample of 400 women was included. A Structured interview questionnaire was used to collect data.

Results: 42.5% of women had age ranged from 25 – 34 years old, 40.5% of them had secondary level of education where as 28 % of them had university educational level. A statistically significant difference was found in the level of women knowledge about folic acid before and after implementation of nursing intervention.

Conclusion: Increase level of women knowledge about folic acid after nursing intervention which accomplished through designing, implementing and evaluating educational program about folic acid than before nursing intervention.

Recommendation: Effective intervention programs to improve periconceptional intake of folic acid among women at reproductive age are needed in maternal and child health centers.

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INTRODUCTION

Folate is a water-soluble B vitamin that is found naturally in foods such as fruits, dark green vegetables, potatoes, beans and yeast extract. Folic acid is the synthetic form of folate found in dietary supplements and added to enriched flour and grain products such as breads, pasta, rice and cereals (Rofail *et al.*, 2011). Folic acid is an essential vitamin recommended for women who are at the prime reproductive age between 18 to 35 years of age, and in particular during the period before and throughout pregnancy (Gilbert and Harmon, 2003). Daily oral iron and folic acid supplementation is recommended by WHO as part of the antenatal care to reduce the risk of low birth weight, maternal anemia and iron deficiency (WHO, 2012). According to Larsen (2006) folic acid is essential for the synthesis of adenine and thymine, two of the four nucleic acids that make up our genes. Folic acid deficiency has been implicated in a wide variety of fetal congenital anomalies included congenital heart defects, cleft lip, limb defects and

urinary tract anomalies and neural tube defects (NTD) (Bjelakovic *et al.*, 2007). Folic acid deficiency during pregnancy may increase the risk for preterm delivery, low birth weight and intrauterine fetal growth retardation and may increase the homocysteine level in the blood, which may lead to spontaneous abortion and pregnancy complications, such as placenta abruptio and pre-eclampsia (Bolander, 2009). Food and Drug Association (FDA) Advisory Committee for Reproductive Health Drugs recommended that pregnant women (pre-pregnancy and early pregnancy) should increase their intake of folic acid by 400 mg a day. Before conception, adequate use of folic acid reduces the incidence of NTDs by 50–70% to a rate of approximately 6 per 10 000 pregnancies (Rofail *et al.*, 2011).

The crucial role of folate in preventing neural tube defects may be attributed to the high fetal requirement for folate to sustain rapid cell division (Cornelia, 2006). Meyer *et al.* (2006) said that the most common neural tube defects are: (1) spina bifida it may be open or incomplete closure of the spinal cord and spinal column, (2) Anencephaly, severe underdevelopment of the brain and (3) Encephalocele, when brain tissue protrudes out to the skin from an abnormal opening in the skull.

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All of these defects occur during the first 28 days of pregnancy usually before a woman even knows she is pregnant. That is why it is so important for all women of childbearing age to get enough folic acid — not just those who are planning to become pregnant. Only 50% of pregnancies are planned, so any woman who could become pregnant should make sure she is getting enough folic acid. The use of FA supplements beyond the first 3 months is also of relevance, because FA use during pregnancy could have a beneficial effect on other adverse birth outcomes besides NTDs (Roy, 2006).

Significance of study

The nutritional intake and its assessment have changed rapidly over past two decades. But initial focus is on pregnant women towards consequences of malnutrition to deficiency disorders. Neural tube defects (NTDs) are among the most common birth defects, contributing not only to infant mortality but also serious disability. About 50 to 80% of these defects can be prevented if a woman consumes sufficient folic acid daily before conception and throughout first trimester of her pregnancy (Wilson *et al.*, 2007). Assessment of the knowledge gained is a first step in the prevention of serious deficiency complications (Bashaier, 2013).

The provision of information on the benefits and correct period of assumption of folic acid is associated with better knowledge and with its increasing use (Laura, 2014). A relevant method for transmitting information to the general population about the benefits of daily folic acid supplementation is through health care providers (West, 2009). Although, many studies have been conducted throughout the world to assess the knowledge regarding use of folic acid among women. Most of these showed there was a lack of knowledge about folic acid and its uses (Kurian, 2013). Also, as the research on folic acid and its use in Egypt especially in menoufia governorate is quite limited, the present study was conducted to increase level of women knowledge about of folic acid intake.

