ORIGINAL ARTICLE

FREQUENCY OF FOLIC ACID DEFICIENCY IN WOMEN OF CHILDBEARING AGE PRESENTING AT AYUB TEACHING HOSPITAL ABBOTTABAD

Saqib Malik, Zainab Syed, Farhat Naz, Najma Rehman, Sadia Rehman, Talha Durrani
Department of Medicine, Ayub Medical & Teaching Institution, Abbottabad-Pakistan

Background: Folic acid deficiency is one of the most common deficiencies among women of childbearing age. It can lead to neural tube defects, a significant cause of disability and mortality among infants. Therefore, the main objective of this study was to determine a folic acid deficiency in women of childbearing age in Ayub Teaching Institute, Abbottabad **Methods:** This cross-sectional study was carried out in Ayub Teaching Institute, Abbottabad from January to June 2020. In this study, a total of 193 women of childbearing age were included through consecutive sampling. **Results:** In this study 193 women of childbearing age were included. Mean age was 30±4.87 years. Out of 193 patients, 56.7% were found to be anemic and 38.9%were found to have folic acid deficiency. **Conclusion:** Our study concludes that the majority of women of child bearing age are anemic in our set up. Moreover, the frequency of folic acid deficiency is 38.9 % which is high.

Keywords: Folic acid deficiency; Women of child bearing age.

Citation: Malik S, Syed Z, Naz F, Rehman N, Rehman S, Durrani T. Frequency of folic acid deficiency in women of Childbearing age presenting at Ayub Teaching Hospital Abbottabad. J Ayub Med Coll Abbottabad 2022;34(3):515–8.

DOI: 10.55519/JAMC-03-10649

INTRODUCTION

Folate, also known as folacin and Vitamin B9, is a B-vitamin. It plays a crucial role in synthesis and maintenance of DNA. This role becomes even more critical in pregnancy, where there is an increased requirement of folic acid to improve the growth and development of the fetus. It has also role in pregnant mother to support tissue growth and expansion of blood volume.[1] As such, a deficiency of folate can lead to adverse effects on birth; especially alongside Vitamin B12 deficiency.[2] Neural tube defects and poor cognition in infants are also result of Vitamin B12 and folic acid deficiency.[3] Furthermore, inadequate amounts of these vitamins in women of reproductive age increase risk of hyperhomocystinemia which in turn increases risk of resistance to insulin and other pregnancy complications.[4]

Megaloblastic anemia can be caused by folate deficiency that is characterized by macrocytosis and hyper segmented polymorph nuclear leukocytes (P.M.N.s).[5] Serum folate levels offer insight into a population and its subgroups with regards to percentage of people at risk of developing folate deficiency.[6] For women of reproductive age who are sexually active, the daily recommended intake of folate/folic acid is 0.70–0.80 mg.[7] According to National Health and Nutrition Examination Survey, folic acid deficiency is defined as serum levels of folate less than 4ng/Ml or 10 nmol/L.[8]

The requirement of folic acid is further increased during pregnancy and lactation thereafter. However, numerous researches have shown that in Middle East, daily intake of folate are not sufficient to meet the daily recommended intakes. For example, while assessing the incidence of N.T.D.s in Saudi Arabia (K.S.A.), several studies showed an incidence of 1.05–1.90/1000 live births [90–92]; thus indicating the inadequacy of folic acid intake.[9] Furthermore in Egypt, Tawfik *et al*. conducted a survey which showed that 14.7% (among the 579 mothers) have folic acid deficiency.[10] In Guatemala, surveys conducted showed that prevalence of serum folate deficiency was 5.1% and R.B.C. folate deficiency was 8.9%.[11] Even in the United States of America, a recent study reported that percentage of women of reproductive age that were folate deficient was 22.8% as per guidelines outlined by the World Health Organization and are therefore at an increased risk of bearing off springs with N.T.D.s. Multiple clinical trials have shown that consuming 400 μg of folic acid daily prevents N.T.D.s from developing.[12]

Internationally, considerable studies and surveys have been conducted on the topic of folate deficiency; there is a lack of data locally despite folate deficiency being a significant issue in our population. Therefore, this study plans to identify the frequency of folic acid deficiency in women of child bearing age locally. The data gathered may then be used by local policy makers, planners and caregivers to implement strategies associated with decreasing

folate deficiency and increase awareness regarding use of folic acid in women of child bearing age.

MATERIAL AND METHODS

This cross sectional study was conducted in the Department of Medicine, Ayub Teaching Institute, Abbottabad from January to June 2020.Total 193 Women of child bearing age (15–49 years) presenting to tertiary care hospital were included in this study. Ethical approval from hospital Ethics committee was taken and it was explained to patients/relatives that this data will be used for research purpose. Informed consent was taken. Serum folic acid levels were measured and data was collected on proforma. SPSS version 20 was used to analyze data.

