



Original Research Article

Knowledge of Pregnant Women Regarding Folic Acid: A Suggested Plan of Action

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ABSTRACT

Background: Folic acid, sometimes called folate, is a B vitamin (B9); it is associated with better pregnancy outcomes. Aim of the study was to assess the pregnant women's knowledge regarding folic acid and to suggest a plan of action. Design, A descriptive exploratory design was adopted. Sample- a convenience sample of 200 pregnant women was recruited for the study. Setting- antenatal clinic at El Manial Maternity Hospital. Tools- two tools were developed by the researchers to collect the data. Structured interview that is included data related to personal background, medical history, past and present obstetric history; 2nd tool to assess the knowledge of pregnant women regarding folic acid. Results indicated that, more than half of the sample didn't know what is folic acid and its importance during pregnancy (57%) and didn't receive any vitamins or supplementation during pregnancy. Low percentage of the sample knew that, it should be taken during first trimester of pregnancy while, 56% of the sample didn't know at which time of pregnancy they should receive folic acid. High percentage of the sample (79%) didn't know the proper dose they should receive per day. Less than half of the sample (43%) had knowledge regarding folic acid, high percentage of them mentioned that, the main source of their knowledge regarding folic acid was the Obstetrician (79%) and only 14% mentioned that, the nurses were the main source of their knowledge regarding folic acid. conclusion, the pregnant women have lack of knowledge regarding folic acid and its importance during pregnancy and the majority of them didn't receive it during pregnancy. Recommendation, it is very crucial to raise pregnant women's awareness about folic acid and its importance during pregnancy. A suggested plan of action should be developed aiming to improve pregnant women's knowledge regarding folic acid.

Key words: Folic acid knowledge, Pregnancy

INTRODUCTION

Folic acid, is a B vitamin (B9) sometimes called aka: folate, folicin, and folic-acid. It is a water-soluble B vitamin with many rich natural sources. Folic acid is the synthetic form of vitamin B9 found in fortified foods and supplements. During pregnancy, folate plays a crucial role in

rapid cell proliferation and tissue growth of the uterus, placenta and production of red blood cells and helps baby's neural tube develop into the brain and spinal cord and expansion of the maternal blood volume Birth defects occur within the first 3-4 weeks of pregnancy. So it's important to have folic acid during those early stages

when baby's brain and spinal cord are developing. [1,2]

Folate deficiency at conception and in early pregnancy is associated with increased risk of neural tubal defects (NTDs). NTDs are the most common birth defects, contributing to miscarriage, infant mortality, severe congenital abnormalities and serious disability. Recent research recommended that, uptake of prenatal folic acid supplements around the time of conception was associated with decrease incidence of autistic disorder among child. There is clear evidence that, sufficient maternal dietary folic acid intake preconception and early pregnancy can reduce occurrence and recurrence of having babies with neural tube defect which include spina bifida, anencephaly, and encephalocele. [3-6]

In both developing and developed countries, supplementation with 400 micrograms per day ($\mu\text{g}/\text{d}$) of folic acid is essential for all women of child-bearing age and increased from 5- to 10-fold higher in pregnant than in non-pregnant women. A prophylactic dose of 400 μg (0.4 mg) per day preconception and early pregnancy was recommended in 2012 by the World Health Organization (WHO). [7,5] During pregnancy, demands for folate increase due to its role in nucleic acid synthesis, [8] to accommodate this need, the Food Nutrition Board (FNB) increased the folate RDA from 400 mcg/day for none- pregnant women to 600 mcg/day during pregnancy [9] This level of intake might be difficult for many women to achieve through diet alone. The American College of Obstetricians and Gynecologists recommends a prenatal vitamin supplement for most pregnant women to ensure that they obtain adequate amounts of folic acid and other nutrients. [10]

Excellent sources for folate are lentils and Romano beans; dark green vegetables, okra; asparagus and spinach;

salad greens; pinto beans; kidney beans and chickpeas; Avocado; Sunflower seeds, shelled; Bread made with enriched wheat flour or enriched corn meal and Orange juice from concentrate. [2]

Several studies have shown significant benefits of folate during pregnancy on birth weight, placental weight, and length of gestation. A meta-analysis conducted by [2] on effect of folate intake on health outcome in pregnancy. The results revealed that, there is a statistically significant increase in birth weight in the intervention group who received folate during pregnancy compared to the placebo group ($P=0.001$); the pooled effect estimate of the relationship between total folate intake (dietary folate plus folic acid/folate supplement) and birth weight was significant ($P=0.03$). While, there is no significant effect between folate and length of gestation and weight of placenta. They concluded that, there are evidenced relationship between folate uptake during pregnancy and increased birth weight.

