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RESEARCH ARTICLE

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Prevalence of Obesity/Overweight and Associated Factors among Students in Burao College of Health Science, Burao Somaliland: A Cross Sectional Study

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ABSTRACT

Background: The epidemic of overweight and obesity is a reflection of societal and behavioral changes in communities over recent decades. There is a global increase in overweight and obesity among students, which has a long-term health risk. Factors strongly linked to obesity among students include high energy, fat, salt, and low fiber food choices, skipping breakfast, excessive snack consumption, insufficient physical activity, high-calorie diets, and smoking. Despite to this there is a major evidence gap of obesity/overweight and its health impacts in developing countries like Somaliland.

Objectives: The objective of this study was to estimate prevalence and associated factors of overweight and obesity and to determine the associated factors among students at Burao college of health science, Burao Somaliland, 2024.

Methods: An institution based cross-sectional study with systematic sampling technique was used A structured questionnaire was used to collect the data. The collected data was checked for completeness, coded and entered into Epi data version 3.1, then exported to Stata version 14 for further analysis. Descriptive statistics was used to provide an overall summary and presented using texts, and, tables. Binary and multivariate logistic regression models were employed to determine the level of the risk associations. Adjusted Odds ratio, at the p-value of <0.05 and 95% confidence interval was used as a significant cut point.

Result: A total of 185 students with 100% response rate. The majority of participants 156 individuals were female. The mean age of the study participants was 21.7 (SD ±2.7) with 176 individuals falling between the ages of 18-26, followed by 7 individuals between the ages of 26-34. In terms of consumption meals per day 69.19% of the participants reported consuming meals three times a day. Regarding, consumption of fast food 25.95% of the participants indicated regular consumption of fast food or processed foods. About daily consumption of dairy products, 32.43% of the participants reported daily consumption of dairy products. In this study the overall prevalence of obesity/overweight was 22.16% (CI; 0.909, 1.603).

In the multivariate logistic analysis, the variables such as infrequent consumption of fast food (AOR= 2.07; 95% CI: 0.445, 3.69) and daily consumption of dairy products such as milk (AOR= 1.55; 95% CI: 0.15, 2.94) were significantly linked to obesity/overweight among students at Burao College of Health Science in Burao, Somaliland. However, some factors like, Sex (p=0.409), Eating meat and egg per week (p=0.882), and physical activity, eating fatty food per week (p=0.783) had no association with obesity/overweight

Conclusion: The current study showed that the prevalence of overweight and obesity among Burao college health science students is a high public health problem. eating habit factors influencing the obesity/overweight were identified. Overweight/obesity is significantly associated with infrequent consumption of fast food and daily consumption of dairy products such as milk. Therefore, to emphasis more focus should give encouraging healthier eating habits, such as reducing fast food consumption and promoting moderation in dairy product intake, in preventing and managing obesity/overweight in this population. However, further research is needed to better understand the underlying mechanisms and potential confounding factors involved in these associations.

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Abbreviations

AOR: adjusted Odds Ratio

COR: Crude Odds Ratio

FIT: Fatness Impacts Total well-being

LMIC- Low- Middle-Income Countries

SCALE: Severe Consequences of Abnormal Lifestyle and Excessive

WHO: World Health Organization

Background

Overweight and obesity are defined as abnormal or excessive fat accumulation, resulting in weakening the health of an individual [1,2]. According W.H.O overweight is defined as having a body mass index (BMI) of 25 to 29.9, indicating excess body weight relative to height and Obesity is defined by a BMI of 30 or higher, indicating a more severe level of excess body weight that can have negative health consequences. According to previous studies, college students are at a high risk of becoming obese [3]. The epidemic of overweight and obesity reflects the changes in society and behavioral patterns of communities over recent decades. Even if genes are important in determining a person's susceptibility to weight gain, energy balance is also a factor for overweight and obesity. Societal changes and worldwide nutrition transition are driving the overweight/obesity epidemic [4,5]. Students overweight and obesity are increasing globally, raising the threat of long-term illness [6]. Overweight and obesity are a result of an imbalance between energy intake and expenditure with an increase in energy balance being closely associated with the lifestyle adopted and the dietary intake preferences [7].