Aim of study

This study aimed to investigate the effect of nursing intervention on knowledge about folic acid intake among women at reproductive age attending maternal and child health (MCH) centers in Menoufia governorate through designing , implementing and evaluating educational program about folic acid (meaning, benefits, foods containing folic acid, proper timing and dosage of folic acid and complications of folic acid deficiency).

Hypothesis of the study

To fulfill the aim of the present study the following hypothesis was used

Hypothesis: There will be an increase in level of women knowledge about folic acid (meaning, benefits, foods containing folic acid, proper timing and dosage of folic acid and complications of folic acid deficiency) after nursing intervention than before nursing intervention.

SUBJECTS AND METHODS

Research design

Quasi-experimental design (pre-posttest) was used in this study

Setting

This study was carried out at eight maternal and child health centers at rural Menoufia governorate, Egypt.

Sampling

Multi stage random sample of four hundred women who had attended the study settings between September 2014 to February 2015 were selected. Women who were eligible to participate in this study fulfilled the following criteria

1. women aged 18-49 years (at reproductive age)
2. Had history of previous pregnancy
3. Not currently pregnant
4. Without chronic medical diseases such as pregnancy induced hyper tension and diabetes.

Sample size

The sample size was estimated to determine level of women knowledge about folic acid; prevalence 25% or more with 5% absolute precision and 95% level of confidence. The Sample size was estimated using the following formula

Sample size: $Z^2 PQ/E^2 = 400$ women

Data collection instrument

I-A Structured interview questionnaire

It consisted of three parts; the first part entailed the self-report items such as age, education, occupation and residence, while the second part concerned with previous obstetric data as number of pregnancy, history of abortion, complications during pregnancy, second part also included data regarding pattern of folic acid intake during previous pregnancy, while third part included assessment questionnaire about knowledge of women regarding folic acid intake (pre-posttest)

Knowledge scoring: it ranged from 0-(all wrong answers) to 100(all correct answer). The total score was categorized into four main categories:

1. Lack of knowledge (zero)
2. Low level of Knowledge (less than 50).
3. Intermediate level of Knowledge (50-75).
4. High level of Knowledge (>75).

Validity and Reliability

Validity of the instrument was determined by experts (1 professor at obstetric department, Faculty of Medicine, Menoufia university and 1 professor at Maternal and Neonatal Health Nursing Department, Faculty of Nursing, Menoufia

University) who reviewed the instrument and judged it to measure what it intended to measure (face validity). Experts were also asked to judge the items for their adequacy (content validity). Reliability was assessed by applying the instrument to 40 women twice with an interval. The 40 women were excluded from the main sample.

Piloting the instrument

It was conducted to test feasibility and applicability of the instrument and maneuver of interventions, it was also used to estimate the time needed to collect the data. It was conducted on a sample of 10% of total sample (40 women at reproductive age). They were excluded from the main sample. The results of piloting were used to finalize the instrument and schedule the field work time needed. Some changes were made to the data collection tool according to the opinion of professors and the findings of piloting.

Study Maneuver

Eligible women were identified from M.C.H. centers. Field work was done three days per week to collect the data from 7 to 10 women daily who fulfilled the inclusion criteria. They were approached individually, and the purpose and procedures of the study were explained to them. All women informed that they have to attend educational session that lasts from 30 to 40 minutes. Only those who gave an oral informed consent were recruited in the sample.

Interviewing

An individualized interview was carried out for each subject in the study. The aim of the study was explained to the woman in a simple way. Then the investigators started data collection about sociodemographic characteristics, obstetric history, pattern of folic acid intake at previous pregnancy, women knowledge regarding folic acid (pretest) and source of women's knowledge. Data collection lasted about 15 minutes, then the investigators presented educational session about folic acid (meaning of folic acid, foods containing folic acid, benefits of folic acid, appropriate time and dose of folic acid, complications of folic acid deficiency) assisted by a booklet.

Outlines

- Meaning of folic acid
- Importance of folic acid during pregnancy
- Correct time, dose of folic acid intake
- Types of food containing folic acid
- Complications of folic acid deficiency

By the end of these educational sessions, women will be able to

Knowledge and understanding

- Explain the term of folic acid.
- Identify the benefits of folic acid.
- Determine the proper timing, dose for folic acid intake.
- List complications of folic acid deficiency

Intellectual skills

- Differentiate between intake of folic acid and intake of iron.

Professional and practical skills

- Take folic acid with appropriate dosage at appropriate time.

General and transferable skills

- Communicate effectively with other women to give advice about folic acid.

Evaluation phase

The investigators assessed women knowledge regarding folic acid after educational session (Posttest) then after 3 months of data collection (follow up test).

