Original Article

The Prevalence of Iron Deficiency Anemia in Female Medical Students of Different Medical Colleges of Khyber Pakhtoonkhwa, Pakistan

Ayesha Jamil[1], Nizamuddin[1], Abdul Hameed Khan[1] and Amjad Mustafa[2]

ABSTRACT

Objective: Iron deficiency anemia (IDA) is very common in adolescent and adults, especially female. In medical students, it is caused by a number of causes, "including overwork, decrease appetite due to stress and unnecessary dieting". Very little data is available at national level about these health conscious medical students. This "descriptive, cross sectional study, was conducted in public and private Medical colleges of KPK". The main objective of the study was "to determine the Prevalence of IDA in female medical students of KPK".

Study Design: Observational / descriptive study.

Place and Duration of Study: This study was conducted at the department of Pharmacology, Khyber Girls' Medical College, Peshawar From December-2015 to May-2016.

Materials and Methods 390-female medical students aged 19 to 24 years have participated in this study'. After formal consent and recording of their demographic information, "Hemoglobin (Hb) and Mean Corpuscular Volume (MCV) was done using digital Sysmex XT-4000i hematology analyzer". Serum ferritin (S-Ferritin) was done using Architect I-2000 analyzer. The identity of all students was kept confidential. All students with, "Hb<12g/dl, MCV<76um^3 and S-Ferritin <11ng/ml were labeled as having IDA and students having Hb>12g/dl, MCV>76um^3 but S-Ferritin<11ng/ml were labeled as having Iron deficiency (ID), but not IDA".

Results: Complete data of all "390 students were available for further analysis". The mean age of the students was 21±1 years. IDA was present in 6.66%(n=26/390) students, while ID was present in 41.54%(n=162/390) students. Normal iron status was found in 51.80%(n=202/390) students.

Conclusion. It is concluded that "ID and IDA are very common in female medical students of KPK. All female medical students should be encouraged to take extra iron to replenish their iron store".

Key Words: Iron deficiency Anemia, Female Medical Students, Iron Deficiency.

Citation of article: Jamil A, Nizamuddin, Khan AH, Mustafa A. The Prevalence of Iron Deficiency Anemia in Female Medical Students of Different Medical Colleges of Khyber Pakhtoonkhwa, Pakistan. Med Forum 2016;27(11):37-40.

INTRODUCTION

Anemia is "chronic states of low Hb level in the blood, which may be due decrease number of Red Blood Cells (RBCs), or decrease amount of Hb in each RBC". Iron is the main component of Hb synthesis and is vital for healthy life but "unluckily ID and IDA are the most commonly reported nutritional problems and causes >50% of anemia in all age group world widely". In developing countries, "every second female is anemic, more than 20% maternal mortality occur due to anemia[1] and around 40% of preschool/school children and around 30% of adult are anemic". Other causes like "chronic disease, autoimmune disease, malaria, folate plus B12 deficiency, and congenital abnormalities in RBCs like thalassemia, sickle cell anemia and spherocytosis" do share some of the current volume of anemia. The overall "global prevalence of IDA is >30%, affecting>2-billion people around the world"[1,2,3]. This problem is wisely handled in developed nations by "fortification of food materials like flour, cooking oil, confectionaries and other beverages with iron and other essential elements". Apart from food fortification, population control, education, elevation standard of life and overall general health and hygiene improvement have really played essential role to defeat all nutritional deficiencies. But on the other hand, it is still a big and booming problem in developing countries. It's commonly affect "preschool and school children, young female and elderly people". The commonest factors are "poor intake of iron in diet, poor absorption from the gut and increase loss from the body". In all these nations, "Poverty, population explosion, poor allocation

[1.] Department of Pharmacology, Khyber Girls' Medical College, Peshawar.
[3.] Department of Pharmacology, Kohat Institute of Medical Sciences, Kohat.