Adults affected by overweight and obesity are predisposed to various morbidities including neuropathy, retinopathy, nephropathy, hypertension, and dyslipidemia, which in turn also increases the rate of mortality [8,9]. In addition, overweight and obesity lead to a risk of psychological and social problems related to a negative self-image, low self-esteem, increased depression disorder, inadequate sleep, and reduced adult life expectancy [10,11]. Students overweight and obesity are rising alarmingly and approaching an epidemic in many developed countries and become a double burden for low- and middle-income courtiers [12].

The global prevalence of obesity increased from 4% in 1975 to 18% in 2016, with an estimated 124 million being affected [2]. In developing countries overweight and obesity increased from 8.1 to 13.4% in girls over thirty years [13]. In Asians, they increased from 9.8% to 11.7% and about 8.7% to 31.4% developed overweight and obesity in Africa [14,15]. The prevalence of obesity and overweight among college students is a major concern, with many factors contributing to these conditions [16]. The prevalence of overweight and obesity varies by study, ranging from 11.2% to 52.4%. Factors such as high energy, fat, salt, and low fiber food choices, skipping breakfast, excessive snack consumption, insufficient physical activity, high-calorie diets, and smoking are strongly linked to obesity among students [17]. Furthermore, the practice of buying food outside the home, particularly during college, has been linked to an increased risk of overweight and obesity among students. Furthermore, studies have revealed a higher prevalence of overweight and obesity compared to underweight among college students, with a significant association between these conditions and older age, female gender [18]. Both overweight and obesity are associated with the incidence of multiple co-morbidities, including type II diabetes, cancer, and cardiovascular diseases, and maintaining a healthy weight may be important in the prevention of the large disease burden in the future [17]. no researchers to date have evaluated overweight and obese among college students in Somaliland since the Study aimed to estimate prevalence and associated factors of overweight and obesity and to determine the associated factors among students at Burao college of health science, Burao Somaliland.

Materials and Methods

Study Design and Setting

This institutional-based, cross-sectional study was conducted on the students at Burao College of Health Sciences from April 5 to 23, 2024, in Burao, Somaliland. Burao is the capital city of the Tog-dheer region, located 290 km east of Hargeisa. the capital city of Somaliland. The health science programs offered by Burao College of Health Science include nursing, midwifery, laboratory, and dental medicine. It was established in 2005 and is located next to Burao General Hospital.

Source and Study Population

All students registered at Burao College of Health Science were the source population. Students registered in the selected classes during the data collection period were considered the study population.

Inclusion and Exclusion Criteria

All students from years 1 to 4 attending during the data collection period were included in the study; those absent and severely ill students during the data collection period were excluded from the study.

Sample Size and Sampling Technique

The sample size was calculated using a single proportion formula by considering the following assumptions: The previous prevalence of overweight and obesity among Ethiopian high school students was 12.5%, 95% confidence level, 5 of marginal error, Finally, a sample size of 185 was obtained by considering a 10% nonresponse rate [19]. Out of the total 400 students at Burao College of Students, 185 college students were included in the study. To select two departments as primary sampling units, the simple random sampling technique was employed. The sample size allocated to each department (185 students) was determined proportionally based on the number of students in

each department. Subsequently, a systematic random sampling technique was used to select 185 students from the total sample.

Data Collection Tool and Measurements

Well-structured questionnaire consists of four parts was used to collect the data on socio-demographic characteristics (age, sex, marital status, department, Sex of the head of household, family, academic, Occupation of head of household and educational status), Eating habits (Eating meals per day, consume fast food, eating Meat and egg, consumption of fruits and vegetables, consumption of dairy products like milk, eat oily and fatty foods, and eat sweet foods such as cake and biscuit), physical activity (engaging physical activity, normally walk, hours a day in spend sitting, and sleeping hours), and physical measurement (height and weight).

Data Quality Control

The questionnaire was prepared in English and translated into the local language (Af-somali). Then, the questionnaire was translated back into English to check for consistency. Training was given for data collectors prior to data collection and we conducted pilot test to refine the tool. The data was collected by trained data collectors and supervisors. Principle investigator was checked daily the completeness of the questionnaires.