Ethical considerations

A necessary approval from Maternal and child health centers was taken after issuing an official letter from the dean of Faculty of Nursing, Menoufia University. An informed consent to participate in the current study was taken after the purpose of the study was clearly explained to each woman. Confidentiality of obtained personal data, as well as respect of participants' privacy was totally ensured. A summary of the intervention was explained to each woman before volunteering to participate in the study and women were informed that they can withdraw from the study at any time. No invasive procedure was required.

Statistical analysis

The data collected were tabulated and analyzed by SPSS (statistical package for social sciences) statistical package version 20 on IBM compatible computer. Qualitative data were expressed as number and percentage (No & %) and analyzed by applying chi-square test.

RESULTS

Table (1) showed that women's age ranged from 25 – 34 years old (42.5%).

Table 1. The Frequency distribution pattern of the socio-demographic characteristics of the study group

Socio- demographic characteristics	Frequency (N= 400)	Percent %
Age	18 >25	35
	25 – 34	42.5
Education level	<34- 49	22.5
	Illiterate	9.25
Occupation	Read and write	8.75
	Primary school	13.5
	Secondary school	40.5
	University level	28
Residence	Worker	33.25
	House wife	66.75
Income	Rural	49.2
	Urban	50.8
Income	Enough	47.5
	Not enough	52.5

Table 2. Frequency distribution pattern of the obstetric history of the study group

Obstetric history		Frequency (N=400)	Percent %
No of previous pregnancy	1	184	46
	2	126	31.5
	3 or more	90	22.5
Previous abortion	Present	71	17.7
	Absent	329	82.3
Congenital anomalies in previous pregnancy	Present	38	9.5
	Absent	362	90.5
Fetal complications during previous pregnancy	Present	45	11.25
	Absent	355	88.75
Maternal complications during previous pregnancy	Present	76	19
	Absent	324	81
Fetal complications during previous labor	Present	63	15.75
	Absent	337	84.52
Maternal complications during previous labor	Present	81	20.25
	Absent	319	79.75

The majority of studied women (40.5%) had secondary level of education where as 28 % of them had university educational level. 33.25% of studied women were workers mean while 66.75% of them were house wives. Studied women who lived in rural areas constituted 49.2% whereas those from urban areas were about 50%. About half of studied women (47.5%) did not have enough income mean while 52.5% of them have enough income. Table (2) showed that majority of the studied women (46%) had previous history of one pregnancy. The minority of them had history of previous abortion (17.7%), while about 82.3% had no history of previous abortion. Concerning congenital anomalies in previous pregnancy, 9.5% of studied women had congenital anomalies in previous pregnancy while 90.5% of them have no congenital anomalies in previous pregnancy. Regarding fetal complications during previous pregnancy 11.25 % of studied women had fetal complications during pregnancy and about 19 % of them had maternal complications during pregnancy. On the other hand, there was about 15.75% of women who had fetal complications during labor, and about 20.25% of them had maternal complications during labor. Table (3) showed that 51.75% of the studied women took folic acid in the previous pregnancy; 15 % at first month of pregnancy, 26% at first trimester and 7.5 % during all trimesters of pregnancy, also the table showed that 3.25% of studied women taken folic acid before conception mean while 48.25% of studied women did not take folic acid at all. Table (4) showed the information sources of knowledge about folic acid.

Table 3. The frequency distribution of women according to different patterns of folic acid intake

Patterns of folic acid intake	Frequency (N= 400)	Percentage %
Pre-conceptional folic acid intake	13	3.25
During first month of previous pregnancy	60	15
During first trimester of previous pregnancy	104	26
During all trimesters of previous pregnancy	30	7.5
Not taken at all	193	48.25

Nearly half of studied women (45.5%) had one information source. 23 % of studied women reported that physicians was the main source of information about folic acid. Women who had knowledge about folic acid from nurses were 9% while 4% of women had their knowledge from reading books and magazines. 4.5% of them had their knowledge from relatives and friends, but those who had their knowledge from media

were 5% of all women. Also, the same table showed that about 10% of studied women had more than one information source. Table (5) showed frequency distribution about knowledge of studied women about best source and benefits of folate (folic acid). Regarding women knowledge about best source of folate (folic acid), the table illustrated that 53.75% didn't know the best source of folate (folic acid) meanwhile 12.5, 8.75, 11.25, 2.5 of women were reported that the best sources were green leafy vegetables, fruits, fish, meat respectively.

