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RESEARCH ARTICLE

BODY MASS INDEX (BMI) AND HEMOGLOBIN (HB) IN THE ASSESSMENT OF ELIMAM-ELMAHADI UNIVERSITY STUDENTS NUTRITIONAL STATUS-WHITE NILE STATE-SUDAN

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ABSTRACT

Anemia is the common nutritional problem worldwide, recent studies showed that young adults specially females are at increased risk of anemia. The BMI has been used by the WHO as the standard for recording obesity statistics since the early 1980s. We studied 376 students, males were 178 students (47.3%) and females were 198 (52.7%). Students with normal Hb were 353 students (93.9%) and low Hb in 23 students (6.1%). Students with normal weight were 255 students (67.8%), underweight in 74 students (19.7%), over weight in 44 students(11.7%) and obesity in 3 students (0.8%). In Elimam Elmahadi university underweight students also had low Hb and more studies were need to evaluate the etiology of low Hb.

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INTRODUCTION

Nowadays, the most common intractable nutritional problem worldwide is anemia; whereas nearly 2 billion have hemoglobin concentration below the recommended average level (World Health Organization, 2008). There are many predisposing factors that enhance the occurrence of anemia as dietary iron deficiency, parasitic infestations, infectious diseases such as malaria, deficiencies of important micronutrients as folate, vitamin B12 and vitamin A, or other inherited conditions that affect red blood cells (RBCs), such as thalassaemia (World Health Organization, 2004). Recent evidences (Sjolin, 1981; Armstrong, 1989) show that young adults especially females are at an increased risk of developing anemia. This could be contributed to an increase in their iron demand during puberty, excessive menstrual losses (due to polymenorrhea and menorrhagia), insufficient dietary iron intake (especially of animal origin) and faulty dietary habits (Sjolin, 1981; Armstrong, 1989).

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The World Health Organization (WHO) global estimates of anemia prevalence averaged 56%, with a range of 35–75% depending on the geographic location. Anemia affects approximately 30–55% of young adults all over the world (World Health Organization, 2006). 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 (Sultan, 2007; Hanafi *et al.,* 2013). Studies carried out during the last decade have led to a better understanding of the value of anthropometric indicators of nutritional status (Bull World Health Organ, 1986). The BMI has been used by the WHO as the standard for recording obesity statistics since the early 1980s.Body Mass Index (BMI) is a measure of weight in relation to height. It is the most practical way to estimate if a person is underweight, at a healthy weight, overweight, or obese (National Institutes of Health, 2000). The WHO regards a BMI of less than 18.5 as underweight and may indicate malnutrition, an eating disorder, or other health problems, while a BMI equal to or greater than 25 is considered overweight and above 30 is considered obese (World Health Organization, 2006). BMI categories are generally regarded as

a satisfactory tool for measuring whether sedentary individuals are underweight, overweight or obese with various exceptions, such as: athletes, children, the elderly, and the infirm (https://en.wikipedia.org/wiki/Body_mass_index). A study published by Journal of the American Medical Association (JAMA) in 2005 showed that overweight people had a death rate similar to normal weight people as defined by BMI, while underweight and obese people had a higher death rate (Flegal *et al.,* 2005). 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.

METHODS

It is a study to determine the nutritional status of Elimam-Elmahadi university at KOSTI – White Nile state. The study conducted during July 2015 to September 2015. Every student included in this study was seen at univerity. Through and comprehensive history was taken and blood for HB, weight and height were measured. The body mass index measure by using anthropometric method (Weight / Height)

$$BMI = weig\ \ t(kg) \div \ \ eig\ \ t^2(m^2)$$

Hemoglobin was measured by chlorometric method.

RESULTS

We studied 376 university studied from July 2015 to September 2015 their age between 19 __23 years old , those less than 20years old were 136 student (36.2%) and those more than 20years were 240 (63.8%) table 1.

Table 1. Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 20yrs old	136	36.2	36.2	36.2
	20yrs old or more	240	63.8	63.8	100.0
	Total	376	100.0	100.0	

In table 2: males were 178 students (47.3%) and females were 198(52.7%).

Table 2. sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	178	47.3	47.3	47.3
	Female	198	52.7	52.7	100.0
	Total	376	100.0	100.0	

Table 3: those with normal Hb were 353 students (93.9%) and low Hb in 23 students (6.1%).

