ORIGINAL ARTICLE

Assessment of body mass index, lifestyle and health perception among female university students in Morocco

Évaluation de l'indice de masse corporelle, du mode de vie et de la perception de la santé chez les étudiantes universitaires au Maroc

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Abstract

Objective: The objective of this study was to assess the relationship between Body Mass Index (BMI), dietary habits, physical activity, and health perception among female university students in Morocco.

Methods: The study was conducted at a Moroccan university among female students from the Faculty of Sciences Ain-Chock in Casablanca. Participants were given a self-administered questionnaire that evaluated sociodemographic factors, dietary habits, food group consumption, physical activity, and self-assessed health status. Data collection took place from February 2023 through the end of April 2023.

Results: A total of 335 students aged 18 to 29 years participated in the survey. The study revealed that 72.5% of the participants were within the normal weight range (BMI 18.5-24.9 kg/m²), while 15.9% were classified as overweight and 3.9% as obese. Additionally, 47.9% of the participants engaged in physical activity, with 30.2% dedicating more than 45 minutes to their activities. The health perception was found to be related to weight classification, with poor health perception most commonly associated with the "18.5-25" BMI range (57.8%).

Conclusion: The study sheds light on the intricate interaction between weight, health, and lifestyle in Morocco. The frequency of normal-weight persons and active participation indicates university students' health awareness. The prevalence of overweight and obesity, on the other hand, need ongoing health measures. These findings help to build focused methods for promoting healthier lives in Morocco, utilizing educational institutions as health promotion platforms.

Key words: Body Mass Index, perception of health, dietary habits, physical activity, Moroccan university students.

Résumé

Objectif: L'objectif de cette étude était d'évaluer la relation entre l'Indice de Masse Corporelle (IMC), les habitudes alimentaires, l'activité physique et la perception de la santé chez les étudiantes universitaires au Maroc.

Méthodes: L'étude a été menée au sein d'une université marocaine auprès des étudiantes de la Faculté des Sciences d'Aïn Chock à Casablanca. Les participantes ont répondu à un questionnaire auto-administré qui évaluait les facteurs sociodémographiques, les habitudes alimentaires, la consommation de groupes alimentaires, l'activité physique et l'auto-évaluation de l'état de santé. La collecte de données a eu lieu de février 2023 à fin avril 2023.

Résultats: Au total, 335 étudiantes âgées de 18 à 29 ans ont participé à l'enquête. L'étude a révélé que 72,5 % des participantes avaient un poids normal (IMC 18,5-24,9 kg/m²), tandis que 15,9 % étaient classées en surpoids et 3,9 % comme obèses. De plus, 47,9 % des participantes pratiquaient une activité physique, dont 30,2 % y consacraient plus de 45 minutes. La perception de la santé était liée à la classification du poids, avec une mauvaise perception de la santé étant le plus souvent associée à la catégorie « 18,5-25 » d'IMC (57,8 %).

Conclusion: L'étude met en lumière l'interaction complexe entre le poids, la santé et le mode de vie au Maroc. La fréquence des personnes ayant un poids normal et la participation active témoignent de la sensibilisation des étudiantes à la santé. En revanche, la prévalence du surpoids et de l'obésité souligne la nécessité de mesures de santé continues. Ces résultats contribuent à l'élaboration de stratégies ciblées pour promouvoir une vie plus saine au Maroc, en utilisant les établissements d'enseignement comme plateformes de promotion de la santé.

Mots clés: Indice de Masse Corporelle, perception de la santé, habitudes alimentaires, activité physique, étudiantes universitaires marocaines.

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Introduction

In recent years, the relationship between dietary habits, Body Mass Index (BMI), and overall health has become a focal point of interest in nutrition, public health, and epidemiology (1). This is especially relevant in countries like Morocco, where lifestyle changes, urbanization, and shifts in dietary patterns have raised concerns about increasing rates of obesity and associated health issues (2). The health behaviors specially of university students have become a growing concern worldwide, as this period often marks significant lifestyle changes that can have long-term implications for health. University students are frequently exposed to new social environments, academic pressures, and lifestyle habits that can lead to both positive and negative health outcomes.

The increasing prevalence of overweight and obesity is a pressing public health issue globally, and young adults, particularly university students, are not exempt from this trend. During their time at university, students often undergo significant lifestyle changes, including alterations in dietary habits and physical activity levels, which can have lasting impacts on their health (3). Poor dietary choices, such as high consumption of fast food and sugary beverages, combined with sedentary behaviors, have been identified as key risk factors for the development of overweight and obesity in this demographic (4).