Data Analysis Procedures

The data was analyzed using Stata version 14.0 statistical software. To describe the characteristics of the participants, descriptive statistics were computed. All independent variables of the study were initially tested for association with the obesity/overweight by using binary logistic regression. Then, all variables showed P < 0.25 on bivariate analysis were selected for multivariate analysis to check for possible association with obesity/overweight by controlling potential confounding factors. Adjusted odds ratio (OR) and its corresponding 95% confidence interval (CI) was calculated to measure the strength of the association. In all cases, a P-value <0.05 were considered to be statistically significant.

Ethical Considerations and Informed Consent

Ethical approval was obtained from Burao college of health. Informed written, and signed consent were obtained from study participants. The purpose of the study and importance of participation was discussed, individual identifications were not included in the data and code numbers were used throughout the study to keep the participant information confidential.

Result

Socio Demographic Characteristics

This study involved a total of 185 students who participated. The majority of participants were female, with a total of 156 individuals. The mean age of the study participants was 21.7 (SD ±2.7), with 176 individuals falling between the ages of 18-26, followed by 7 individuals between the ages of 26-34. When it came to academic year, the most of participants, totaling 71 individuals, identified as year two. Regarding marital status, majority of the participants, 180 individuals, were single.

Table 1: Socio Demographic Characteristics of Students in Burao College of Health Science, Burao Somaliland, 2024 (n=185)

Variables	Category	Frequency (n)	Percentage (%)
Age	18-26	176	95.14
	26-34	7	3.78
	34-42	2	1.08
sex	Male	29	15.68
	Female	156	84.32
Family size	2-10	126	68.11
	10-18	59	31.89
Marital status	Single	180	97.30
	Married	5	2.70
Academic year	Year 1	33	17.84
	Year 2	71	38.38
	Year 3	19	10.27
	Year 4	62	33.51
Faculty	Dental	4	2.16
	Nursing	81	43.78
	Midwifery	100	54.05
Residence	Rural	21	11.35
	Urban	164	88.65
Sex of the head of household	Female	69	37.30
	Male	116	62.70
Occupation of head of household	Daily laborer	29	15.68
	Farmer	6	3.24
	Government employee	31	16.76
	Merchant	14	7.57
	Self-employee	105	56.76
Educational status	Not read and write	23	12.43
	Primary	20	10.81
	Secondary	24	12.97
	University level	118	63.78

Eating Habits

The study revealed that a significant portion of the participants, specifically 128 individuals accounting for 69.19% of the total sample, reported consuming meals three times a day. In contrast, a smaller percentage of 48 participants (25.95%) indicated that they regularly consumed fast food or processed foods on a daily basis. This data provides insight into the dietary habits of the study population and highlights the prevalence

of traditional meal patterns among the majority of participants. Furthermore, the findings also shed light on the consumption of dairy products among the participants, with 141 individuals (32.43%) reporting daily consumption of such products. Similarly, a significant number of participants reported consuming meat and eggs on a daily basis. These dietary preferences reflect the diverse food choices made by the study participants and underscore the importance of understanding individual dietary habits in the context of overall health and well-being (Table 2).

Table 2: Eating Habits among Students in Burao College of Health Science, Burao Somaliland, 2024

Question	Category	Frequency (n)	(%)
How many meals do you eat per day?	2 times in a day 3 times in a day More than 3	35 128 22	18.92 69.19 11.89
How often do you consume fast food or processed foods?	Daily 2 times a week Rarely 3-5 times a week	48 72 43 22	25.95 38.92 23.24 11.89
How many times per week do you usually eat Meat and egg?	4 times per week Less than once per week Never Once a week Once per day 2 times per day	60 26 19 58 14 8	32.43 14.05 10.27 31.35 7.57 4.32
How often do you consume fruits and vegetables?	4 times per week Less than once per week Never Once a week Once per day 2 times per day	67 17 14 44 31 12	36.22 9.19 7.57 23.78 16.76 6.49
How many times per week do you usually |take dairy products like milk?	Daily 2 times a week Rarely 3-5 times a week	45 60 59 21	24.32 32.43 31.89 11.35
How many times per week do you usually eat oily and fatty foods?	4 times per week Less than once per week Never Once a week Once per day	36 32 34 38 45	19.46 17.30 18.38 20.54 24.32
How many times per week do you usually eat sweet foods such as cake and biscuit?	4 times per week Less than once per week Never Once a week Once per day	63 28 23 34 37	34.05 15.14 12.43 18.38 20.00

