

Eating habits and physical exercise patterns among undergraduate nursing students at Muhimbili University of Health and Allied Sciences, Tanzania: A cross-sectional study

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Abstract

Background: Globally, overweight and obesity affect over one-third of the global population and it is projected that by 2030 obesity will affect more than half of the world population. The current burden of overweight and obesity is attributed to high rates of unhealthy eating and physical inactivity as it had also been revealed in Tanzania. The substantially increased prevalence of malnutrition at young ages is associated with a high incidence of non-communicable diseases in the young population and ultimately increased premature deaths.

Objectives: This study aimed to assess eating habits, physical exercise patterns, and the overweight/obesity status among undergraduate students at the Muhimbili University of Health and Allied Sciences (MUHAS).

Methods: A quantitative cross-sectional study was conducted between January and March 2022 by employing a stratified sampling technique to recruit 232 undergraduate nursing students. A self-administered questionnaire and anthropometric measurements were used to obtain data which were finally analyzed using SPSS version 25.

Results: The prevalence of overweight/obesity was 20.2%. Approximately 43% of the participants were physically inactive, with a higher proportion among females compared to males $p=0.001$. Male participants were more likely to perform physical exercises for a longer duration (≥ 30 minutes per day) compared to female participants, $p=0.008$. The consumption of more than three meals per day was associated with an increased odds of being overweight/obese than the consumption of three meals or less per day (OR: 3.11; 95%CI: 1.11-8.73). Similarly, the average long duration of sleeping per day (eight hours or more) was associated with an increased odds of being overweight/obese than sleeping less than eight hours per day (OR: 2.08; 95%CI: 1.06-4.11).

Conclusions: The findings revealed high rates of unhealthy eating habits, physical inactivity patterns and a significant prevalence of overweight/obesity. This indicates a need for developing actionable interventions and national health programs to promote healthy eating habits and physical activity, particularly among university students.

Keywords: Eating habits, Physical exercises, Non-communicable diseases, Nursing students, Obesity, Tanzania

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Introduction

Globally, there has been a substantial increase in the prevalence of overweight and obesity among young adults over the last few decades (Lacent Gastroenterology Hepatology, 2021). In 2016, the World Health Organization (WHO) report showed that about 2 billion (39%) adults aged 18 years and older were overweight. Of these more than 650 million (13%) were obese (Lacent Gastroenterology Hepatology, 2021). Recent studies in Africa showed that 18.4% of women and 7.8% of men in the continent live with obesity (GBD 2019 Diseases and Injuries Collaborators, 2020). The study conducted among adolescents in the Kilimanjaro region, Tanzania obtained that 25% of the participants were overweight while 6.1% were obese (Nicholaus et al., 2020). Further, a community-based study conducted in Dar es Salaam, Tanzania revealed that 34.8% of the participants were overweight and 32.8% were obese (Pallangyo et al., 2020).

Eating habits, sleeping, and physical exercise patterns are the major determinants of overweight and obesity (Peltzer et al., 2014). Poor eating habits and physical exercise patterns are significant risk factors for chronic illnesses (GBD 2016 Risk Factors Collaborators, 2017). Recently, the burden of Non-Communicable Diseases (NCDs) such as diabetes, cardiovascular diseases, osteoarthritis, and cancers has been increasing among the young population (GBD 2019 Diseases and Injuries Collaborators, 2020). Annually, NCDs lead to about 41 million deaths each year, equivalent to 71% of all deaths globally (GBD 2019 Diseases and Injuries Collaborators, 2020).

According to the WHO recommendations, adolescents and adults between the ages of 18 to 64 years should perform physical activities for at least 150 minutes of moderate-intensity aerobic physical activities throughout the week, or perform at least 75 minutes of vigorous-intensity aerobic physical activities throughout the week, or an equivalent combination of both moderate- and vigorous-intensity activities (Bull et al., 2020). While previous studies reported that eating habits and physical exercise patterns differ in different population groups (Benaich et al., 2021; Nicholaus et al., 2020), the study conducted in Ethiopia showed that 69.3% of the female participants and 74.3% of the male participants were physically active (Tsfaye et al., 2020). However, in Tanzania, the study obtained that 88.3% of the study participants were physically inactive and that skipping breakfast and regular fast food consumption were among the significant predictors of obesity (Pallangyo et al., 2020).