Like many other countries, Morocco is experiencing a rising prevalence of obesity and its associated health risks. Urbanization and modernization have led to changes in dietary habits, with traditional diets giving way to increased consumption of processed foods, sugary beverages, and reduced physical activity (5–7). These shifts have contributed to the increasing prevalence of overweight and obesity, not only among adults but also among children and adolescents. Against this backdrop, investigating the dietary preferences of individuals across different BMI categories becomes critical to addressing this health challenge (8,9).

Despite the wealth of research on these issues in various global contexts, there is a notable gap in the literature regarding the health behaviors of university students in Morocco. While some studies have examined general health trends in the Moroccan population, specific investigations into the dietary habits, physical activity patterns, and body weight perceptions of female university students are scarce. This gap is significant, given the unique cultural, social, and economic factors that shape health behaviors in Morocco, which may differ substantially from those in other regions (2). Furthermore, national health data indicates rising rates of overweight and obesity in Morocco, particularly among young adults, highlighting the need for more targeted research in this area (10).

Our objective was to assess weight status, dietary habits, physical activity, and health perception among a cohort of female students enrolled at the Faculty of Sciences Ain Chock, University Hassan II of Casablanca.

Methods

This study was a cross-sectional, observational analysis conducted at a Moroccan university, designed to ensure that the data collected was representative of the broader female student population.

Study Participants

The study focused on female university students from the Faculty of Sciences Aïn-Chock in Casablanca, Morocco. Participants were selected based on their availability, willingness to participate, and absence of any medical history, ensuring a diverse representation of ages, educational levels, and academic backgrounds. Data collection spanned from mid-February to the end of April 2023. Inclusion criteria required participants to be female students who were available and consented to participate. Non-inclusion criteria excluded those who did not meet these requirements.

Data Collection

The self-administered questionnaire was tailored to capture a range of essential data points. Sociodemographic characteristics, such as age, and educational level, marital status…were collected to provide context for the study participants. Dietary habits were explored through inquiries about eating patterns, food preferences and frequencies. Upon obtaining ethical clearance, we distributed the questionnaires to the identified cohort of female students. Participants were given clear instructions on how to complete the questionnaire, ensuring accuracy and consistency in their responses. Participants were provided with informed consent forms explaining the study's purpose and procedures. Confidentiality and privacy of participants' data were ensured throughout the study.

Anthropometric measurements

The anthropometric measurements were carried out following the standards of the World Health Organization (WHO) and were carried out using an impedance meter (Omron HBF-511T-E), a precise tool for assessing various body parameters. Weight: Measured in kilograms. The height was measured using a stadiometer graduated in centimeters (Seca 213). The Body mass Index (BMI) calculated from weight and height (kg / m2), BMI = weight (kg) / (height (m)2. The calculated BMI values were then categorized into groups (BMI <18.5: underweight; 18.5<BMI<24.9:normal weight; 25<BMI<29.9:overweight; BMI > 30: obese (30<BMI<34.9 Moderate obesity, 35<BMI<39..9 severe obesity, BMI ≥40 morbid obesity) (11).

Food Consumption Assessment

Dietary habits, including dairy intake, were assessed using a dietary recall method, where participants were asked to report their usual consumption of various food groups

such as dairy products, animal protein sources (meat, chicken, eggs, fish), vegetables, fruits, and legumes. The recall data collected were then categorized into specific consumption ranges, such as "< 250 g" and "250 g - 500 g," to quantify the intake levels for each food group and for meat >100g and <100g(12).

Physical activity

Physical activity was assessed by means of a detailed frequency questionnaire, including weekdays and weekends. Usual physical occupational activity, method of going to and from work, leisure time and sports were considered in the questionnaire, it was defined according to WHO guidelines, which recommended that at least 30 min of regular, moderate or intense physical activity on most days reduces the risk of CVD and diabetes, colon cancer and breast cancer (13).

Perception of health

To assess participants' perceptions of their health in this study, three response options were provided: "good," "medium," and "poor." This approach, often used in health research, allows participants to self-assess their health status in a simple and intuitive manner (14).

Data Analysis

Data were analyzed using SPSS to examine the relationship between food consumption patterns and BMI categories. Descriptive statistics were used to summarize the proportions of individuals in each consumption range within different BMI categories. Chi-square tests were employed to assess the associations between categorical variables.

Results

Table 1 outlines key sociodemographic attributes of the studied population, focusing on age groups, educational levels, marital statuses, and monthly income distribution.