RESULTS

Age distribution among 193 patients was analyzed as 109 (56.5%) were aged 15–30 years, and 84 (43.5%) were aged 31-45. The mean age was 30 years with SD±4.87. Importantly, 37 (19.2%) patients had 0 parity, while 29 (15.4%), 43 (22.4%), and 84 (43.1%) had 1, 2 and more than 2 parities respectively. The frequency of folic acid deficiency in 193 patients was analyzed as 75 (38.9%) patients have a folic acid deficiency. In contrast, the remaining 118 (61.1%) patients do not have a folic acid deficiency, as shown in table-1.

Hb level distribution was analyzed, which led out of 193 patients,108 (56.5%) were anemic with Hb levels below 12g/dl, and 85 (44%) were normal, having hb between (12–15 g/dl). Folic Acid levels also seem to correlate strongly with Hb levels are shown in graph 2. Regarding age and folic acid levels, the trend seems to follow a normal distribution, with the 25–30 year-old-group having one of the highest levels while age groups like 15-20 and 40-45 have the least, as shown in graph 2. This difference was statistically significant with a *p*-value of 0.04, as shown in table-2.

In terms of socioeconomic status, a total of 19 (10.2%) patients belonged to the upper class, 77 (40.3%) to the middle, 23 (12.4%) to the lower-middle, and 74 (37.1%) belonged to the lower class. The levels of folic acid in these different classes of patients decreased as with the decrease in socioeconomic status with the lower-income group, having 44 (59.5%) of patients affected with folic acid deficiency. This difference was found to be statistically significant with p=0.05.

In terms of other demographic factors, 61 (31.7%) were urban, while 132 (68.3%) were from rural areas, and 128 (65.9%) had no formal education, while 65 (34.1%) were educated. 120 (62.6%) patients who had presented were presently employed, and 73 (37.4%) were unemployed. The levels of folic acid in these patient groups were not different from each other in terms of statistical significance, with p >0.05.

Table-1: Demographic characteristics and Folic Acid deficiency

Variable		N (%)	Folic Acid Deficiency		*p*-value
			Present	Absent	
Age Group	15-30 year	109 (56.5)	36	73	0.04*
	31-45 year	84 (43.5)	39	45	
Parity	0	37 (19.2)	14	23	0.08
	1	29 (15.4)	12	17	
	2	43 (22.4)	17	26	
	>2	84 (43.1)	33	51	
Residence	Urban	61 (31.7)	24	37	0.93
	Rural	132 (68.3)	52	80	
Educational Status	Uneducated	128 (65.9)	26	39	0.900
	Educated	65 (34.1)	50	78	
Employment Status	Employed	120 (62.6)	48	72	0.821
	Unemployed	73 (37.4)	28	45	
Socioeconomic status	Upper Class	19 (10.2)	7	12	0.05*
	Middle Class	77 (40.3)	31	46	
	Lower-middle Class	23 (12.4)	11	12	
	Lower Class	74 (37.1)	44	30	

Chi-square test was used to evaluate statistical significance

Table-2: Stratification of Hb level group w.r.t age

AGE		HB level group		Total	*p*-value
		Anemic	Normal		
Age group	15 to 30 years	53	56	109	0.019
		27.5%	29.0%	56.5%	
	31 to 45 years	55	29	84	
		28.5%	15.0%	43.5%	
Total		108	85	193	
		56.0%	44.0%	100.0%	