University life is a critical period where most students make changes in their eating habits and overall lifestyle habits due to their busy and demanding class schedule (Peltzer et al., 2014; Tok et al., 2018; Wright et al., 2015). Hence, due to the changing environmental exposure, university students tend to establish new lifestyles that are different from those practised at their homes and high schools and this may predispose them to unhealthy meal patterns and unhealthy lifestyle behaviours which are the risk factors for NCDs (Hailu et al., 2021). Studies report that a large proportion of university students are at increased risk of chronic illnesses like obesity due to their poor dietary habits, sleeping patterns, and physical inactivity (Hailu et al., 2021; Okeke et al., 2020; Peltzer et al., 2014). The study conducted in Nigeria among medical university students revealed that the majority of the students believed that physical exercise is important for health although only 3.8% of the participants were performing physical exercises for 3-5 days (Okeke et al., 2020).

In Saudi Arabia and Romania studies revealed that more than two-thirds and more than a half of the university students were physically inactive respectively (Al-shehri et al., 2017; Anton-Păduraru et al., 2021). Furthermore, unhealthy eating habits and alarming prevalence of overweight and obesity among university students had been disclosed previously in some settings (Anton-Păduraru et al., 2021; Yousif & Kaddam, 2019). In Tanzania, previous studies concerning eating habits and physical exercise patterns have been focused on school-aged children, high school adolescents, and the community (Nicholaus et al., 2020; Pallangyo et al., 2020) while forgetting university students who are at increased

risk for unhealthy eating, physical inactivity and NCDs (Peltzer et al., 2014). This calls for a need to conduct a study among university students in Tanzania to add up in the knowledge gap concerning eating habits, physical exercises pattern and nutrition status. Therefore, this study aimed to assess the eating habits, physical exercise patterns, and association with the overweight/obesity status among undergraduate nursing students at the Muhimbili University of Health and Allied Sciences (MUHAS).

Methods

Study design and setting

The study employed a quantitative cross-sectional design to assess the eating habits, physical exercise patterns, and association with the overweight/obesity status among undergraduate nursing students at MUHAS from January to March 2022. The approach was objective in nature and helped in collecting original data from the study participants at a single point in time.

MUHAS is a public health and allied sciences university located at Ilala city Municipal in Dar es Salaam, Tanzania. The university has five schools (school of medicine, school of nursing, school of public health and social sciences, school of pharmacy, and school of dentistry) providing undergraduate and postgraduate studies. Undergraduate degree enrollment are in the fields of Medicine (MD), Nursing (BScN), Dentistry (DDS), Pharmacy (BPharm), Environmental Health Sciences (BScEH), Science in Radiotherapy (BRTT), Medical Laboratory Sciences (BMLS), Midwifery (BScM), Anesthesia (BScNA), Biomedical Engineering (BME), Physiotherapy (BScPT). During this study, MUHAS had a total of 3,861 students of which 420 were first to fourth year undergraduate nursing students

Study population and eligibility criteria

This study involved a population of undergraduate nursing students at MUHAS. All undergraduate nursing students at the MUHAS aged 18+ years were included while students who were pregnant and those who were on special weight loss or weight gain programs were excluded.

Sampling technique

A stratified random sampling technique was used to recruit the study participants. The year of study among undergraduate nursing students at MUHAS was used as strata, and then a simple random sampling method was used for each year of study to obtain the sample size required. The variation in the number of undergraduate nursing students in different years of study was considered in sampling by the proportional distribution of the final sample size among the four strata. Finally, first-year students contributed 24.2% of the estimated sample size. The second-year and third-year students contributed 23.0% and 30.0% respectively, and the fourth-year of study contributed 22.5% of the total sample size.

Sample size determination

We used a single proportion formula to estimate the minimum required sample size given as $[N = (Z)^2 \times p(1-p)/e^2]$, where N is the minimum required sample size, and p is the prevalence of overweight/obesity among university students due to poor dietary habits and physical inactivity (16.4%) based on a previous study conducted in Morocco (Benaich et al., 2021). Furthermore, e is the margin of error or precision (5%), and Z is the standard normal value (1.96) corresponding to a 95% CI. After adding a 10% proportion of non-response, the estimated sample size was 232 undergraduate nursing students.