Physical Activity among Students in Burao College of Health Science, Burao Somaliland, 2024

In the physical activity among the students, most of the study participants, specifically 63 (34.05%), reported that they had never engaged in any form of physical activity. On the other hand, a slightly lower percentage of 51 (27.57%) students claimed to engage in physical activity on a daily basis. It is worth noting that these findings highlight the varying levels of physical activity among the student population. When it comes to transportation to the Burao College of Health Science, approximately half of the study participants, for 89 (4.11%) individuals, relied on taxis as their mode of transportation. Conversely, a slightly higher percentage of 78 (42.16%) students preferred to come on foot. These statistics shed light on the diverse transportation preferences and choices made by the students in reaching their educational institution. In terms of sleep patterns, a significant majority of 143 (77.30%) study participants reported sleeping for less than 8 hours. Conversely, a smaller percentage of 39 (21.08%) students indicated that they slept for a duration greater than 8-10 hours. These findings underscore the prevalence of inadequate sleep duration among the student population, which may have implications for their overall well-being and academic performance (Table 3).

Table 3: Physical Activity among Students in Burao College of Health Science, Burao Somaliland, 2024

Question	Category	Frequency (n)	(%)
How often do you engage in physical activity?	Daily 2 times a week Never 3-5 times a week	51 48 63 23	27.57 25.95 34.05 12.43
How do you get to and from Burao college of health science?	By taxi On foot service(bus)	89 78 18	48.11 42.16 9.73
In a typical week, do you normally walk to Burao college of health science?	Yes No	44 141	23.78 76.22
On average, how many hours a day do you spend sitting?	1-2 hours 2-4 hours Less than 1 hour More than 4 hour	45 27 36 77	24.32 14.59 19.46 41.62
On average, how many hours did you spend sleeping?	8-10h <8h >10h	39 143 3	21.08 77.30 1.62

Physical Measurement among students in Burao college of health science, Burao Somaliland, 2024

The research findings indicated that a majority of the students, specifically 111 individuals for 60% of the total sample, were the normal range based on their body mass index (BMI). In contrast, a smaller proportion of 11 students (5.95%) were classified as obese, while 31 students (16.76%) were categorized as overweight. These results provide valuable insights into the distribution of BMI categories among the student population under study (Table 4).

Table 4: Physical Measurement among Students in Burao College of Health Science, Burao Somaliland, 2024

Question	Category	Frequency (n)	(%)
What is the body mass index(weight/height^2)?	Under weight Normal Over weight Obese	32 111 31 11	17.30 60.00 16.76 5.95

The prevalence of Obesity/Overweight

In this study the overall prevalence of obesity/overweight was 22.16% (CI; 0.909, 1.603).

Factors Associated with Obesity/Overweight among Students

In the bivariate analysis about thirteen variables showed association. Variables with p<0.25 in bivariate model were entered into multivariate model so as to control the confounders. Therefore, in the multivariate logistic analysis, the variables such as infrequent consumption of fast food (AOR= 2.07; 95% CI: 0.445, 3.69) and daily consumption of dairy products such as milk (AOR= 1.55; 95% CI: 0.15, 2.94) were significantly linked to obesity/overweight among students at Burao College of Health Science in Burao, Somaliland (Table 5).

