ORIGINAL ARTICLE

HAEMOGRAM INDICES OF MEDICAL STUDENTS IN KARACHI

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ABSTRACT

Background: Anaemia is a global public health problem. Prevalence of deficiency anaemias in healthy teenage population can be an important indicator of general nutritional status. The aim of this study was to assess haemogram values of medical students in Karachi and correlate it with WHO parameters.

Material & Methods: This descriptive cross-sectional study was conducted in 2010 on 518 apparently healthy subjects of both genders, who presented for fitness test prior to admission in medical college. Anti-coagulated whole blood samples were collected and tested on automated haematology cell counter and an 18 parameter haemogram was obtained. Peripheral smear was prepared using Leishman's stain.

Results: The mean age was 18.1 years with male to female ratio of 1:3. The mean haemoglobin was 14.7 g/dl in males and 12.8 g/dl in females. Mean MCV 83.3 fl in males and 82.4 fL in females. Mean MCHC 33.4 g/dl in both genders. Mean platelet count $247.4x10^9$/l in males while $289.6x10^9$/l in females.. Normochromic-normocytic morphology was found in 478(92.2%), hypochromia with aniso and poikilocytosis in 38(7.3%) and macrocytosis in 2(0.4%) persons. These frequencies were consistent to WHO reference ranges.

Conclusion: The blood indices of medical students fall within the specified range as set by WHO parameters.

KEY WORDS: Blood count, Haemogram, Medical student.

INTRODUCTION

Anaemia is a condition in which the number of red blood cells (and consequently their oxygen-carrying capacity) is insufficient to meet the body's physiologic needs. Specific physiologic needs vary with a person's age, gender, residential elevation above sea level (altitude), smoking behavior, and different stages of pregnancy.[1] Anemia is defined as a decreased concentration of haemogobin and red blood cell mass compared with that in age matched controls. It is a frequent laboratory abnormality in children. As many as 20% children in United States and 80% in developing countries will be anaemic at some of age of 18 years.[2]

Anaemia is a global public health problem, affecting all the countries of the world, with many social and economic consequences for the development of a country as well as having profound effects on human health. In 2002, iron deficiency anaemia (IDA) was considered to be among the most important contributing factors to the global burden of disease.[3,4] WHO estimates that more than 2 billion people worldwide are anemic.[1]

Prevalence of common deficiency anaemias, among healthy teenage population group, can be an important indicator of general nutritional status. Adolescent girls show highest prevalence of low iron intake and poor iron status.[5] Accounting for the accelerated growth spurts, teenagers carry relatively higher risk for developing deficiency anemias.[6] As their requirement for nutrients escalate, dietary deficiency may develop in this setting. Teenager females carry a comparatively higher risk for developing iron deficiency anemia (due to added menstrual losses and uncompensated dietary iron input).[7] Living in a developing country; apparently healthy Pakistani youth may be affected by the dietary deficiency anaemias. Anemia in this age group can have many side effects including a person's ability to concentrate, learn, and remember, lethargy, inability of immune system to function properly leading to increase susceptibility to infection and lack of stamina and decreased work and study performance.[8,9]

Anemia can thus have a relevant effect on healthcare needs and become a significant healthcare burden.[10,11] it is an established fact that anemia is very common in teenage population especially in girls. Hence more work needs to be done in Pakistan.

The objective of this study was to evaluate haemogram values among teenage medical students in Karachi and to compare it with normal age and gender specific reference ranges provided by WHO.[12]

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted in 2010 on 518 apparently healthy subjects of both genders, who presented for fitness test prior to admission in medical college. Anticoagulated whole blood samples were collected and tested on automated haematology cell counter l TAC-α and an 18 parameter haemogram was obtained of which we included 10 parameters i.e. white blood cells (WBC), red blood cells (RBC), hemoglobin (Hb), haematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), platelets (PLT), red cell distribution width (RDW) and platelet Crit (PCT) in our study. Analysis was done on SPSS version 16.0.

Peripheral smear was prepared within a standardized time limit of 4 hours while Leishman's stain was utilized for staining. Peripheral smear morphology was reported by conventional microscopy.