Data collection tool

A well-structured self-administered questionnaire developed after a review of previous related literatures (Al-shehri et al., 2017; Anton-Păduraru et al., 2021; Hailu et al., 2021; Tok et al., 2018), and modification based on study objectives was employed for gathering information from the study participants. The questionnaire was developed in English language and composed of close-ended questions and short answer questions. The questionnaire had a total of 14 items in three parts. Part one had questions on the socio-demographic characteristics and anthropometrics of the participants, part two had questions concerning participants' eating habits, and part three contained questions regarding participants' physical exercise patterns. A panel of experts in the fields of nursing research, education, and nutrition assessed the content validity of the questionnaire.

Anthropometric measurements including weight, height, and body mass index were carried out according to the protocol of the International Society for the Advancement of Kinanthropometry (Karupaiah, 2018). Body weight (kg) and height (cm) were measured by using an electronic scale (Seca 750, Germany; 150+0.1 kg) and a stadiometer (Seca, Germany; 200+0.1 cm) respectively. The body mass index (BMI) was determined as the ratio of the body weight (kg) value divided by the square value of height (m) and further used to categorize participants' nutritional statuses (Weir & Jan, 2023).

Data collection procedure

Before data collection, four research assistants were recruited to assist in the data collection procedure from the study participants. These research assistants were members from each year of study and were currently working as class representatives in their respective classes (years of study). They were trained before the data collection exercise to familiarize them with the study objectives, study methodology, data collection tool, and study protocol, and much emphasis was on the importance of signing consent, confidentiality, and ethical procedures while respecting the participant's decision to participate or not participating in the study. Data were collected from participants in each of the strata (year of study) by research assistants under the supervision of the principal investigators of this study. After obtaining the informed consent, and completion of the questions concerning socio-demographic information, each participant who was willing to proceed with the study had their weight and height measured and recorded by research assistants.

Validity and reliability of the tool

As part of quality control, a pilot study was done on 10% of the sample size who were finally excluded from the actual study sample. A reliability test was performed by calculating the reliability coefficient (Cronbach's alpha), and its values for eating habits and physical exercise patterns parts were 0.810 and 0.772 respectively. These findings indicate a good reliability level for the tool with the studied sample. Moreover, analysis of the pretest results guided appropriate modifications of the tool before the data collection procedure for the actual study.

Ethical consideration

The ethical clearance for this study was obtained from the MUHAS Research and Ethics Committee with reference number DA.25/111/01B/119. Permission to conduct the study was obtained from MUHAS administration with reference number MU/DOS/16/08/2022. Written informed consent was sought and obtained from all participants. Confidentiality of participants' information was strictly maintained. To further maintain confidentiality, no identifiers were in the questionnaire. Participation was fully voluntary, and the participants were informed of the freedom to withdraw from the study at any stage if they so desired without any penalty.

Data management and analysis

The data were entered and analyzed by IBM Statistical Package for Social Sciences (SPSS Version 25.0). Descriptive statistics using frequencies, percentages, means, median, interquartile range, and standard deviations were computed and data were then presented in tables. A Pearson Chi-square test with the Fisher exact approximation was used to determine the association between categorical variables. Logistic regression analyses were performed to identify the significant factors associated with overweight/obesity. The test of significance was performed using a 95% confidence interval, and the level of significance was set at a p-value < 0.05.

Results

Socio-demographic characteristics

In total, 232 undergraduate nursing students were recruited in this study. Of which 213 participants responded completely giving a response rate of 91.8%. The age of the participants recruited ranged from 19 to 40 years with a mean (\pm SD) age of 24.0 (\pm 4.0) years. The majority (171; 80.3%) of the participants were in the age group of 19-25 years. Nearly two-thirds of the participants (132; 62.0%) were male giving a male-to-female ratio of about 2:1. Regarding the year of study, 64 (30.0%) participants were third-year students (Table 1).