Nurses are important members of health teams; they play a crucial role in providing care and health education to pregnant mothers during pregnancy period to improve maternal and neonatal outcomes through preventing and /or reducing occurrence of complications. Nurses in their role as educator provide pregnant mothers with the health information about the importance and benefits of Folate supplementation during early pregnancy. [11]

Significance of the Study

Worldwide, the neural tube defect (NTDs) is considered one of the most common congenital anomalies among neonates. They constitute heterogeneous group of disorders that occur during first week of gestation. The incidence of occurrence of NTDs in the general population varies from 1 per 1000 pregnancies in the USA to 12 per 1000 in

parts of Ireland and Wales and among Indian Sikhs and certain ethnic groups in Egypt. In Mediterranean area 6.4% of all women start to take folic acid preconception. [6]

However, there are few scattered studies in Egypt that assessed pregnant women's knowledge regarding folic acid. So, this study will contribute to better understanding of the pregnant women knowledge regarding taking folic acid and it will help in developing a plan of action to correct misconception or knowledge deficit toward folic acid and its importance during pregnancy.

Aim of the study was to assess the pregnant women's knowledge regarding folic acid and to suggest a plan of action.

Research questions

- What is the knowledge of the pregnant women regarding folic acid?
- What are the sources of the pregnant women's knowledge regarding folic acid?
- What is the relationship between personal background of the pregnant women and their knowledge regarding folic acid?

MATERIALS AND METHODS

Research design

A descriptive exploratory design was adopted for the current study (this design, usually field studies in natural settings, provides the least control over variables. The data collected either contribute to the development of theory or explain phenomena from the perspective of the persons being studied. [12]

Setting

Antenatal clinic at El Manial Maternity Hospital which is a university affiliated hospital. The antenatal clinic serves about 45.000 women annually with

various levels of socioeconomic status. [13]

The antenatal clinic provides free services such as antenatal care; gynecological care and infertility treatment as well.

Sample

A convenience sample of 200 pregnant women (based on the rule of sum which result from multiply number of variables by 10) who came for antenatal follow up were recruited for the study after their acceptance to participate in the study. All pregnant women from different trimesters of pregnancy were included, both primigravida and multigravida women were included. Pregnant women with medical disorders were excluded.

Measurements

Two tools were developed by the researchers according to the extensive review of literature to collect the data;

I-Structured Interview tool, that included data related to 1) personal background; 2) medical history; 3) past and present obstetric history.

II- A tool to assess the knowledge of pregnant women regarding folic acid, it included 12-items such as; importance of folic acid to the pregnant woman, sources of knowledge, the daily recommended dose of folic acid during pregnancy, during which trimester the pregnant woman should receive folic acid and the sources of food rich in folic acid

Tool validity

Tools were submitted to a panel of five experts in the field of maternity nursing and fetal medicine to test the content validity. Modifications were carried out according to the panel judgment on clarity of sentences and appropriateness of the content.

Ethical Considerations

Participants were informed about the nature of the study. All women were informed that their participation is voluntary and they can withdraw from the study at any

time. A written consent was obtained from all participants. Confidentiality and anonymity of the collected data were assured.

Pilot study

A total of 10% of the sample were included in the pilot study in order to assess the feasibility and clarity of the tool and determine the needed time to answer the questions. The pilot study lasted for one week. Based on its result minimal changes were carried out. Pilot study revealed that, the average length of time needed to complete the structured interview was approximately 15 minutes with each pregnant woman. Sample included in the pilot study were excluded from the study sample.