Table 4. Frequency distribution of information sources about folic acid knowledge among women of the study

Parameter	Frequency (N= 400)	Percent %	
Information sources about folic acid knowledge	None	177	44.25
	Doctor	92	23
	Nurse	36	9
	Reading books and magazines	16	4
	Relatives and friends	18	4.5
	Media	20	5
	More than one source	41	10.25

Table 5. The frequency distribution of women according to their knowledge of best source of folate (folic acid) intake and benefits of folic acid

Parameters	Frequency (N=400)	Percentage %	
Best source of folate (folic acid) intake	Green Leafy Vegetables	50	12.5
	Fruits	35	8.75
	Fish	45	11.25
	Meat	45	11.25
	Milk	10	2.5
	Not know	215	53.75
Benefits of folate (folic acid) intake	Prevents congenital malformations	84	21
	Prevents miscarriage	68	17
	Increase Fetal weight	63	15.75
	Not know	185	46.25

Regarding women knowledge about benefits of folate (folic acid) intake 21%, 17%, 15.75% of them reported that folic acid prevents congenital malformation, miscarriage, increase fetal weight respectively meanwhile 46.25% reported that they didn't know benefits of folic acid intake. Table (6) showed that about 10% of women had high level of knowledge regarding meaning of folic acid at pretest mean while 37.25%, 31.75% of

Table 6. Studied women knowledge about folic acid before and after (Pre- Post- Follow up) Educational program

Knowledge parameters		Pretest		Post test		Follow up test		X ²	P
		N	%	N	%	N	%		
Meaning of folic acid	Lack of knowledge	210	52.5	11	2.75	11	2.75	47.44	<0.05
	Low level	100	25	94	23.5	137	34.25		
	Intermediate	50	12.5	146	36.5	125	31.25		
	High level	40	10	149	37.25	127	31.75		
Knowledge about foods containing Folic acid	Lack of knowledge	215	53.75	0	0	0	0	49.22	<0.05
	Low level	82	20.5	64	16	80	20		
	Intermediate	58	14.5	147	36.75	140	35		
	High level	45	11.25	189	47.25	180	45		
Knowledge about Benefits of folic acid	Lack of knowledge	185	46.25	14	3.5	14	3.5	39.46	<0.05
	Low level	122	30.5	70	17.5	72	18		
	Intermediate	53	13.25	116	29	125	31.25		
	High level	40	10	200	50	189	47.25		
Knowledge about proper timing and dose of folic acid intake	Lack of knowledge	177	44.25	0	0	0	0	37.22	<0.05
	Low level	122	30.5	79	19.75	86	21.5		
	Intermediate	59	14.75	110	27.5	121	30.25		
	High level	42	10.5	211	52.75	193	48.25		
Complications of folic acid deficiency	Lack of knowledge	212	53	10	2.5	11	2.75	46.47	<0.05
	Low level	98	24.5	110	27.5	137	34.25		
	Intermediate	50	12.5	131	32.75	125	31.25		
	High level	40	10	149	37.25	127	31.75		

them had high level of knowledge at posttest and follow up test respectively. Regarding knowledge about foods containing folic acid, the table showed that only 11.25% had high level of knowledge at pretest mean while 47.25%, 45% of them had high level of knowledge at posttest and follow up test respectively. Regarding knowledge about benefits of folic acid intake, only 10% of women had high level of knowledge at pretest while 50%, 47.25% of them had high level of knowledge at post and follow up test respectively. Regarding knowledge about proper timing and dose of folic acid intake 10.5% of women had high level of knowledge at pretest while 52.75%, 48.25% of them had high level of knowledge at post and follow up test respectively. Also, the same table showed that 10% of women had high level of knowledge regarding complications of folic acid deficiency at pretest while 37.25%, 31.75% had high level of knowledge at post and follow up test respectively.

DISCUSSION

The present study showed age of women ranged from 18 -49 years and nearly one third of them were worker. The current study findings were similar to study conducted by Bashaier *et al.* (2013) who studied perceptions of women of reproductive age about vitamin and folic acid supplements during pregnancy at Kingdom of Saudi Arabia and took women at same age group and documented that about one third of them were worker. Simin *et al.* (2011) who studied consumption, knowledge and attitude of pregnant women toward the effects of folic acid on pregnancy outcome in Tabriz documented that seventeen percent of women had university level of education and thirty six of them had high school diploma. On the same line with Simin *et al.* study findings, the current study findings showed that nearly more than one third of studied women had secondary level of education and nearly one fourth of them had university educational level. Regarding pattern of folic acid intake during previous pregnancy, nearly one third of women took folic acid during first trimester, three percent of them used it before conception mean while about half of them did not take folic acid during previous pregnancy.