Correspondence: Dr. Nizamudin, Lecturer, Pharmacology, Khyber Girls' Medical College, Peshawar.
Contact No: 0300-5909437
Email: drnizam99@yahoo.com

Received: August 10, 2016; Accepted: October 03, 2016

of health resources, bad quality plus low quantity of food, adulteration of food and unnecessary dieting are the common causes of poor intake" while"Poor immunization, recurrent illnesses, diarrheal disease due to poor health and hygiene practices,overcrowding, intake of contaminated water and worms infestation are the common causes for poor absorption from the gut". Menstrual problems, recurrent pregnancies and extensive lactation to multiple children are the common causes of iron loss from the body (4,5).

IDA passes through many stages, starting from depletion of iron store in first stage. In this stage, "Hb is normal but S. Ferritin is <12ng/ml". In the second stage, "S. Ferritin further decrease but Hb still remains normal'. In third stage, "the iron store get almost empty and full blown IDA get develop, which is characterized by Hb<12g/dl and S. Ferritin <11ng/ml (6) and MCV<76um^3". In young age, "female are especially prone to ID and IDA because of poor intake of iron, increase demand for rapid growth, menstrual loss and pregnancy in early married teenage girls". IDA is commonly responsible for many "pregnancy related complication and perinatal mortality in developing countries" (7).

Medical students especially female students develop "IDA due to stress, unnecessary dieting, over work, polymenorrhoea due to stress and fast food selection". It has been observed that "anemia affect all females and significantly affect their growth, behavior and performance". However, very little research data is available in Pakistan regarding this field. Keeping in mind the importance of IDA, "this study was conducted to determine the prevalence of anemia female medical students, so that all female especially the targeted group in stress can be advised to use supplemental iron timely".

MATERIALS AND METHODS

From December-2015 to May-2016, 390-female medical students aged 19 to 24 years from different medical colleges of KPK were recruited for this study. All those students who have bleeding disorder, "history of thalassemia and recent major bleeding due to any cause were excluded from the study as they may have to act as confounders and will introduce bias" in results. Criteria for "IDA and ID was designed, including Hb<12g/dl, MCV<76um^3 and S-Ferritin <11ng/ml for IDA and Hb>12g/dl, MCV>76um^3 but S-Ferritin< 11ng/ml for ID". While "Hb above 12gm/dl with normal MCV and S. Ferritin were labeled as normal". Students were divided into three groups, as group-A having IDA, group-B having ID and group-C as normal. The descriptive- cross sectional design was used in the study.

Data Collection: Total 390 female medical students, "fulfilling the inclusion and exclusion criteria were enrolled in the study in a consecutive manner". Getting formal written consent and recording of demographic information like names, age etc., "Haemoglobin (Hb) and Mean Corpuscular Volume (MCV) was done using digital sysmex XT-4000i hematology analyzer". At the same time, "serum ferritin (S-Ferritin) was done using Architect I-2000 analyzer". All students with "Hb<12g/dl, MCV<76um^3 and S-Ferritin <11ng/ml were labeled as having IDA and students having Hb>12g/dl, MCV>76um^3 but S-Ferritin<11ng/ml were labeled as having Iron deficiency (ID), but not IDA". The identity of all students was kept confidential and risk/benefits were explained accordingly. All collected information was recorded on pre-designed Performa.

Data Analysis: Data was entered in "Microsoft Office Excel 2007 and analyzed, by using SPSS statistical program". The data was expressed as "mean and presented in tabulated form"."Student's t-test was applied to test compare the difference between the groups". P-value<. 05 were considered significant statistically.

RESULTS

Laboratory and demographic data for all 390 studied students was available for further analysis. The mean age of the "students were 21±1 years, ranged from 19 to 24 years". The overall result of these three groups show that"IDA was present in 6.66%(n=26/390) students, while ID was present in 41.54%(n=162/390) students". While 51.80%(n=202/390) students was found to have normal iron status, having no IDA and ID as shown in Table 1.

Iron status in different age group of 390 students was analyzed, which show that in age group of 19-20 years, IDA, ID and normal Hb were present in 06, 62 and 65 students respectively. In age group of 21-22 years, IDA, ID and normal Hb were present in 12, 65 and 72 students respectively. While in age group 23-24 years, IDA, ID and normal Hb were present in 08, 35 and 65 students respectively as shown in figure 1.