Procedures

Approval to conduct the study was obtained from the maternity hospital authorities. Data collected through a period of 3 months from beginning of May 2013 to August 2013 during the working hours of antenatal clinic which is from 9 a.m. to 2 p.m., three days per week. Data were collected through personal interview; each pregnant woman was interviewed to collect data related to: 1) personal background 2) medical history; 3) past and present obstetric history, knowledge toward folic acid and its importance during pregnancy. The Researcher met the pregnant woman in the waiting area in the antenatal clinic. The duration of the interview was 10 minutes for each one.

Statistical analysis

The collected data was scored, tabulated and analyzed using Statistical Package for the Social Science (SPSS) program version 19. Descriptive as well as parametric inferential statistics was utilized to analyze data pertinent to the study. Level of significance was set at $p < 0.05$. Chi-Square test was used to analyze the categorical data.

RESULTS

Findings of the current study are presented in three main parts: 1) personal data of the pregnant women; 2) the pregnant women's knowledge regarding folic acid; 3) relationship between personal background of the pregnant women and their knowledge regarding folic acid.

1) Personal background of the Pregnant Women

Regarding maternal age range, it was 17-41 with mean age 26.84 ± 6.14 years. More than one fourth of the pregnant women fell in the age class 17-21 years while; low percentage of them fell in the age class 37-41 years. In relation to educational level, about one third of the pregnant women received secondary school education compared to less than one fourth of the pregnant women can't read and write. High percentages of the pregnant women live in rural area (72%), more than half (78%) of the pregnant women were housewives. As regard obstetrical data, more than half of the pregnant women got pregnant more than two times, (30%) had previous cesarean section and (11%) had previous child with congenital anomalies (Table,1).

2) The Pregnant Women's knowledge regarding Folic Acid

Less than half of the pregnant women had knowledge about folic acid and its importance (43%), 88.4% of them know that, folic acid prevent congenital anomalies. High percentage of the pregnant women received their knowledge from the obstetrician (79%) while; low percentage (14%) of them received their knowledge from the nurse. More than one third of the pregnant women received the daily recommended dose of folic acid as doctor order regularly while; high percentages of them (79%) didn't know the daily recommended dose of folic acid and the appropriate period during pregnancy to receive folic acid. More than half (65%) of

the pregnant women didn't know the food that is rich in folic acid (Table, 2,3).

Table (1) Percentage Distribution of the Pregnant Women according to their Personal background and Obstetrical Data

Item	Frequency (n=200)	%
Age Class		
17-	52	26
22-	50	25
27-	48	24
32-	34	17
37-41	16	8
Educational level		
Can't read & write	32	16
Read & Write	28	14
Primary School	26	13
Preparatory School	54	27
Secondary School	60	30
Residence		
Urban	56	28
Rural	144	72
Social level		
Average	196	98
High	4	2
Occupation		
Working	44	22
Housewife	156	78
Past Obstetric History		
Gravidity		
Primigravida	74	37
Multigravida	126	63
Mode of Previous Deliveries		
Not applicable (Primi)	74	37
Normal vaginal delivery	22	11
Normal vaginal delivery with episiotomy	42	21
Cesarean Section	60	30
Instrumental	2	1
Do You Have Any Children With Congenital Anomalies		
Yes	22	11

Table (2) Percentage Distribution of the Pregnant Women according to their knowledge regarding Folic Acid

Item	Frequency (200)	%
Do You Know What Is Folic Acid and Its Importance		
Yes	86	43
What is the importance of Folic Acid? (n= 86)		
Prevent fetal congenital anomalies	76	88.4
Help in bone formation	8	9.3
Prevent hereditary disease	2	2.3
Do you know the daily recommended dose of Folic Acid during early pregnancy?		
400 microgram	34	17
600 microgram	2	1
800 microgram	6	3
Don't know	158	79
Do you receive the daily recommended dose of Folic Acid as doctor order regularly?		
Yes	78	39
Do you know the appropriate period during pregnancy to receive Folic Acid?		
First trimester of pregnancy	28	14
Second trimester of pregnancy	60	30
Don't know	112	56
Which food is rich with Folic Acid? (the following responses are not mutually exclusive)		
Green Vegetables	30	15
Vegetables	26	13
Bread	2	1
Peas	8	4
Dried beans	12	6
Nuts	8	4
Orange juice	20	10
Milk	6	3
Don't know	130	65