Table 1. the Main sociodemographic parameters of the studied population

	n = 334	%
Age group (Year)		
18-21	140	41.9
22-25	177	53.0
26-29	17	5.1
Education level		
Second year	11	3.3
Bachelor	46	13.8
Master	149	44.6
Doctorat	128	38.3
Marital status		
Single	319	95.5
Married	14	4.2
Divorced	1	0.3
Monthly income		
≤ 5000 DH	166	49.7
>5000 DH	168	50.3

years, The population was predominantly aged between 18 and 25. Educationally, the population was diverse, with 44.6% having a Master's degree and 38.3% holding a Doctorate. The majority of the population was single (95.5%) and had a relatively even distribution of monthly income, with 49.7% earning less than 5000 DH and 50.3% earning more.

Table 2 presents the mean values for the anthropometric parameters (weight, height, and BMI) of the study population.

Table 2. Means of anthropometric parameters for the study population

	Mean	SD	Minimum	Maximum
Weight (kg)	61.214	11.0546	40.0	104.0
Height (m)	1.639	.070	1.480	1.920
BMI kg/m2	22.76	3.73	14.83	37.34

BMI: Body Mass Index

Table 3 presents key data on the distribution of the studied population according to Body Mass Index (BMI) categories and physical activity.

Table 3. Distribution of the population studied according to body mass index and physical activity

	Effectif N	%
BMI Class		
<18.5	26	7.8
18.5-24.9	242	72.5
25-29.9	53	15.9
>30	13	3.9
Physical activity (PA)		
No	174	52.1
Yes	160	47.9
Duration of PA daily		
≤ 45 min	111	69.4
> 45 min	49	30.6

PA: Physical activity, min: minutes

The distribution of weight categories evaluated by BMI across different age groups within the studied population is presented in Table 4. Most females fall within the normal weight category (72.5%). Additionally, BMI categories were observed to vary according to age groups. Notably, the highest proportion of overweight female students is found in the 26-29 age group, while this same group has the lowest proportion of obesity.

Table 4. Body mass index (BMI) categories by age groups

			BMI				χ^2
			<18.5	18.5-24.9	25-29.9	>30	
Age group (Years)	18-21	N	13	103	17	7	0.002
		%	**9.3%**	**73.6%**	**12.1%**	**5.0%**	
	22-25	N	13	131	27	6	
		%	**7.3%**	**74.0%**	**15.3%**	**3.4%**	
	26-29	N	0	8	9	0	
		%	**0.0%**	**47.1%**	**52.9%**	**0.0%**	
	Total	N	26	242	53	13	
		%	**7.8%**	**72.5%**	**15.9%**	**3.9%**	

χ^2 test

Table 5 presents the food consumption habits across different BMI categories, focusing on dairy products,

animal protein sources, vegetables, fruits, and legumes. In most food groups, a consumption of less than 250g per day predominates across all BMI categories, with this trend being particularly pronounced in the "18.5-25" BMI class. Specifically, for dairy products and derivatives, the majority of participants in each BMI category, including normal weight (86.9%), overweight (83.0%), and obese (84.6%), consumed less than 250g. In terms of meat the data show that 46.6% of students with normal weight consume less than 100g/day. Regarding vegetable 62.7% participants in the normal category consume less than 250g/day. Similarly, for fruit consumption, 82.8% of students with normal weight consume less than 250g/day. For legumes, the majority of students (82.6%) with normal weight also reported consuming less than 250g/day.

Table 5. The distribution of Daily food consumption in various BMI categories

Food group			BMI categories			χ2
			Normal 18.5-24.9	Overweight 25-29.9	Obese >30	
Dairy Products	< 250 g	N	233	44	11	0.740
		%	86.9%	83.0%	84.6%	
	250g -500g	N	35	9	2	
		%	13.1%	17.0%	15.4%	
Vegetables	< 250 g	N	168	40	6	0.081
		%	62.7%	75.5%	46.2%	
	250g-500g	N	100	13	7	
		%	37.3%	24.5%	53.8%	
Fruits	< 250 g	N	222	41	7	0.027
		%	82.8%	77.4%	53.8%	
	250g-500g	N	46	12	6	
		%	17.2%	22.6%	46.2%	
Legumes	< 250 g	N	190	36	7	0.647
		%	82.6%	87.8%	77.8%	
	250g-500g	N	40	5	2	
		%	17.4%	12.2%	22.2%	
Meat	<100g	N	125	16	6	0.087
		%	46.6%	30.2%	46.2%	
	≥100g	N	143	37	7	
		%	53.4%	69.8%	53.8%	

χ2 test, Significant, p <0.05

Table 6 illustrates the perception of health status among female students in relation to their BMI categories. Three response options were offered in this study: good, medium, and poor.