Table 3. Hb

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Normal	353	93.9	93.9	93.9
	Low	23	6.1	6.1	100.0
	Total	376	100.0	100.0	

In Table 4: students with normal weight were 255 students (67.8%), underweight in 74 students (19.7%), over weight in 44 students (11.7%) and obesity in 3 students (0.8%).

Table 4. BMI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under wt	74	19.7	19.7	19.7
	Normal wt	255	67.8	67.8	87.5
	Over wt	44	11.7	11.7	99.2
	Obese	3	.8	.8	100.0
	Total	376	100.0	100.0	

In table 5: those with normal weight and low Hb were 14 students (3.7%), underweight students and low Hb were 7(1.9%) , over weight students with low Hb were 2 students (0.5%) and all the obese students were of normal Hb. Normal Hb and normal weight were 241students (64.1%)

Table 5. BMI and Hb Crosstab

			BMI				
			Under wt	Normal wt	Over wt	Obese	Total
Hb	Normal	Count	67	241	42	3	353
		% of Total	17.8%	64.1%	11.2%	.8%	93.9%
	Low	Count	7	14	2	0	23
		% of Total	1.9%	3.7%	.5%	.0%	6.1%
Total		Count	74	255	44	3	376
		% of Total	19.7%	67.8%	11.7%	.8%	100.0%

In table 6: males with normal Hb were 173 students (46%) and female with normal Hb were 180 students (47.9%) . Female with low Hb were 18 students (4.8%) and males with low Hb were 5 students (1.3%).

Table 6. Sex and Hb Crosstab

			Sex		
			Male	Female	Total
Hb	Normal	Count	173	180	353
		% of Total	46.0%	47.9%	93.9%
	Low	Count	5	18	23
		% of Total	1.3%	4.8%	6.1%
Total		Count	178	198	376
		% of Total	47.3%	52.7%	100.0%

DISCUSSION

The study was done at Elimam Elmahadi university between July 2015& September 2015 to assess the students nutritional status based on BMI and Hb measurement . Their age was ranged between 17 and 23 years old. Males were 178 students (47.3%) and females were 198(52.7%). In study done by Ayse Gozkaman *et al.,* 2015 a total of 146 patients (89.1%) female and (10.2%) male. Also study done by Khaled Eltohami Medani *et al*., 2014 on anemia among university students, 32% were males, whereas, 68% were females. The mean age of the students was 21.3 ± 0.9 years.and the variation because they studied about 15 universities with large study group. In our study students with low Hb were (6.1%). In Khaled Eltohami Medani *et al*., 2014 *anemia was found in 26.2% student* the high percentage because they studied many university and we only studied one university. Gender wise female with low Hb were (4.8%)and males with low Hb were (1.3%). Both sex had

moderate anemia according to WHO classification. These results are lower than reports from eastern Sudan where the prevalence of anemia was (36.2%) among adult population (Abdallah *et al.,* 2005), and also lower than other countries like Eygpt (46.6%), Cameroon (32%), India (55%), Nepal (42%)and Turkey[16]. The high prevelance of anemia among adults due to increased needs for iron supplementation and the high prevelance in females because of the menstruation.

Studies carried out during the last decade have led to a better understanding of the value of anthropometric indicators of nutritional status so we used BMI in our study to assess the nutritional status of students. In our study those who were underweight were (19.7%), over weight in (11.7%) and obesity in(0.8%). The obesity and overweight in our study was lower than that in Iran where overweight and obesity was found in 40% [17] Saudi Arabia 50% of the adults Saudi females were obese or overweight but other study in Saudi Arabia showed 41.2% of adult students were of underweight (Manal Ibrahim Hanafi *et al.,* 2013). In Pakistan study done by (Shah Mohammad Abbas Waseem, 2016) on undergraduates medical students the underweight (44.9%) and (10%) overweight subjects which meant that (34.78%) anemic subjects were malnourished where in our study the percentage is low as underweight students and low Hb were (1.9%).and these because of our small group study. In our study there was significant correlation between BMI and Hb.

Conclusion

In Elimam Elmahadi university underweight students also had low Hb. We need more detailed study to look for the etiology of these anemia and to assess the effect of the low Hb on their education.

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