Table 1: Socio-demographic characteristics of the study participants (N=213)

Variables	n(%)
Age, Mean(SD) (in years)	24.0(4.0)
Age group	
19-25	171(80.3%)
\geq 26	42(19.7)
Sex	
Male	132(62.0)
Female	81(38.0)
Year of Study	
1 st year	52(24.4)
2 nd year	49(23.0)
3 rd year	64(30.0)
4 th year	48(22.5)

Prevalence of overweight/obesity

On the anthropometric measurements, the median body weight of the participants was 60.0 kg (Interquartile range (IQR) = 11.0 kg); the mean height was 1.654 m (SD =0.082). The median BMI was 22.8 kg/m² (IQR = 4.1 kg/m²). According to WHO (“Obesity: Preventing and Managing the Global Epidemic. Report of a WHO Consultation.,” 2000) BMI categorization, the majority 157(73.7%) of the

participants were in the normal weight category. 36 (16.9%) and 9 (3.3%) participants were in the overweight and obese categories, respectively. The prevalence of overweight/obesity among the study participants was 20.2%, and it was higher among males compared to females (23.5% vs. 14.8%). However, no significant BMI status differences were observed between males and females (Table 2).

Table 2: Distribution of the study participants according to BMI status (N=213)

WHO International BMI Classifications					
BMI (kg/m ²)	BMI category	Male n=132	Female n=81(%)	Total n=213(%)	p-value
< 18.5	Underweight	6(4.5)	7(8.6)	13(6.1)	0.256
18.5-24.9	Normal weight	95(72.0)	62(76.5)	157(73.7)	
25.0-29.9	Overweight	25(18.9)	11(13.6)	36(16.9)	
≥ 30.0	Obese	6(4.5)	1(1.2)	7(3.3)	
	Total	132(100)	81(100)	213(100)	
< 25.0	Underweight/normal weight	101(76.5)	69(85.2)	170(79.8)	0.160
≥ 25.0	Overweight/obese	31(23.5)	12(14.8)	43(20.2)	

Eating habits

The majority 147(69.0%) of the participants (68.2% of males and 70.4% of females) reported consuming breakfast always. Among the participants who consumed breakfast always, more than half 84(57.1%) of them (57.8% of males and 57.8% of females) reported consuming it at 08:00 AM and before. The majority 196(92.0%) of the participants (92.4% of males and 91.4% of females) reported consuming three or fewer main meals per day. Lunch was the largest meal consumed per day by nearly two-thirds, 136(63.8%) of the participants (64.4% of males and 63.0% of females). More than half, 120(56.3%) of the participants reported sleeping for less than eight hours. Concerning the length of overnight fasting, the majority, 153(71.8) of the participants (72.7% of males and 70.4% of females) reported overnight fasting for 12 hours or less (Table 3).

Table 3: Eating habits (N = 213)

Item	All n=213 (%)	Male n=132(%)	Female n=81(%)	p-value
Always consume breakfast				
Yes	147(69.0)	90(68.2)	57(70.4)	0.762
No	66(31.0)	42(31.8)	24(29.6)	
Time for consuming breakfast				
≤ 08:00 a.m.	84(57.1)	52(57.8)	32(56.1)	0.845

> 08:00 a.m.	63(42.9)	38(42.2)	25(43.9)	
Number of main meals consumed per day				
≤ 3 meals	196(92.0)	122(92.4)	74(91.4)	0.799
> 3 meals	17(8.0)	10(7.6)	7(8.6)	
Largest meal consumed per day				
Lunch	136(63.8)	85(64.4)	51(63.0)	0.884
Dinner	77(36.2)	47(35.6)	30(37.0)	
Average sleep duration				
< 8 hours	120(56.3)	74(56.1)	46(56.8)	0.917
≥ 8 hours	93(43.7)	58(43.9)	35(43.2)	
Average length of overnight fasting				
≤ 12 hours	153(71.8)	96(72.7)	57(70.4)	0.710
> 12 hours	60(28.2)	36(27.3)	24(29.6)	

Physical Exercises Pattern

Among the participants in this study, the majority 122(57.3%) of them reported performing regular physical exercises. Male participants were more likely performing regular physical exercises 88(66.7%) compared to female participants 34(42.0%), $p = 0.001$. Concerning the days per week for adhering to regular physical exercises, the majority 81(66.4%) of the participants (69.3% of males and 58.8% of females) reported three days or more. Male participants were more likely to spent 30 minutes per day or more on physical exercises compared to female participants, $p = 0.008$ (Table 4).

