

*Research article***Prevalence and determinants of anaemia among University students living in public hostels, Khartoum state, Sudan**Khaled Eltohami Medani<sup>1\*</sup>, Mohammed AliAwad El- Karim<sup>2</sup>, Waqas Sami<sup>3</sup>, Sawsan MustafaAbdalla<sup>4</sup>, ElsadigYousif Mohamed<sup>4</sup><sup>1</sup>Assistant Professor, Community Medicine, Department of Public Health & Community Medicine, College of Medicine, Majmaah University, Kingdom of Saudi Arabia.<sup>2</sup>Professor of Public Health, Faculty of Medicine, University of Khartoum, Sudan<sup>3</sup>Lecturer, Biostatistics, Department of Public Health & Community Medicine, College of Medicine, Majmaah University, Kingdom of Saudi Arabia.<sup>4</sup>Associate Professor, Community Medicine, Department of Public Health & Community Medicine, College of Medicine, Majmaah University Kingdom of Saudi Arabia.**ARTICLE INFO:****Article history:**

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**ABSTRACT**

**Introduction:** Anaemia is a major world health problem and still remains widespread. According to W.H.O, around the world 1.3 – 2.15 billion people are iron deficiency anaemic and more than 90% are living in the developing countries. **Objectives:** The objectives of this study were to; find out the prevalence of anaemia among University students living in public hostels in Khartoum State and secondly to identify the possible risk factors involved. **Methods:** This descriptive cross-sectional study was conducted among University students living in public hostels in Khartoum State. Blood samples were collected from 810 university students for the estimation of haemoglobin level. **Results:** The overall prevalence of anaemia was 26.2% most of which was mild to moderate, with only one severe case. Females were more anaemic than males ( $p < 0.001$ ,  $OR = 1.876$ ). Age was significantly associated with the level of anemia 28.1% for the age group [16-19 years] Vs 4.3% for the age [ $< 28$  years]. Students who were receiving bursary (the poorest students) were more anaemic. High prevalence of anemia was associated with infections i.e. typhoid, intestinal worms. **Conclusion:** Prevalence of anemia among university students living in public hostels was high (26.2%). Anemia was more prevalent among females, younger age groups, those having infections and of the lower economic status.

**1. Introduction**

Anaemia is a condition where the amount of haemoglobin in the blood is below the normal level, or there are fewer red blood cells than normal[1]. Anaemia is an old enemy and still remains a widespread public health problem[2]. According to W.H.O, 1.3 – 2.15 billion people are anaemic all over the world and more than 90% are living in the developing countries[3]. Apart from developing countries, Middle East and North African countries also share the health problem of anemia. The prevalence of anemia among female college students attending the university of Sharjah, United Arab Emirate and Tayba, Kingdom of Saudi Arabia was 26.7% and 32.2% respectively[3,4].

Anaemia is more prevalent in preschool children, women in childbearing age and almost all age groups[5]. In Sudan anemia affected 58.4% of pregnant women[6]. Higher education is considered as the most important factor for accelerating

economic, social, and cultural development in human communities. Responding to this vital role of higher education, the Government of Sudan planned for a revolution in this sector, in lieu of this, the number of University students increased from 38,000 to 39,8733. Out of 39, 8733 students 26,4752 (66.4%) were enrolled in Universities of Khartoum State.

About 34,683 students were living in 52 youth hostels[7]. According to the rapid and large increase in the university student's number, plethora of problems were arising among students like; academic, socio-economic and health related including nutritional deficiencies. All the students were boarders and living in hostels from other states, cities and villages. There is an assumption that the university students living in the public hostels are nutritionally deficient due to poverty status and lack of choices in hostel meals. Though, the restaurants located inside the hostels serve cheap meals but they are generally nutritionally deficient[8].

In Sudan, not much data is available on prevalence of anaemia especially among University students. However, sufficient literature related to anemia is available among pregnant women and children. Furthermore the effect of poverty and lack of knowledge are the main associated factors to anemia. Therefore, we planned this study to find out the prevalence of anemia among University students living in public hostels in Khartoum State and secondly to identify the possible risk factors involved.

## 2. Methodology

This was a cross-sectional study conducted among University students living in 52 Governmental hostels in Khartoum State. The state is the capital of the Sudan. The population is about 5,948,700 persons with an annual growth rate of 6.29. Khartoum State possesses 38 Universities and Colleges of which 32 are private[9].

Out of 52 hostels, 15 and 37 were allotted for males and females respectively, coherently accommodating about 34,683 University students. The data was collected using stratified cluster random sampling technique. Stratification in this study was based upon the localities and gender. Prima facie, students were selected from all 52 hostels and were divided into three strata by locality (Khartoum, Omdurman, Khartoum north). The sample size of 810 was calculated according to the population size between the strata's. In the second stage strata's were further divided into 20 clusters based on gender. At the end, the data was collected from 810 students of both sexes successfully (Response rate=100%). The data were collected using direct investigation method on a structured, pre-coded and pre-tested questionnaire. After obtaining consent from the participating students, 2.5 cc venous blood samples were drawn from each student. The tests were done by Automated Hematology Analyzer (Sysmex KX-21N, made in Japan).

Cut-off levels for anemia were taken according to W.H.O. criteria (anemia was considered to be present if the Haemoglobin value was below 13g/dl and 12g/dl for males and females respectively). According to the severity, anaemia is classified into three categories; mild (Haemoglobin level between 10g/dl to the cut-off); moderate (Hemoglobin level between 7 - 9.9 g/dl); and severe (Hemoglobin level <7g/dl)[10]. The data was entered and analyzed using SPSS version 17 and STATA 8.2. Mean  $\pm$  S.D was given for quantitative variables. Frequencies and percentages were given for qualitative variables. Pearson-chi square test was applied to observe associations between qualitative variables. Unconditional Logistic regression analysis was also applied to

observe the log-odds of contributing variables. A p-value of <0.05 was considered as statistically significant.