Reference ranges for both genders were used in accordance to the WHO guidelines. For morphology, normochromic normocytic picture was considered as non-anaemeic. hypochromia with aniscytosis & poikilocytosis as either iron deficiency anaemia or haemoglobinopathy or both while macrocytosis was taken as vitamin B_{12} or folic acid deficiency anemia.

Out of the two approaches i.e. kinetic (focusing on production, destruction and loss)[10] and morphological (which groups anaemia by red blood cell size) the second one was used as it is reliable and conveniently done by routine hematology analyzers.

RESULTS

Mean age group of the subjects included in the study was found to be 18.1 yrs with 127(24.52) males and 391 (75.48) females.

In males the calculated means of all the parameters are shown in Table-1

Table 1: Descriptive statistical analysis of male subjects.

Parameter	Mean+SD
WBC(103/ul :mean ± SD)	7.27+1.94
RBC(106/ul:mean ± SD)	5.36+0.61
Hb(gm%:mean ± SD)	14.71+1.46
HCT(%:mean ± SD)	44.85+5.88
MCV(fl:mean ± SD)	83.35+8.55
MCH(pg:mean ± SD)	27.62+2.82
MCHC(g/dl:mean ± SD)	35.14+25.80
PLT(103/ul:mean ± SD)	247.40+80.81
RDW(%:mean ± SD)	13.83+2.65
PCT(%:mean ± SD)	0.17+0.06

In females the calculated means of all the parameters are shown in Table-2

Table 2: Descriptive statistical analysis of female subjects.

PARAMETER	Mean (Standard deviation)
WBC(103/ul :mean ± SD)	7.744 (1.9090)
RBC(106/ul:mean ± SD)	4.7967(0.44702)
Hb(gm%:mean ± SD)	12.884(1.2365)
HCT(%:mean ± SD)	39.303(3.5127)
MCV(fl:mean ± SD)	82.449(7.4339)
MCH(pg:mean ± SD)	27.470(5.7445)
MCHC(g/dl:mean ± SD)	32.860(2.8178)
PLT(103/ul:mean ± SD)	289.61(79.451)
RDW(%:mean ± SD)	14.037(2.7447)
PCT(%:mean ± SD)	0.2087(0.05911)

Normochromic and normocytic morphology was found in 92.2% (478), while Hypochromia with anisocytosis and poikilocytosis was seen in 7.3% (38). Macrocytosis was found in 0.4% (02).

DISCUSSION

Anaemia begins to show its effects since childhood and continue to cause problems throughout a person's life. Research have highlighted the fact that iron-deficiency anaemia in children is associated with impaired cognitive and intellectual performance; it also has significant effect on motor development, coordination, language development, and scholastic achieve-

ment.[13-17] The adverse health consequences do not only impair cognitive and physical development of children but reduces work productivity of adults.[3] This study was carried out in a population which was about to enroll in a medical college.

The analysis showed 8% prevalence of anaemia in the study group. This poses the question as to why the frequency of anaemia in future medical students is lower as compared to the general population. The possible explanations could be the presence of awareness about the issue. Pre medical students have been taught the importance of a balanced diet and the functions of iron in the body. Haemoglobin and oxygen transport form a core part of their biology curriculum.

Prevalence of anaemia among different populations has been a hot topic amongst doctors throughout the world. Several studies have been done on the issue. It is more widespread in South Asia (53%) than in other regions of the world. A study conducted in Taiwan highlights the anaemia prevalence in children and adolescents with IDA is a mild public health problem among people with intellectual disabilities.[4] Majority of the anaemia control programs of the developing world focus on iron supplementation as their core strategy. A study conducted in underdeveloped district of Vehari, Punjab showed anaemia prevalence of 47% in children.[5] It may be due to difference in socio-demographic profile of study subjects. On the other hand the research statistics among young pregnant women analyzed prevalence of anemia as 90.5%[6] indicating physiological stress to be the reason.

Along with non-modifiable factors such as female sex, genetic predisposition and age, there are potentially preventable risk factors leading to anaemia. The most important of these is a balanced diet. Adequate iron supplementation can prevent anemia and the trail of defects it brings about. Awareness about the issue is the best way to beware the population from this issue and being well informed comes a long way in its prevention, as shown by the results of our study.