Table 4: Physical Exercises Pattern (N=213)

Item	All n=213	Male n=132	Female n=81	p-value
Perform regular physical exercises				
Yes	122(57.3)	88(66.7)	34(42.0)	0.001
No	91(42.7)	44(33.3)	47(58.0)	
Days per week for performing physical exercises				
< 3 days	41(33.6)	27(30.7)	14(41.2)	0.217
≥ 3 days	81(66.4)	61(69.3)	20(58.8)	
Length of time for performing physical exercises per day				
< 30 minutes	27(22.1)	14(15.9)	13(38.2)	0.008

≥ 30 minutes 95(77.9) 74(84.1) 21(61.8)

Association between BMI Statuses and their Eating Habits and Physical Exercises Patterns.

Table 5 shows the association between the study variables obtained from logistic regression analyses. The study participants who consumed more than three meals per day were three times more likely to be overweight/obese than those who consumed three meals or fewer per day (OR: 3.11; 95%CI: 1.11-8.73; $p = 0.031$). Also, the study participants who slept eight hours or more per day were two times more likely to be overweight/obese than those who slept less than eight hours per day (OR: 2.08; 95%CI: 1.06-4.11; $p = 0.034$). No significant association observed between physical exercise patterns with BMI status (overweight/obesity) ($p > 0.05$) (Table 5).

Table 5: Logistic regression analysis of BMI Statuses and their Eating Habits and Physical Exercises Patterns (N = 213)

Variable	Non-overweight/obese n=170	Overweight/Obese n=43	OR	95% CI	p-value
Consume breakfast always					
Yes	115(67.6)	32(74.4)	1		
No	55(32.4)	11(25.6)	0.72	0.34-1.52	0.392
Time for consuming breakfast					
≤ 08:00 a.m.	67(58.3)	17(53.1)	1		
> 08:00 a.m.	48(41.7)	15(46.9)	1.23	0.56-2.71	0.604
Number of main meals consumed per day					
≤ 3 meals	160(94.1)	36(83.7)	1		
> 3 meals	10(5.9)	7(16.3)	3.11	1.11-8.73	0.031*
Largest meal consumed per day					
Lunch	108(63.5)	28(65.1)	1		
Dinner	62(36.5)	15(34.9)	0.93	0.46-1.88	0.847
Average sleep duration					
< 8 hours	102(60.0)	18(41.9)	1		
≥ 8 hours	68(40.0)	25(58.1)	2.08	1.06-4.11	0.034*
Average length of overnight fasting					
≤ 12 hours	122(71.8)	31(72.1)	1		

> 12 hours	48(28.2)	12(27.9)	0.98	0.47-2.07	0.966
Perform regular physical exercises					
Yes	95(55.9)	27(62.8)	I		
No	75(44.1)	16(37.2)	0.75	0.38-1.49	0.414
Days per week for performing physical exercises					
< 3 days	34(35.8)	7(25.9)	I		
≥ 3 days	61(64.2)	20(74.1)	1.59	0.61-4.15	0.341
Length of time for performing physical exercises per day					
< 30 minutes	21(22.1)	6(22.2)	I		
≥ 30 minutes	74(77.9)	21(77.8)	0.99	0.36-2.78	0.990

OR: odds ratio; CI: confidence interval; I, reference category; *significant association at $p < 0.05$

Discussion

Unhealthy eating habits and poor physical exercise patterns have been attributed to an increase in the global prevalence of NCDs like obesity, diabetes, and hypertension. Recent studies have shown a gradual increase in the burden of NCDs in young adults and the ultimate increase in premature deaths. Studies that have been done in different settings concerning eating habits, physical exercise patterns, and lifestyle behaviors of university students have revealed controversial results, although most of these studies show that the majority of the university students have been engaging in consuming unhealthy diets, sedentary lifestyles and other unhealthy lifestyle behaviors (Al-shehri et al., 2017; Anton-Păduraru et al., 2021; Okeke et al., 2020). Our study aimed to assess the eating habits, physical exercise patterns, and association with overweight/obesity status among undergraduate nursing students at the Muhimbili University of Health and Allied Sciences.

The median BMI of the participants in the present study was 22.8 (IQR = 4.1) Kg/m² with 16.9% (18.9% male; 13.6% female) and 3.3% (4.5% male; 1.2% female) of the participants being overweight and obese respectively. The prevalence of overweight/obese was 20.2% (23.5% male; 14.8% female). This is consistent with the findings of other studies conducted previously among university students in different settings, whereby the prevalence of overweight and obese was revealed higher among males compared to females (Alkazemi, 2019; Benaich et al., 2021; Peltzer et al., 2014). A study conducted among university students from 22 LMICs obtained that 22.0% (24.7% male; 19.3% female) were overweight/obese (Peltzer et al., 2014).