The present study findings were consistent with Simin *et al.* (2011) who reported that about one third of women reported taking folic acid supplements during first trimester meanwhile forty-one women did not use folic acid during their pregnancy. On the same line Kadivar *et al.* (2005) reported that according to Volls *et al.* study (2000) ten percent used folic acid before pregnancy and more than one third of them used it after awareness about their pregnancy. In the current study, the majority of women had one information source but physicians were the main source of information about folic acid. Women who had knowledge about folic acid from nurses and media were small in number while women who had their knowledge from reading books and magazines or from relatives and friends were the least in number. The current study findings were consistent with Al Hosani *et al.* (2010) who reported that in Arab Emirates there were about half of all women had knowledge about folic acid. The majority of those women had their knowledge from physicians and the least of them had their knowledge from relatives and friends. A small number of them had their knowledge from media. On the same line, Stevenson *et al.* (2006) who studied decline in prevalence of neural tube defects in a high risk region of North Carolina pediatrics, reported that a majority of women who delivered babies in 2005 in north Carolina knew about the benefits of folic acid from their doctor.

Regarding the best source of sufficient amount of folic acid, the present study showed that about fifteen percent of women reported that the best source was green leafy vegetables and nearly ten percent of women reported that the best source was fruits. On the same line, Bashaier *et al.* (2013) reported that nearly one fourth of women reported that best source of sufficient amount of folic acid was vegetables. Regarding benefits of folic acid intake, the present study showed that nearly one fourth of women reported that folic acid prevents congenital malformations, the present study findings were consistent with study conducted by Bener *et al.* (2006) who studied maternal knowledge, attitude and practice on folic acid intake among Arabian Qatari women and reported that 14% knew that it can prevent birth defects. On the same line,

Canfield *et al.* (2006) who studied folic acid awareness and supplementation among Texas women of child bearing age reported that twenty five percent of women knew that it could prevent birth defects. These differences may be due to differences in sampling techniques and educational status of studied women. Regarding women knowledge about folic acid (meaning of folic acid, foods containing folic acid, benefits of folic acid, appropriate time and dose of folic acid, complications of folic acid deficiency), nearly ten percent of women had high level of knowledge, nearly one third of women had low level of knowledge and nearly half of them had no knowledge about folic acid before educational program. The present study findings were matching with the findings of study conducted by Hedyeh *et al.* (2012) who studied awareness of pregnant women about folic acid supplementation in Iran and reported that nearly eight percent of women had high level of knowledge, and nearly thirty percent of them had low level of knowledge and added that only eighteen percent knew about folic acid benefits and nine percent knew what folic acid is.

The present study showed that after educational program, nearly half of women had high level of knowledge and nearly one third of studied women had intermediate level of knowledge regarding meaning of folic acid, foods containing folic acid, benefits of folic acid, proper timing and dose of folic acid and complications of folic acid deficiency. The findings of present study were matching with findings of study conducted by Laura *et al.* (2014) who studied women's knowledge and periconceptional use of folic acid: data from three birth centers in Italy and reported that most of those women said they knew the role of folic acid in reducing risks of spina bifida and NTDs and more than half of them knew when it should be taken after counseling on folic acid provided by gynecologist/general practitioner in anticipation of- and during pregnancy.

Conclusion

- Based on findings of present study, it was found that, majority of women took folic acid at first trimester. The main source of women knowledge about folic acid was mainly from physicians. Majority of women were not aware about meaning of folic acid, benefits, proper time, dose, foods containing folic acid and complications of folic acid deficiency.
- The study showed increase level of women knowledge about folic acid after nursing intervention which accomplished through designing, implementing and evaluating educational program about folic acid (meaning, benefits, foods containing folic acid, proper timing and dosage of folic acid and complications of folic acid deficiency) than before nursing intervention.

Recommendation

1. Effective intervention programs to improve periconceptional intakes of folic acid among women at reproductive age are needed in maternal and child health centers which are feasible for large numbers of women.

2. Pre-marital counseling regarding periconceptional use of folic acid among prospective mothers at premarital counseling centers.
3. Further studies are needed to develop effective intervention for preventing and controlling of fetal complication e.g neural tube defects and maternal complications

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