Table (3) Percentage Distribution of the Pregnant Women according to their Source of knowledge regarding Folic Acid

Item	Frequency	%
What is the Source of your Knowledge (n= 86)		
Gain knowledge from one source	42	48.8
Gain knowledge from two sources	22	25.6
Gain knowledge from three sources	12	14
Gain knowledge from four sources	10	11.6
These sources are (the following responses are not mutually exclusive)		
Mass media	8	9.3
Friends	4	4.6
Magazine	11	12.8
Obstetrician	68	79
Nurses	12	14
Internet	8	9.3
Previous experience	25	29

3) Relationship between Personal background of the Pregnant Women and their Knowledge regarding Folic Acid

Statistical analysis indicated highly statistical significance relations between age class and knowledge regarding importance of folic acid, it was clear that those pregnant women who fell in the age range of 17- 21 had poor knowledge about folic acid ($P= 0.001$), also those pregnant women who had secondary school education had better knowledge of the importance of folic acid than those who can't read and write or had fewer years of education , a statically significant relation between residence; occupation and pregnant women knowledge regarding folic acid. ($P = 0.00$, $P = 0.00$ respectively (Table 4)

Table (4) Relationship between personal background of the Pregnant Women and their Knowledge

Item	Do You Know What Is Folic Acid and Its Importance		Test
	Yes (n=86) %	No (n=114) %	
Age Class			$X^2=18.63$, $P= 0.001$
17-21	14.0	35.1	
22-26	25.4	24.6	
27-31	23.3	24.6	
32-36	23.3	12.3	
37-41	14.0	3.4	
Educational level			$X^2= 49.32$ $P= 0.00$
Can't read & write	9.3	21.1	
Read & Write	7.0	19.3	
Primary School	7.0	17.5	
Preparatory School	20.9	31.6	
Secondary School	55.8	10.5	
Residence			$X^2= 25.64$ $P= 0.00$
Urban	46.5	14.0	
Rural	53.5	86.0	
Social level			$X^2= 1.48$ $P= 0.22$
Average	100.0	98.2	
High	0	1.8	
Occupation			$X^2= 34.68$ $P= 0.00$
Working	41.9	7.0	
Housewife	58.1	93.0	
Gravidity			$X^2= 1.27$ $P= 0.25$
Primigravida	32.6	40.4	
Multigravida	67.4	59.6	

DISCUSSION

The current study was conducted to assess the pregnant women's knowledge regarding folic acid and to develop a

suggested plan of action. Findings of the current study are discussed within the following frame of references: 1) the pregnant women' knowledge regarding folic

acid;2) the sources of the pregnant women's knowledge regarding folic acid and 3) the relationship between personal background of the pregnant women and their knowledge regarding folic acid.

As Regard to the pregnant women knowledge about folic acid and its importance, results of the current study revealed that, less than half of the participant knew what folic acid is and its importance during pregnancy. High percentage of them knew that it can prevent birth defects. In the same context, approximately half of participants were aware of folic acid for the prevention of congenital anomalies in study done by Koken et al., (2013).^[14] While a study done by Abdulrazzaq et al.,(2003)^[15] in United Arab Emirates, illustrated that, only 8.7% of participant know the importance of folic acid to prevent birth defect. Also, Kondo et al (2005)^[16] reported that, less than 15% of Japanese women were aware of the link between folic acid and the incidence of neural tubal defect (NTDs). In the same line study done in Qatar by Bener et al.,(2006)^[17] reported that, out of 1480 participant, only 14% knew that it can prevent birth defects. Furthermore, Nawapun and Phupong (2007)^[18] observed that less than one fourth of participants among Thai women understand that folic acid could help to prevent NTDs.