However, the present study's prevalence estimates remain lower compared to that estimated by other studies (Oyindasola & Alabi, 2020; Tok et al., 2018; Wright et al., 2015). For instance, a study conducted among university students in Nigeria obtained a prevalence estimate of overweight and obesity of 31% and 9.3%, respectively (Oyindasola & Alabi, 2020). Furthermore, a study conducted in Kenya reported a higher prevalence of overweight (26.4%) but a lower prevalence of obesity (1.4%) compared to our study (Mogeni & Ouma, 2022). These differences may be due to the significant effects on weight and height statuses that ethnicity/race and socioeconomic status disparities could have

among the participants from different countries (Peltzer et al., 2014) and the same country (Wattelez et al., 2021). The increasing prevalence of overweight/obesity among university students may be attributed to the unhealthy eating, physical activity and lifestyle behaviours adopted during the university period.

The European Guidelines on cardiovascular disease prevention in clinical practice recommend that for healthy dietary habits, three main meals should be consumed per day, and should always include breakfast (Perk et al., 2012). The present study revealed that 31.0% of the participants were not consuming breakfast always. Similarly, 25% of the participants of the study were conducted in Poland (Likus et al., 2013), and 38% of the undergraduate students at Najran University, Saudi Arabia (Al-shehri et al., 2017) were skipping breakfast. Inconsistent with the current study findings, the higher percentages of skipping breakfast have been obtained by the studies conducted in Southeastern Nigeria, whereby 68.1% of undergraduate students were skipping breakfast (Okeke et al., 2020), and Northeastern Romania, whereby 60.53% of the participants were skipping breakfast (Anton-Păduraru et al., 2021). However, the current study revealed no association between skipping breakfast and BMI status like other previous studies (Horikawa et al., 2011; Pallangyo et al., 2020; Wright et al., 2015), the habit of skipping breakfast has been associated with an increased prevalence of overweight/obesity. For instance, a study conducted in Tanzania by Pallangyo et al. obtained that participants with overweight/obese significantly skipped breakfast compared to those who had normal weight (Pallangyo et al., 2020).

The differences in habitual taking or skipping breakfast may be due to the variation in socio-economic statuses and the class schedules among the participants. The present study obtained that 57.7% of the participants consumed three main meals daily, 34.3% of them consumed less than three main meals daily, and 8.0% of the participants consumed more than three main meals daily. Similar findings were obtained from the study by Tok Chen Yun et al. conducted at Universiti Brunei Darussalam which shows that among the university students, 52.5% of them consumed three meals daily, 33.3% of them consumed less than three meals daily, and 14.2% of them consumed more than three meals daily (Tok et al., 2018). Likewise, the studies done in Kilimanjaro Region, Tanzania (Nicholaus et al., 2020), Nigeria (Okeke et al., 2020), and Northeastern Romania (Anton-Păduraru et al., 2021) indicated similar findings to the current study.

The largest consumed meal per day reported by the participants in the present study was lunch (63.8%), for both males (64.9%) and females (63.4%). Similar findings were obtained from the study conducted among medical university students in Romania (Pop et al., 2021). However, breakfast was the second largest meal among female participants (Pop et al., 2021), the current study shows that none of female students considered breakfast as a largest meal. Furthermore, the present study indicates that 56.3% of the participants were sleeping for an average of less than eight hours per day. Besides, the average sleeping duration of medical students in Romania shows consistent findings (Pop et al., 2021). Likely, spending more hours studying and night shift clinical rotations might be the reason for the few hours spent sleeping by university students in the health field.

The current study findings show that 57.3% of the participants were performing regular physical exercises. Similarly, a study conducted by Anton-p et al. shows that 55.07% of the participants were engaging in regular physical exercises (Anton-Păduraru et al., 2021). The lower findings of the current study were obtained from the study conducted in Poland (Likus et al., 2013) in which only 40% were physically active. Furthermore, the study done in Ethiopia indicated lower performance in regular physical activities among the students compared to the presented study findings (Hailu et al., 2021). However, Benaich et al. reported that 74.4% of Moroccan university students were physically active (Benaich et al., 2021) which is higher than our findings.