Chi-square test was applied, and the p-value was 0.019

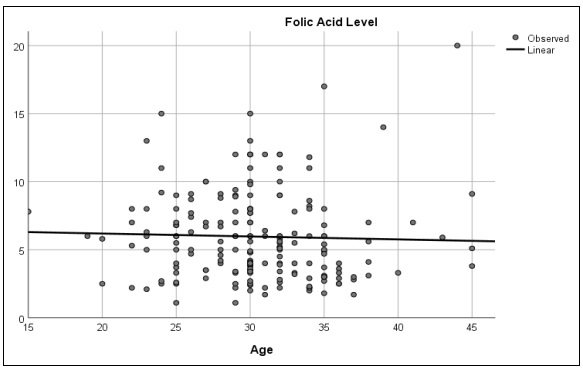

Figure-1: Correlations between Age and Folic acid

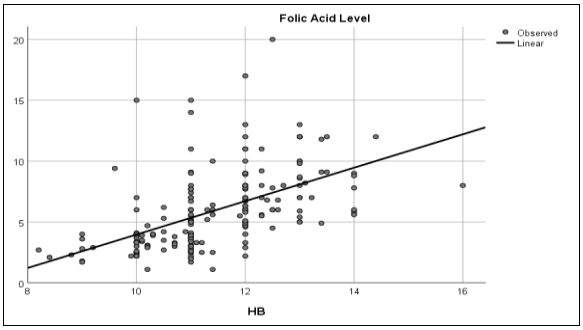

Figure-2: Correlations between Hb level and folic acid

DISCUSSION

It was found that 56.5% of the patients were anemic with hemoglobin levels below 12 g/dL, while 38.9% of the patients had a folic acid deficiency. According to the literature, its prevalence should be ≥40.0% for a severe public health problem.[13] So, if we compare our study, our study data strongly suggest that women of childbearing age in our setup have a greater percentage of these deficiencies, which make them severe public health issues. Therefore, women need to be aware of the importance of folic acid to ensure a safe pregnancy.

According to the WHO, worldwide, a million people are affected by vitamin B12 and Folate deficiency, making them an important Public Health Issue.[14] Globally, the prevalence of folate and vitamin B12 is not known. The reason behind this fact is that a limited work is being done on a larger scale. Data derived from local and national surveys are used to determine the prevalence of these deficiencies. In Ethiopia, a survey conducted at a larger scale determined an astounding prevalence of folate deficiency at 67% (≤6.6 ng/mL).[15] Furthermore, a survey conducted in Iran showed that 14.3% of women of childbearing age had folic acid deficiency levels (<6.7 nmol/L), and 22.7% were shown to have low vitamin B_{12} levels (<110 pmol/L).[16]

Pregnant women, women of childbearing age (15–49 years), and children are most commonly affected by anaemia.[17] Worldwide, anemia affects approximately 29% of women of reproductive age, pregnant women 38%, and children approx. 43%.[18] The prevalence of anemia in South Asian countries ranged from 42–55%. For instance, in India, the prevalence of anemia among W.R.A. (women of reproductive age) was estimated at 52%. The data from our study also showed that a large percentage (56.5%) of women of childbearing age were anemic. Folic acid deficiency requires that W.R.A. be supplemented with folic acid; this corrects the folate levels, addresses associated anemia, and lowers the risk of neural tube defects. Especially in pregnancy, it is globally recommended that women be given folic acid supplements during the periconceptional period to prevent adverse pregnancy outcomes. For unplanned pregnancies, supplementing women during this period may become challenging. Therefore, it is recommended that all women of reproductive age be supplemented with folic acid. The benefits of daily intake of folic acid supplements in women of childbearing age are well documented. One study (Duffy 2014) showed that the serum/plasma levels of folate and red blood cell folate levels respond to folic acid intervention in a dose-dependent manner up to a supplementation intake of 400 μg/d in adults populations.[19] Our study is one of the few studies examining the association between parity and folic acid levels. Although our results indicate a possible relation between parity and folic acid levels, earlier studies were done in China showed no relationship between the two, while similar studies done in south American countries demonstrated a possible negative correlation.[20–22] This could likely be explained because of the difference in the socio-cultural issues between the two countries as poverty is one of the factors that increase the general population and, by extension, parity, but definitive scientific evidence is needed for further confirmation.

Another significant association that our study revealed was that folic acid deficiency is associated with low-income status. While nutritional deficiencies are common in low-income countries, folic acid deficiency holds particular importance because it can lead to fetal abnormalities, furthering the economic divide. A strong association between folic acid deficiency and low income is also confirmed by studies done in other countries and generally seems to be generalizable.[23,24] This is obvious from the finding that although factors like residence, educational status, employment status, and relevant factors are not associated with an increase or decrease in anemia, the low-income status might lead to it.[25, 26]

The shortcoming of this research was that all the patients were included from only medical units of tertiary care hospital; instead, it should involve the Gynaecology department, where most of women of childbearing age present with pregnancy complications of folic acid deficiency.

CONCLUSION

Our study concludes that the incidence of folic acid deficiency in women of childbearing age is 38.9% in our setup. This high frequency of folic acid deficiency requires that women of child bearing age should be supplemented with folic acid to prevent pregnancy associated complications.

AUTHORS' CONTRIBUTION

SM: Literature search, data collection. ZS: Data analysis. FN: Data interpretation. NR: Proof reading. SR, TD: Statistical analysis.

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Submitted: January 30, 2022	*Revised: May 22, 2022*	*Accepted: May 22, 2022*

Address for Correspondence:

Farhat Naz, Department of Medicine, Ayub Medical & Teaching Hospital, Abbottabad-Pakistan
Cell: +92 331 574 4594
Email: drfarhatmed10@gmail.com