World Health Organization (WHO)^[7] reported that, supplementation of 400 microgram per day for all women in childbearing period is recommended. In the current study finding, although more than one third of participants received folic acid as doctor order, only low percentage of the participant knew the proper dose that they should receive per day. These results are in agreement with Potzschet al., (2006)^[19] and Cleveset al., (2004)^[20] who they mentioned that, more than one third of the participants were taking folic acid at least once per weeks. In accordance with French et al

(2003)^[21] who they reported that only one fourth met the recommendation of WHO (400 µg SFA/day) for women capable of becoming pregnant. In contrast, A study done by Barbour et al;(2012)^[22] mentioned that, about one third reported having taken folic acid supplements as recommended; more than half receive it during pregnancy, less than one fourth receive it intermittently; and low percentage had not taken folic acid at all.

According to Koken et al., (2013)^[14] Folic acid recommended during the pre-conception period and the first trimester of pregnancy. It is associated with reduction in the incidence of neural tube defects (NTDs). In the current study findings only low percentage of the participant knew the appropriate time of receiving folic acid during pregnancy. This finding is in consistent with Abdulrazzaq et al., (2003)^[15] who illustrated that near half of respondents received folic acid in the first trimester among pregnant women. Furthermore, less than one fourth of participants didn't use folic acid and more than one fourth of them didn't remember whether they had or not.

Concerning the sources of knowledge, more than half of the participants who had knowledge about folic acid mentioned that, the main source of information regarding folic acid was the obstetrician, while low percentage mentioned that, the nurses were the main source of information. These results are in accordance with Nosrat, Sedehi, & Gosalipour (2012)^[6] who they found that, the most commonly cited sources of information were the healthcare service it constitutes more than the half; radio and TV (17.8%) and midwives (11.2%). This finding was nearly found by Bener et al; (2006)^[17] and French et al; (2003)^[21] This may be related to cultural differences and differences in the sample level of education.

Also, the current study finding is in contrast with Gjergja et al; (2006) [23] who reported that, among Croatian pregnant women, the media (TV, radio, newspapers, internet, etc.) was the most frequent source of information about folic acid it constitutes more than one third. The physician was the second source of information but it constitutes less than one third. In the same line, Nawapun and Phupong (2007) [18] reported that, the media was the most frequent source of information for Thai women, it constitutes near the half. The other sources of information were doctors/healthcare personnel they constitute less than one fourth and friends/relatives constitutes low percentage.

Concerning the participant knowledge about sources that are rich in folic acid, the present study revealed that, few participant identified food rich in folic acid. These results lower than other study done by Nawapun and Phupong (2007) [18] among Thai women near one third of women could identify types of natural foods rich in folic acid that is corresponding to urban Iranian pregnant women. (Nosrat, Sedehi & Gotalipour. 2012) [6]

Concerning the relationship between personal background of participants and their knowledge regarding folic acid, results of the current study revealed that, pregnant women who had secondary school education, who fell in age class 22-26, live in rural area and multigravida were able to identify food rich in folate and they knew the importance of folic acid, this finding was similar with that reported by Bener et al. (2006) [17] in which awareness of folic acid among Qatari women was significantly associated with education of the mother. Also, women with higher education (from high school to university level) knew more about folic acid, and used it more often. Also, Ren et al., (2011) [24] found that, women with less education, farmers, rural dwellers, and women who had a previous

child were less likely to be aware of folic acid, and were less likely to take folic acid. Moreover, current study finding is similar with Koken et al., (2013) [14] This may be related to women who had high education is associated with improved knowledge and knowledge. In contrary, Nosrat, Sedehi & Gotalipour (2012) [6] in their study found no relation was found between educational level, age of mothers, and the awareness about folic acid. Also, educational level and age of mothers did not relate to the correct intake of folic acid. Also, in the current study, about one third of the participant had secondary school education with an average range of social income. The study results were inconsistent with Cleves et al., (2004) [20] who they mentioned that, about two third had completed some education after high school, and had annual household income under \$30,000. While, Al-Hossani, Abouzeid, Salah, Farag and E. Fawzy (2010) [4] in their study of Knowledge and practices of pregnant women about folic acid in pregnancy in Abu Dhabi, United Arab Emirates found that, more than one third of the sample had secondary school education and more than half had university education. Nearly one-third of the interviewed women were primigravida and 12.3% were grand parity this is incongruent with the current study findings as more than half of the women multigravida.

