

Prevalence of Anemia in Relation to Body Mass Index (BMI) Among Students of Faculty of Nursing and Public Health, Bhutan

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Abstract

A. Introduction: Anemia is an important cause of morbidity. This is a study to find out BMI and anemia among residential students of Faculty of Nursing and Public Health.

B. Method: A cross sectional study was conducted at Faculty of Nursing and Public Health from October to November 2015. A total of 153 students, 80 males and 73 females, who stay in hostels, were included. The survey included collection of data on demographic parameter related to anemia, anthropometry (weight and height), and clinical and hematological assessment for anemia. Result: Female students with normal BMI were more anemic as compared to male students. The result indicates that having a normal BMI does not always indicate good micronutrient status. Conclusion: Female students are more anemic than males students and BMI has no association with anemia

Keywords - Anemia; Body Mass Index; Hemoglobin

I. INTRODUCTION

Anemia is one of the most important health problems throughout the world, especially due to deficiency of mineral iron. It is a condition characterized by a reduction in red blood cell mass or a decrease in the concentration of hemoglobin in the blood. Quantitatively, it is expressed as the concentration of hemoglobin (Hb), which is an iron-containing pigment of red blood cells. The cut-off points recommended by the World Health Organization for diagnosing anemia in various population groups are: Hb < 13.0 g/dl for men and Hb < 12.0 g/dl for female, after correction for altitude.

Anemia among young have many causes and is a serious public health problems. Young adults are defined as individuals between the age of 18-24 years. Many young adults, especially from developing countries and disadvantage societies, enter into

adulthood with nutritional deficiencies; mostly iron deficiency anemia (IDA). IDA is a major public health problem among women, children and young adults in a majority of Asian countries, including Bhutan.

Many studies also have shown a relationship between Hb level and body mass index (BMI) depending on gender and age of individuals. In a study conducted among medical students in India,

We have no data in Bhutan on prevalence of anemia among young adults in residential hostels. Therefore, this study aims to estimate the prevalence of anemia in relation to BMI among students of Faculty of Nursing and Public Health (FNPH).

II. METHODS

In this cross-sectional study, 153 students were selected randomly (73 females, 80 males) to represent the study population from a pool of 314 students that were eligible and enrolled in the pre-service program. In-service program students, students diagnosed with anemia and students residing outside the campus were excluded. Randomization was done by using random sampling with replacement technique. The purpose of the study was explained to all students, and participation was voluntary. Written informed consents were obtained with a provision to withdraw anytime.

All students were given a self-administered questionnaire on bio-data, dietary information and medical history related to anemia, to complete on the spot. Anthropometry measurements were taken for each student by a trained, qualified nurse. Height was measured to the nearest 0.1 cm using Seca height measurement scale, and weight to the nearest 0.1 kg using anthropometer (Seca GmbH & Co. KG, Germany). BMI was calculated by the formula: $BMI = \text{weight (Kg)} / \text{height (M)}^2$. Individuals were classified into different categories using the World



Health Organization⁷ prescribed BMI cutoff values; Underweight: BMI < 18.5 kg/m²; Normal: BMI 18.5 to 24.9 kg/m²; Overweight: BMI 25-29.9 kg/m² and Obese: BMI ≥ 30 kg/m². Three (3) ml of blood was drawn by professional laboratory trained staff and was analyzed at the pathology laboratory at Jigme Dorji Wangchuk National Referral Hospital (JDWRH). Hemoglobin concentrations (gm/dl) were estimated using the fully automated hematology analyzer Sysmex XS 1000.

Peripheral blood smears were analyzed for those whose Hb levels were less than 12 gm/dl in female and 13 gm/dl in male to elucidate the cause of anemia.

Ethical approval (Ref.No REBH/Approval/2015/033) was obtained from the Research and Ethical Board of Health, Ministry of Health, Thimphu, Bhutan.

Data was analyzed using Statistical Package for Social Sciences (SPSS) software, version 16. Descriptive statistics provided basic information on the aggregate sample. Chi-square was used

for categorical data to deduce relationship and independent t- test was employed to elucidate mean differences among male and female students.

III. RESULTS

Among 153 respondents, 80 (52.3%) were males and 73 (47.7%) were females. The mean age of respondents was 21 years (±1.418). From hematological analysis,

24.9 kg/m²; Overweight: BMI 25-29.9 kg/m² and Obese: BMI ≥ 30 kg/m². Three (3) ml of blood was drawn by professional laboratory trained staff and was analyzed at the pathology laboratory at Jigme Dorji Wangchuk National Referral Hospital (JDWRH). Hemoglobin concentrations (gm/dl) were estimated using the fully automated hematology analyzer Sysmex XS 1000.

Table 1: Hematological characteristics of students

	Male (n=80)		Female (n=73)	
	n	(%)	n	(%)
Haemoglobin (Hb)				
No Anemia	77	96.2	45	61.6
Anemia	3	3.8	28	38.4

The mean body weight for males was 56.9 kg and for females was 52.9 kg, where as the mean height for males was 165.74 cm and for females it was 160.60 cm. Mean BMI for males was 20.73 and for female were 22.03. There were 9 (11.25%) males and 5 (6.8%) females who were underweight. There was 1 (1.25%) male and 8 (11%) females who were overweight and 2 (2.7%) females were categorized as obese. (Table 2). There was no association between anemia and BMI

Table 2: Association between BMI and Anemia

BMI (kg/m ²)	Male (n=80 (52.3%))		Female (n=73 (47.7%))		P value
	Anaemia n (%)	No Anaemia n (%)	Anaemia n (%)	No Anaemia n (%)	
≤ 18.4	1 (1.2%)	8 (10.0%)	2 (2.7%)	3 (4.1%)	0.760
18.5 – 24.9	2 (2.5%)	68 (85.0%)	23 (31.5%)	35 (47.9%)	
25 – 29.9	0 (0.0%)	1 (1.2%)	2 (2.7%)	6 (8.2%)	
>30	-	-	1 (1.4%)	1 (1.4%)	
Total	3 (3.8%)	77 (96.2%)	28 (38.4%)	45 (61.6%)	

IV. DISCUSSION

Anemia is the most common health problem in many countries⁸. This study shows the prevalence of anemia was 3.8% in males and 38.4% in female students with no association between anemia and BMI. A study done by Ayoub Et.al⁹ reported that the prevalence of anemia is common among female college students at the University of Sharjah, Emirati. UNICEF conducted a situation analysis of Bhutan in 2006¹⁰. It reported that anemia is considered to be one of the major public health problems for children and women in Bhutan. From the National Nutritional Survey¹¹ in 2015, the prevalence of anemia among non-pregnant

women dropped to 36.1% as compared to 54.8% in the 2003 National Nutritional Survey¹². Findings in this study are quite similar for the prevalence of anemia in non-pregnant females. The commonly detected anemia was microcytic hypochromic type suggesting iron deficiency as cause based on peripheral blood smear reports.

In the present study, female students with normal BMI were more anemic as compared to male students. There was no association between anemia and BMI. A negative association between BMI and Hb

concentration was observed among overweight and obese students 13, 14.

V. LIMITATION OF THE STUDY

The study has limitations. This study was conducted among students who reside in hostels with not very good dietary options. Diet poor in micronutrients from the hostel mess may be the reason. Our study couldn't assess the correlation between hostel diet and the prevalence of anemia. The menstrual history of female students couldn't be taken, and blood loss could not be quantified or correlated with anemia.

VI. CONCLUSION

Anemia, being an important public health problem, is more prevalent among female health students than males. This study confirms the need to screen and correct anemia even in healthy young females. There is no association between BMI and anemia.

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