Table 5: Factors Associated with Obesity/Overweight among Students in Burao College of Health Science, Burao Somaliland, 2024

Variable name	Categories	Obesity/overweight		COR (95% CI)	P-value	AOR (95% CI)	P-value
		Yes	No				
Sex	Male	25	4	0.664 (-.453, 1.78)	0.244*	0.66(-0.91, 2.25)	0.409
	Female	37	119	1		1	
Marital status	Single	38	142	1.72(-.10, 3.54)	0.064*	2.86(-0.22, 5.96)	0.069
	Married	3	2	1		1	
Family size	2-10	32	94	1		1	
	10-18	9	50	0.63(.177, 1.45)	0.126*	0.40(-0.64, 1.44)	0.453
Academic year	Year 1	9	24	1		1	
	Year 2	12	59	0.611(.374, 1.59)	0.224*	1.23(-.12, 2.59)	0.075
	Year 3	5	14	0.048(-1.22, 1.32)	0.940	-0.65(-2.5, 1.28)	0.509
	Year 4	15	47	0.161(-.80, 1.12)	0.742	0.37(-.99, 1.73)	0.594
Department	Midwife	23	58	1			
	Dental	1	3	0.173(-2.14, 2.48)	0.883	1.60(-1.57, 4.78)	0.322
	Nurses	17	83	0.660(-.050, 1.37)	0.069*	0.98(-0.20, 2.17)	0.104
Residence	2	39		1.10(-.398, 2.60)	0.150*	-1.13(-2.8, 0.62)	0.206
	19	125		1			
Occupation of the head of household	3	26		1			
	4	2		2.85(0.77, 4.92)	0.007*	2.27(-.47, 5.02)	0.105
	8	23		1.74(-.129, 3.62)	0.068*	0.97(-1.58, 3.53)	0.456
	2	12		2.48(0.221, 4.74)	0.031*	2.21(-0.84, 5.26)	0.156
Consumption of fast food	24	81		1.90(.152, 3.66)	0.033*	1.61(-0.762, 3.9)	0.183
	13	35		1			
	17	55		0.183(-.653, 1.021)	0.667	0.48(-.617, 1.58)	0.388
	5	38		1.03(-.091, 2.16)	0.072*	2.07(0.445, 3.69	0.012*
Eating meat and egg per week	6	16		-0.009(-1.143, 1.12)	0.987	0.185(-1.36, 1.7)	0.814
	16	44		0.423(.810, 1.65)	0.501	0.21(-2.63, 3.06)	0.882
	3	23		1.44(-.176, 3.07)	0.081*	1.26(-1.97, 4.49)	0.445
	5	14		0.441(1.054, 1.93)	0.563	-0.90(-4.05, 2.2)	0.574

	11	47	0.864(-.410, 2.13)	0.184*	0.34(-2.5, 3.20)	0.816
	5	9	1.35(-1.00, 3.72)	0.260	-0.36(-3.2, 2.54)	0.806
Consumption of fruit and vegetable	1	7	1			
	17	50	1			
	5	12	0.203(-.976, 1.38)	0.735	0.52(-1.12, 2.17)	0.533
	3	11	0.42(1.22, 2.07)	0.614	0.71(-1.54, 2.96)	0.538
	7	37	0.78(-.529, 2.10)	0.241*	1.12(-.68, 2.93)	0.224
Consumption of dairy products like milk per week	6	25	0.5(-.820, 1.92)	0.431	1.28(-.61, 3.19)	0.186
	3	9	0.22(-1.44, 1.89)	0.794	2.03(-1.1, 5.205)	0.209
	7	38	1			
	13	47	0.78(-.1962, 1.77)	0.117*	1.55(0.15, 2.94)	0.029*
Eating fatty food per week	17	42	0.38(-.452, 1.21)	0.371	0.86(0.41, 2.13)	0.184
	4	17	0.54(-.68, 1.76)	0.386	1.36(-0.52, 3.26)	0.157
	24	12	0.244(-1.110, 1.59)	0.117*	-0.45(-1.8, 0.95)	0.529
	7	31	-0.161(-1.41, 1.08)	0.371	0.72(-2.2, 0.83)	0.362
Getting to Burao college	4	30	-0.51(-1.76, 0.683)	0.386	1.19(-.56, 2.94)	0.183
	18	59	-0.11(-1.20, 0.9)	0.856	0.20(-1.23, 1.64	0.783
	25	64	1			
	12	66	0.76(-.004, 1.53)	0.051*	0.78(-.23, 1.80)	0.212
	4	14	0.56(-1.03, 2.16)	0.490	1.5(-.87, 3.93)	0.130