The duration of engagement in physical activities per week among the participants in the current study was more than three days per week for 66.4% of the participants. The study by Hailu et al. shows a lower duration of performing physical exercise per week compared to the present, as only 7.4% of the participants engaged in regular physical exercises at least three times per week (Hailu et al., 2021). This study also revealed that the average length of performing physical exercises per day was 30 minutes or more for 77.9% of the participants. Inconsistent findings were obtained in Nigeria where the majority (55.1%) of the students who performed regular physical exercises spent less than 30 minutes (Okeke et al., 2020) and Universiti Brunei Darussalam (Tok et al., 2018).

The difference in university schedules and space for performing physical exercise might be the justification for this variation. The male participants in this study were more likely to perform regular physical exercises compared to female participants. A similar finding was obtained from the previous studies (Fagaras et al., 2015; Hailu et al., 2021; Pop et al., 2021). Inconsistently, Kenyan female students commonly undertake regular physical exercise compared to male students (Mogeni & Ouma, 2022). Furthermore, the male participants in the current study spent a long time performing physical exercises than female participants. Likewise, males had a longer duration of physical exercise than females (Fagaras et al., 2015).

Another study conducted in Morocco among university students also reported increased physical activities and time spent in physical activities among male students compared to female students (Benaich et al., 2021). Even though many previous studies (Peltzer et al., 2014; Tesfaye et al., 2020; Vilchis-gil et al., 2015) have indicated a significant association between physical activities and BMI status, the present study revealed no association between physical exercises pattern and overweight/obesity. Similar to studies conducted among Moroccan university students (Benaich et al., 2021) and Caribbean undergraduate students (Wright et al., 2015).

This study revealed that the consumption of more than three main meals per day was three times associated with an increased risk for overweight/obesity. Similarly, the study conducted at Universiti Brunei Darussalam revealed a significant association between BMI and the number of meals daily (Tok et al., 2018). Besides, the study conducted in Mexico revealed consistent findings (Vilchis-gil et al., 2015). The increase in calories with the increase in the number of meals consumed per day is the possible explanation for this association. An average sleeping duration of eight hours or more was two times associated with an increased risk for overweight/obesity. Inconsistent with our findings, a study conducted in Mexico found that sleeping hours were less among obese participants (Vilchis-gil et al., 2015). Although, a study conducted in Morocco found no association between sleeping hours and overweight/obesity (Benaich et al., 2021).

Study limitations

This study was limited to undergraduate nursing students from one university, and thus generalization of the findings to other populations in other settings should be undertaken cautiously. Furthermore, participants' information about eating habits in the present study was based on the frequency of consumption of food items without much consideration of food quantity and food content.

Conclusion and recommendations

The current study revealed unhealthy eating habits, physical inactivity, and significant prevalence of overweight/obesity among the study participants. Furthermore, the study obtained the significant predictors of overweight/obesity among the participants. These findings depict a relatively alarming future public health burden of NCDs attributed to unhealthy eating habits, physical inactivity, and unhealthy lifestyle behaviors in young ages.

These findings call for the elaboration and implementation of more tailored university-based healthy lifestyle promotion programs that will serve as a sustainable and optimal way for university students to adopt healthful lifestyles during their university tenure. It is also imperative to formulate focused-counseling services and seminars at university campuses to enrich students with the awareness, support, and empowerment needed for them to make informed choices concerning lifestyles that affect their health. Additionally, this study findings highlight a need for national wide studies and more qualitative studies to explore the barriers among university students in adopting healthy eating habits and physical exercise patterns which will guide in the development of tangible interventions to reduce their risks of developing NCDs.

Authors' contributions

RAG conceived the study, participated in its design, collected the data and analyzed the data, and prepared the first draft. EZC conceived the study, participated in its design, collected the data and analyzed the data, and prepared the first draft. VFK conceived the study, participated in its design, collected the data and analyzed the data, and prepared the first draft. RHK and FBR participated in the conception and design of the study and involved in providing a critical review of the manuscript. All authors read and approved the final manuscript.

Declaration

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

RAG, EZC & VFK conceived the study, participated in its design, collected the data and analyzed the data, and drafted a manuscript. RHK & FBR participated in the conception and design of the study and was involved in providing a critical review of the manuscript. All authors read and approved the final manuscript.

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