## 3. Results

Almost two third of the students were from the Central region of Sudan, followed by those from the Western (12.8%), Northern (9.4%) and Eastern Sudan (7.4%). The least percentage of the students was from the Southern part of the country (2.6%). Almost half of the students belonged to urban areas, whereas, 54.1% were from rural areas. Out of 810 students, 32% were males, whereas, 68% were females. The mean age of the students was  $21.3 \pm 0.9$  years. Majority of the students (58.9%) belonged to the age group of 20-23 years, however, a small percentage of students (2.8%) were above 28 years of age. The percentage of students in other age groups (16-19) years and (24-27) years was 25.9% and 12.3% respectively. The overall prevalence of anemia for students of both sexes living in the Public hostels was 26.2%. The overall average Hb was  $13 \text{ gm/dl} \pm 0.06$ . Gender wise, anaemia was prevalent in 4.6% male students with average Hb =  $14.8 \text{ gm/dl} \pm 0.07$ . Whereas, it was highly prevalent among female students (36.6%) with average Hb of ( $12.1 \text{ gm/dl} \pm 0.05$ ).

Only one female student has hemoglobin less than (7g/dl). According to W.H.O. classification for severity of anemia, mild and moderate anemia was observed among 4.2 % and 0.4% male students, while none of them had severe anaemia. Contra to it, 29.9% female students had mild anaemia, 6.2% had moderate anemia and only one female student had severe anemia.

Cross-tabulation was performed to observe the association between anaemia and age which revealed that the prevalence of anaemia was decreasing with increase of age ( $p=0.027$ ). The prevalence of anaemia among the age-group 16-19 years was 28.1%, whereas, only 4.3% students above 28 years had anaemia. The analysis demonstrated some important relationships between anaemia and other factors such as gender, low socioeconomic status, history of diseases (typhoid, intestinal worms, dysentery and malaria) and symptoms of anaemia (fatigue, weakness, hair fall and dizziness).

Also it gave a general overview of the growth effect of the differentials on anaemia phenomenon. The principal aim is to assess the net effect of each explanatory variable on the dependent variable using the logistic regression model. Logistic regression analysis pointed out that gender is significantly associated with anaemia ( $p<0.001$ ) and females were more anaemic than males ( $p<0.001$ , OR=1.876) (Table 1).

**Table (1):** Logistic regression analysis of anemia among university students living in public hostels

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Age	-0.073	0.134	0.294	1	0.588	0.930
Gender	-2.418	0.319	57.615	1	0.000	0.089
Poverty	0.000	0.000	0.030	1	0.864	1.000
Disease	1.112	1.086	1.048	1	0.306	3.039
Symptoms	-0.168	0.116	2.121	1	0.145	0.845
Constant	4.429	1.309	11.440	1	0.001	83.836

#### 4. Discussion

Anaemia is the most common and widespread health problem in both developed and developing countries[11]. According to this study, moderate anaemia was observed among female University students living in public hostels in Khartoum State. This finding is lower than reports from eastern Sudan where the prevalence of anemia was (36.2%) among adult population[12], and also lower than other countries such as, Egypt (46.6%), Cameroon (32%), India (55%), Nepal(42%)and Turkey[11,13]. Studies conducted on adolescents in United Arab Emirates have reported prevalence rates for anaemia ranging from 30% - 55%, the majority of them (80%) reported mild anemia[3], whereas, only few studies reported improvement in anaemia status in this age group. The high prevalence of anemia in adolescents was due to increased need of iron necessary for rapid growth, menarche, and low intake of iron rich food. Inappropriate dietary choices and frequent consumption of tea with meals are associated factors for anemia[6].

In this work we also studied certain determinants of anaemia such as age, gender, income, region and presence of infection. Gender was the main significant variable affecting especially the female students. Anaemia is prevalent in females because of the blood loss through menstruation. Some studies have reported the increase in prevalence of anemia with increase in the duration of the menstruation. A study carried out in Egypt revealed that 41.5% of Egyptian females aged 16 - 19 years had anemia[11]. A study in Turkey showed that 40% and 33.8% of women between 19-40 years had anemia and iron deficiency anemia respectively[14]. In this study, the prevalence of anaemia in male students was very low (4.6%), whereas, a study conducted on Egyptian males aged 16 – 19 years reported a prevalence of 33.3%[11].

The facts observed from the hostels revealed that, male students spent more money on their meals, and their movements to and further helped them to had variety of food choices. On the other side, female students used to spend money on other items such as makeup accessories and mobile phones. Our study also showed that the prevalence of anaemia decreased with increase of age, this finding is also supported by an Egyptian study, which reported that adolescents below 16 years are 1.7 times at higher estimated risk of having anaemia than those at 16 years and above[11]. The decline in the prevalence of anaemia may be due to the end of growth spurt. Majority of the students living in the public hostels were from poor families, who cannot afford to live in private hostels. Generally the environment of private hostels is much better than the public hostels. According to the literature,

malaria is one of the main causes of anemia[15]. This study however, showed that anaemia and exposure to malaria were not significantly associated. However a significant relation was present between anaemia and the prevalence of other infectious diseases such as typhoid, intestinal worms and dysentery.

#### 5. Conclusion

Anaemia, although mainly of mild to moderate severity, is still a health problem among University students living in public hostels in Khartoum State. Anaemia was more prevalent among females, the younger age groups, those having infections and the low economic status

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