Table No.1: Over all finding in all study groups

Finding	Number of cases	Percentage
IDA	26/390	6.66%
ID	162/390	41.54%
Normal	202/390	51.80%
Total	390/390	100%

Table No.2: Mean Hb, MCV and S. Ferritin level inall groups

Finding	Group-A	Group-B	Group-C
Hb	9.8±02gm/dl	12.8±. 08gm/dl	13.3± .08gm/dl
MCV	68±01um^3	70±02um^3	78±08um^3
S.Ferritin	6.4±0.1ng/ml	8.6±0.2ng/ml	28±08ng/ml
P-value <0.**005**			

Statuses of mean Hb, MCV and S. ferritin in allthree groups was analyzed, which show that, mean Hb was 9.8±02gm/dl in group-A then 12.8±.08gm/dl in group-B and finally 13.3± .08gm/dl in group C. Mean MCV was 68±01um^3 in group-A, 70±02um^{3}in group-B and 78±08um^3 in group-C. Mean S. Ferritin was 6.4±0.1ng/ml in group-A, 8.6±0.2ng/mlin group-B and 28±08ng/ml in group-C as shown in Table 2.

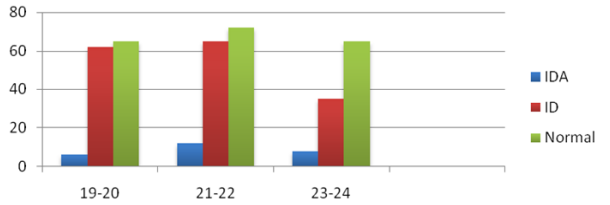

Figure No.1. Age wise over all iron status in 390 students.

DISCUSSION

Anemia is "one of the most commonly diagnosed medical problems worldwide". In our study, "Hb level of 12gm/dl was considered as the cutoff point for normal Hb, and all female students having Hb<12gm/dl were labeled as anemic". According to WHO criteria, "all Children from six month to 5 years, children from 6 to 11 years, adult female and adult male will be considered anemic, if their Hb is less than 11gm/dl, 11.5gm/dl, 12gm/dl and 13gm/dl respectively". All pregnant female having Hb<11gm/dl will be considered anemic[8,9]. Anemia is not simply known for "low blood Hb level, but a chronic morbid state of low mood, stress, poor concentration, loss of energy, growth retardation, performance depth and well-known factor for all sort mortality". There are many causes of anemia, "but iron deficiency is considered the most important cause of anemia". ID start when there is,"low intake iron containing foods, mall absorption and continuous utilization during rapid growth, pregnancy, lactation and menstruation". If not treated, then this low iron store further precipitates IDA[10].

In our study, IDA was present in 6.66%, while ID was present in 41. 54% of the female students, age 19-24 years. Although most of the female medical students come from middle to upper class families, in spite of that these figures are alarming. In 2010, "Shams S, Asheri H,Kianmehr A et al, conducted a study in Tehran, targeting medical students, which show that IDA was present in 4% while ID was present in 43.3% of the female medical students in Tehran medical university[11].

IDA and ID can affect all students at any age from preschool time up to university life in any part of the world. In 2012, "Bano R, Ahmed N, Sharma BC et al, found that, IDA was present in 32% of the Indian medical students, in which 44% were female and 20% were male"[12]. In 2014, another study conducted in Bangladesh by "Kumar B. Shill, Palash Karmakar et al, which show, that 55.3% of the university students have iron-deficiency anemia, in which 63.3% were female and 36.7% were male[13]". The finding of our study is closed to the finding of another study, conducted in 2010 at university of Peshawar by "MT Khan, T Akhtar, et al with the help of PMRC, which show that 17.6% of the male and 23.3% of the female students have microcytic anemia, which is usually caused by iron deficiency[14].

Daily requirement of iron for "children, adult male and adult female is 15mg, 8mg and 18mg respectively, which usually increase to 36mg for adult female during pregnancy". Total iron store in the body is "2gm to 4gm and every person loose about 1mg iron per day, which increases up to 42mg during menstruation"[15,16]. After searching extensive online studies and literature, several possible explanations can be suggested for the development of anemia in female students, including

1. Stress due to heavy curriculum and comprehensive examination system.
2. Excessive blood loss during heavy menstruation, caused by stress.
3. Poor intake of iron and diet due to loss of appetite during stress hours.
4. Poor quality of food in hostel and college cafeteria.
5. Unnecessary dieting for weight conscious female students.