Age of the participant, in the current study it ranged from 17-41 years with a mean of 26.84 ± 6.14 years. This finding was similar to that reported by Cleves et al., 2004; Al-Hossani, Abouzeid, Salah, Farag and E. Fawzy (2010) [20,4] in which two third of women were 20–29 years old; only 1.1% women were 40+ years. It is contradicting to what was reported by Baykan et al., (2011) [25] they found that, the mean age of the participant was 33 ± 8.1 years old. These differences may be due to cultural differences as most of the participants were

from rural area with different socioeconomic status.

CONCLUSION

Pregnant women have lack of knowledge regarding folic acid and its importance during pregnancy and the majority of them didn't receive it during pregnancy.

Recommendations

Based on the study findings the following recommendations are suggested:

- It is crucial to raise pregnant women awareness about folic acid and its importance during
- Pregnancy through mother class.
- Nurses should play an active role in raising pregnant women awareness about folic acid.
- Mass media should have a role in raising the awareness of adolescents female regarding importance of folic acid.
- All women of childbearing age who are planning for pregnancy, or might become pregnant, should consume more folate rich foods and take a daily supplement of 400µg of folic in addition to eating a healthy diet.
- Further study to investigate the relationship between health instructional program and knowledge and practice of pregnant women toward folic acid
- Replicate the study with large sample size and different setting to disseminate the result.

The suggested plan of action:

- Development of health instruction brochure to raise the pregnant women's awareness regarding folic acid and its importance.
- The brochure should include knowledge related to the definition

of folic acid; importance; the recommended dose for the pregnant woman; at which time the woman should receive it; sources of folate in food.

- The brochure should be distributed to the pregnant women during their scheduled antenatal visit.
- Meeting with the antenatal clinic nurses to encourage them to educate pregnant women about importance of receiving folic acid and its natural sources in food during pregnancy
- Referral of the women who had previous child with congenital anomalies to the proper channels for further examinations.

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REFERENCES

1. Surén, p., Roth, C., Bresnahan, M., Haugen, M., Hornig, M., Hirtz, D., Kveim Lie, K., Lipkin, W.I., Magnus, P., Reichborn-Kjennerud, T., Schjølberg, S., Smith, G.D., Oyen, A.S., Susser, E., Stoltenberg, C. (2013). Association between Maternal Use of Folic Acid Supplements and Risk of Autism Spectrum Disorders in Children. *JAMA* 309(6)PP:570-577.
2. Fekete, K., Berti, C., Trovato, M., Lohner, S., Dullemeijer, C., Souverein, O.W., Cetin, I., Decsi, T. (2012). Effect of folate intake on health outcomes in pregnancy: a systematic review and meta-analysis on birth weight, placental weight and length of gestation. *Nutrition Journal* 11:75 Page 3 of 8 located at <http://www.nutritionj.com/content/11/1/75>