Discussion

Based on this study revealed that a significant portion of the participants 128 (69.19%) of the total sample, reported consuming meals three times a day. It agreed with studies conducted in Italy [20]. In contrast, a smaller percentage of 48 participants (25.95%) indicated that they regularly consumed fast food or processed foods on a daily basis. This finding was supported study done in Assam [21]. On the other hand, the majority of the students, specifically 111 (60%) of the total sample, were the normal range based on their body mass index (BMI). In contrast, 11 students (5.95%), and 31 students (16.76%) were classified as obese. The finding was in agreement with other study [22].

In the present study, the prevalence of obesity and associated factors among students in Burao College of Health Science were investigated according to the findings, the prevalence of obesity and overweight was 22.2%, which is significantly higher compared to the study in Bangalore 13% the discrepancy might be due to differences in socioeconomic background, sample size, dietary habits, types of meals and exercise habits [23]. The study is consistent with studies done in 22 countries 19.3% study done in India (23%) study done in Pakistan (22%) The study is lower studies Egypt 56.4%, Saudi Arabia 56.4%, Malaysia 35.4%, Namibia 58% [24-29].

Factors associated with overweight and obesity include consumption of fast food this could be increased excess energy consumption, increased caloric intake and lower diet quality this is consistence with study done in Indonesia, Pakistan, Malaysia, India and dairy products among students in Burao College of Health Science [30-33]. The impact of consuming dairy products on weight can vary depending on different factors. Studies suggest that consuming high amounts of dairy without restricting energy intake may lead to weight gain [34]. However, consuming dairy products while restricting energy intake can positively affect weight and body composition [34].

However, some factors like, Sex (p=0.409), Eating meat and egg per week (p=0.882), and physical activity, eating fatty food per week (p=0.783), place of residence, education level of the father, education level of the mother, family size, number of meals per day, occupation status of the father, had no association with obesity/overweight. These may be due to variation in study settings, geographical location, culture and socio-economic factors.

Conclusion

The current study showed that the prevalence of overweight and obesity among Burao college health science students is a high public health problem. eating habit factors influencing the obesity/overweight were identified. Overweight/obesity is significantly associated with infrequent consumption of fast food and daily consumption of dairy products such as milk. Therefore, these findings highlight the importance of considering dietary habits when addressing the issue of obesity/overweight among students. Encouraging healthier eating

habits, such as reducing fast food consumption and promoting moderation in dairy product intake, may be beneficial in preventing and managing obesity/overweight in this population. However, further research is needed to better understand the underlying mechanisms and potential confounding factors involved in these associations.

Recommendation

This shows the importance of strict preventing the consuming infrequent fast food. It can be recommended that awareness should increase among students about healthy choices of fast food, complications of obesity/overweight and dairy products. Health education programs are recommended to promote healthy lifestyles and dietary habits college students.

Limitations of the Study

This study had several limitations. The investigation was carried out with students from one college in the city (country) mostly in urban center. College students are not representative of young adults in general, where they are a small proportion of the college age population, and the overweight or obesity prevalence and its associated factors may be different in other sectors of the population. The study was a cross-sectional study and the temporal relationships between health behavior practices and social and health status cannot be established in such studies. Further prospective studies are warranted to understand whether social and health behaviors lead to overweight or obesity or vice versa.

Data Sharing Statement

Due to the privacy policy, the datasets are not publicly available. On reasonable request, the corresponding author will provide the data that support the findings of this study.

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Author Contributions

Dek Kahin Yosef, performed data analysis, directed all aspects of this research, and drafted the manuscript fully. Mohamed Cumar Ali, Fadumo Osman, and Hamse Dubad designed the study and participated in data collection, developing the tool, writing and approving the final manuscript. Mohamed Jamac, and Saed Ibrahim were involved in training the data collectors, and supervised data collection in study participants in Burao college of health, and contributed to the data entry. All authors critically read and approved the final version of the manuscript.

Disclosure

The authors declare that they have no conflicts of interests

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