Although it was really a targeted study, but still there are some "limitations of this study including female students of medical colleges whom usually belong to middle class or upper class families, cross-sectional study design, lack of data on potential confounders and poor addressing of different students in hostel and those who are coming on daily basis from homes to the college". Finally, "the prevalence of anemia in female students leaves concern about the possibility of confounding, like socioeconomic background and religious belief of using beef or vegetarian, whichmay have impact on the development of iron deficiency in these students". We can improve the strength of our study by addressing all potential confounders, selecting large size population, categorization of students on the basis of socio-economic status and addressing of daily intake of selected food in these students.

And finally, all these finding show that " ID and IDA is a reality in all students, especially female". However, factor contributing IDA, the clinical relevance of these findings in terms of the development of IDA and ID has yet to be precisely scrutinized and ascertained.

CONCLUSION

IDA and ID are very common in female medical students. All female students, "especially the targeted group with ID should be encouraged to take iron supplements regularly". There should be strict monitoring of their food quality and awareness activity

in medical colleges on regular interval. Further study is suggested, both at national and international level to find possible causes of IDA and ID in female students.

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. World Health Organization (WHO). Deficiency of micronutrient around the world. Update 2016 (online).
2. Textbook of Current Medical Diagnosis and Treatment, CMDT 2016.
3. Akhtar S, Ahmed A, Ali Z, et al. Iron status of the Pakistani population-current issues and strategies. Asia Pac J Clin Nutr 2013;22(3):340-y347.
4. Kayode O. Osungbade and Adeolu O. Oladunjoye (2012). Anaemia in Developing Countries: Burden and Prospects of Prevention and Control, Anemia, Dr. Donald Silverberg (Ed.), ISBN: 978-953-51-0138-3, In Tech Available from: http://www.intechopen.com/books/anemia/anaemia-in-developing-countries-burden-and- prospects-of-prevention-and-control.
5. Tolentino K, Jennifer F. Friedman. An Update on Anemia in Less Developed Countries. Am J Trop Med Hyg 2007;77(1):44-51.
6. Kotze MJ, van Velden DP, et al. Pathogenic mechanisms underlying iron deficiency and iron overload: New insights for clinical application. JIFCC e-journal;20(2).
7. Engmann C, Adanu R, Lu TS, et al. Anemia and iron deficiency in pregnant Ghanaian women from urban areas. Int J Gynaecol Obstet 2008;101:62-63.
8. Tolentino K, Friedman JF, et al. An update on anemia in less developed countries. Am j Trop Med Hyg 2007;77:44-51.
9. Siti-Noor AS, Wan-Maziah WM, Narzah MY et al. Prevalence and risk factors for iron deficiency in Kelantanese pre-school children. Singapore Med J 2006;47:935-936.
10. Jougleux JL, Rioux FM, et al. Mild maternal iron deficiency anemia during pregnancy and lactation in guinea pigs causes abnormal auditory function in the offspring. J Nutr 2012;142(8):1613.
11. Shams S, Asheri H, Kianmehr A, et al. The prevalence of iron deficiency Anemia in female medical students in Tehran. Singapore Med J 2010; 51(2):116-119.
12. Bano R, Ahmed N, Sharma BC, et al. Nutritional anemia in in the medical students. Ind Med Gaz 2012;1:16-18.
13. Shill KB, Karmakar P, Sattar MM. Prevalence of iron-deficiency anemia among university students in Noakhali region Bangladesh. J Health Popul Nutr 2014;32(1):103-110.
14. MT Khan, Akhtar T, Niazi M, et al. Prevalence of anemia among university of Peshawar students. JPMI 2010;24(04): 265-269.
15. Al-Sayes F, Gari M, Qusti S, et al. prevalence of iron deficiency and iron deficiency anemia among female at university stage. J Med Lab Diagn 2011; 2:5-11.
16. Rowland TW, Kelleher JF. Iron deficiency in athletes. Insights from high school swimmers. Am J Dis Child 1989;143:197-200.