3. Folic acid and pregnancy (2014) located at
http://kidshealth.org/parent/pregnancy_center/your_pregnancy/preg_folic_acid.html, connected on Saturday 17/5/2014
4. Al-Hossani, H. Abouzeid, M.M. Salah, H.M. Farag and E. Fawzy (2010) Knowledge and practices of pregnant women about folic acid in pregnancy in Abu Dhabi, United Arab Emirates , Eastern Mediterranean Health Journal, vol 14 (4)PP: 402-407.
5. Ogundipe, O., Hoyo, C., stbye, T., Oneko, O., Manongi, R., Terje Lie5, R., and Daltveit5,A.K. (2012). Factors associated with prenatal folic acid and iron supplementation among 21,889 pregnant women in Northern Tanzania: A cross-sectional hospital-based study. BMC Public Health , 12:481 Page 3 of 10.
<http://www.biomedcentral.com/1471-2458/12/481>.
6. Nosrat, S. B., Sedehi, M., & Golalipour, M. J. (2012). Knowledge and practice of urban Iranian pregnant women towards folic acid intake for neural tube defect prevention. JPMA-Journal of the Pakistan Medical Association, 62(8), 785.
7. WHO handbook for guideline development. Geneva, World Health Organization, 2012 (http://apps.who.int/iris/bitstream/10665/75146/1/9789241548441_eng.pdf, accessed 1 December 2012).
8. Scholl TO, Johnson WG (2000) .Folic acid: influence on the outcome of Pregnancy. Am Clin Nutr 71(5 Suppl): 12955- 13035
9. Institute of Medicine. Food and Nutrition Board (1998). Dietary References Intakes: Thiamine, Riboflavin , Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin and Choline. Washington, DC, National Academy Press.
10. American College of Obstetrics and Gynecology (2010) . Frequently Asked Questions, FAQ001, Pregnancy, Nutrition during Pregnancy. Retrieved May 15, 2012
11. Towle, A. Maternity-newborn Nursing Care. (2009) 2nd ed. Pearson Prentice Hill Company. United States.
12. Pamela J., Brink, M., Marynn J., (2012). Advanced Design in Nursing Research, 2ndedition, SAGA Publication inc.
13. Statistical department at El-Manial University Hospital, Cairo University. (2011). survey in the Federal State of Saxony-Anhalt (Germany). Journal of applied genetics, 47(2), PP: 187-190.
14. Köken, G. N., Derbent, A. U., Erol, O., Saygin, N., Ayık, H., &Karaca, M. (2013). Awareness and use of folic acid among reproductive age and pregnant women. Journal of the Turkish-German Gynecological Association, 14(2).
15. Abdulrazzaq, Y. M., Al-Gazali, L. I., Bener, A., Hossein, M., Verghese, M., Dawodu, A., &Padmanabhan, R. (2003). Folic acid awareness and intake survey in the United Arab Emirates. Reproductive Toxicology, 17(2),PP: 171-176.
16. Kondo, A., Kamihira, O., Shimosuka, Y., Okai, I., Gotoh, M., & Ozawa, H. (2005). Awareness of the role of folic acid, dietary folate intake and plasma folate concentration in Japan. Journal of Obstetrics and Gynecology Research, 31(2),PP: 172-177.
17. Bener, A., Al Maadid, M. G., Al-Bast, D. A., & Al-Marri, S. (2006). Maternal knowledge, attitude and practice on folic acid intake among Arabian Qatari women. Reproductive toxicology, 21(1), PP: 21-25.
18. Nawapun, K., & Phupong, V. (2007). Awareness of the benefits of folic acid and prevalence of the use of folic acid supplements to prevent neural tube defects among Thai women. Archives of gynecology and obstetrics, 276(1), PP: 53-57.
19. Pötzsch, S., Hoyer Schuschke, J., Seelig, M., &Steinbicker, V. (2006). Knowledge among young people about

- folic acid and its importance during pregnancy: a Statistical department
20. Cleves, M. A., Hobbs, C. A., Collins, H. B., Andrews, N., Smith, L. N., & Robbins, J. M. (2004). Folic acid use by women receiving routine gynecologic care. *Obstetrics & gynecology*, 103(4), PP: 746-753.
 21. French, M. R., Barr, S. I., & Levy-Milne, R. (2003). Folate intakes and awareness of folate to prevent neural tube defects: a survey of women living in Vancouver, Canada. *Journal of the American Dietetic Association*, 103(2), PP:181-185
 22. Barbour, R. S., Macleod, M., Mires, G., & Anderson, A. S. (2012). Uptake of folic acid supplements before and during pregnancy: focus group analysis of women's views and experiences. *Journal of Human Nutrition and Dietetics*, 25(2), PP:140-147
 23. Gjergja R, Stipoljev F, Hafner T, Tezak N, Luzar-Stiffler V., (2006) Knowledge and use of folic acid in Croatian pregnant women--a need for health care education initiative. *ReprodToxicol* , 21, PP: 16-20
 24. Ren A., Zhang L., Li ,Z., Hao, L., Tian, Y., Li, Z (2011) Awareness and use of folic acid, and blood folate concentrations among pregnant women in northern China—An area with a high prevalence of neural tube defects. *Reproductive Toxology* ,Vol 22 (3).
 25. Baykan,Z., Ozturk, A., Poyrazoglu, S., Gun, I, (2011) Awareness , Knowledge and use of folic acid among women : a study from Turkey. *Archives of Gynecology and Obstetrics* , 28 (6) PP: 1249-1253.

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