It is strongly recommended that future research be directed towards this issue. While unawareness and poverty play a huge role in the causation of anaemia, it is commendable to note that on the other side; education and awareness play the role as barrier in preventing anaemias.

CONCLUSION

The mean concentration of blood indices of the pre-medical students in Karachi fall within the normal range as set by WHO parameters.

Further inference deducted from the study show the importance of socio-demographic status and health awareness as valuable indicators for the prevention of nutritional deficiency anaemias.

REFERENCES

1 Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011 (WHO/NMH/NHD/MNM/11.1) (http://www.who.int/vmnis/indicators/haemoglobin)

2 Muhmmad Ramzan, Irshad Ali,Abdus Salam. Iron Dfeciency Anaemia in school children of Dera Ismail Khan. Pakistan Journal of Nutrition.2009; 8(3)259-263.

3 Cook JD. Iron Deficiency Anaemia. Baillieres Clin Haematol. 1994; 7: 787-804.

4 Ershler WB, Chen K, Reyes EB, Dubois R. Economic burden of patients with anemia in selected diseases. Value Health, 2005; 8(6): 629-38.

5 C W Thane,C J Bates, A Prentice.Risk factors for low iron intake and poor iron status in a national sample of British young people age 4-18 years. Public Health Nutrition.2003; 6:485-496.

6 Calis JC, Phiri KS, Faragher EB. Severe Anemia in Malawian Children. N Engl J Med 2008; 358:888–99.

7 Lea, Febiger. Etiological factors in iron deficiency. Wintrobe's clinical haematology, 1993; 9.

8 Tettamnti. Prevalence, incidence and types of mild anemia in the elderly: the "Health and Anemia" population-based study. Haematology. 2010; 95:1849-56.

9 Nissenson. Anemia Not Just an Innocent Bystander? Arch Intern Med, 2003; 163: 1400-04.

10 Robinson B. Cost of anemia in the elderly. J Am Geriatr Soc, 2003;51:S14-S7.

11 M E Bentley,P L Griffits.The burden of anemia among women in India. European Journal of Clinical Nutrition. 2003;57:52-60.

12 Beutler E, Waalen Jill. The definition of anemia: what is the lower limit of normal of the blood hemoglobin concentration? Blood. 2006; 107:1747-50

13 McGregor SG, Ani C. A Review of Studies on the Effect of Iron Deficiency on Cognitive Development in Children. Journal of Nutrition. 2001; 131:649S-68S.

14 Agarwal DK, Upadhyay SK, Tripathi AM, Agarwal KN. Nutritional Status, Physical Work Capacity and Mental Function in School Children. Indian Pediatrics 2000; 37: 261-7

15 Aukett M, Parks Y, Scott P, Wharton B. Treatment with iron increases weight gain and psychomotor development. Arch Dis Child. 1986; 61: 849-57.

16 Clarke N, McGregor SMG, Powell C. Nutrition and health predictors of school failure in Jamaican children. Ecol Food Nutrition. 1991; 26: 1-11.

17 Agha F, Sadaruddin A, Khan RA, Ghafoor A. Iron deficiency in adolescents. Pak Med Assoc. 1992; 42:3-5.

18 Anjana Gulani, Jitender Nagpal, Clive Osmond, H P S Sachdev. Effect of administration of intestinal anthelmintic drugs on haemoglobin: systematic review of randomized controlled trails. BMJ. 2007;334:1095.

19 Jin-Ding Lina, Pei-Ying Lina, Lan-Ping Linb, Shang-Wei Hsuc, Ching-Hui Lohd, Chia-Feng Yenb, et al. Research in developmental disabilities. 2010;31:25-32

20 Mehmood K, Sherwani MIK, Ahmed M, Hussain M, Safdar S, Baitu M. Parasitic Infestation in Children of District Vehari: An Underdeveloped area of Pakistan. Pak J Med Res, 2009 ; 48:

21 Baig-Ansari N, Badruddin SH, Karmaliani R, Harris H, Jehan I, Pasha O, Moss N, McClure EM, Goldenberg RL. Anemia prevalence and risk factors in pregnant women in an urban area of Pakistan. Food Nutrition Bulletin, 2008; 9: 132-9.

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