Table 6. Perception of health status according to different BMI Categories

		BMI Categories				χ2
		<18.5 Underweight	18.5-24.9 Normal	25-29.9 Overweight	>30 Obese	
Poor	N	6	26	6	7	
	%	13.3	57.8	13.3	15.6	<0,0001
Medium	N	2	41	11	0	
	%	3.7	75.9	20.4	0.0	
Good	N	18	174	36	6	
	%	7.7	74.4	15.4	2.6	

χ2 test, P value<0.0001

A significant proportion, 74.4% (n=174), of students who had a normal weight, perceive their health status as good. Additionally, 215 of students who rate their health status as medium to good are also in the normal BMI category. This data suggests a strong correlation between a normal BMI and a positive perception of health among the students.

Discussion

The analysis of Body Mass Index (BMI) distributions among the participants in our study revealed a significant trend that reflected the increased awareness of health and well-being among university students. A substantial 72.5% of individuals fell within the normal weight range (18.5-25), which mirrors the findings of Boukrim et al. This result highlights the impact of health-conscious behaviors in populations with greater access to health education and information. It can be explain by the positive influence that higher education institutions have on promoting healthier weight management practices among students, as also observed in similar studies (15) which investigated university students' perceptions and factors contributing to obesity and overweight in Southern Morocco. Similarly, our research resonates with the results of the descriptive cross-sectional study conducted in Nepal among medical students at a medical college (16).

In terms of physical activity, our results reflected the health-conscious mindset prevalent among university students. Nearly half (47.9%) of the participants engaged in some form of physical activity, with a notable 30.6% dedicating more than 45 minutes to their activities. This proactive engagement with physical exercise underscored the influence of the university environment in promoting health-conscious behaviors. The awareness of the benefits of physical activity and its integration into daily routines among this group signifies their commitment to maintaining a healthy lifestyle. This tendency is consistent with the findings of the study headed by Bogna Grygiel-Górniak et al.(17), this comparable observation emphasizes the large proportion of students who engage in regular physical exercise, which is supported by the similarity between our study and the aforementioned studies. Our study's findings emphasize the positive impact of the university environment on weight management and physical activity. The prevalence of normal weight individuals and active participants is indicative of a health-conscious cohort driven by education and awareness. This trend aligns with global shifts toward healthier lifestyles and holds promise for the future health of the population.

Our results underscored the impact of age on the prevalence of different Body Mass Index (BMI) categories, aligning with previous research by Peltzer et al. (19) and Rabanales-Sotos et al. (20). The analysis revealed distinct patterns in weight distribution across age groups, with a particularly noteworthy finding that the highest proportion of overweight individuals was concentrated in the 26-29 age group. This suggests that age plays a

significant role in influencing weight status, potentially due to lifestyle changes, metabolic factors, or other age-related variables that contribute to weight gain in this demographic. This finding mirrors the observations of Rabanales-sotos et al.(18), who noted a similar trend of increased overweight prevalence in the late twenties. These results highlight the importance of age as a contributing factor to weight distribution, emphasizing the need for tailored health interventions targeting different age segments. The age-specific variations in overweight and obesity prevalence underscore the need for targeted strategies to address shifting weight dynamics throughout the lifespan.

Our study examines dietary patterns across various food groupsincluding"DairyProduct,""AnimalProteinsources," "Vegetables," "Fruits," and "Legumes," while considering specific consumption ranges. This investigation shed light on the intricate relationship between dietary choices and Body Mass Index (BMI) categories. Notably, our findings offered insights that resonate with the observations of previous studies by Bede et al. (21) and Al-Awwad et al. (22), reinforcing the importance of understanding dietary habits within different BMI contexts. Across most food groups, consumption below "< 250 g" emerges as a prevailing trend across all BMI categories. This consistent pattern aligns with others research (19), highlighting the shared tendency towards limited food intake within this consumption range, regardless of weight status.

The "Dairy Product" group reveals that "< 250 g" consumption is the most common across all BMI categories. This does not reflect the findings of a Mendelian Randomization Analysis (20), indicating a widespread preference for this consumption range in only overweight category. Furthermore, examining the "Vegetables," "Fruits," and "Legumes" groups, "< 250 g" consumption maintains dominance, with peak percentages within the "18.5-25" BMI category. These findings align with studies by Monteiro et al. (21), underscoring the tendency for individuals to adhere to consistent intake levels foods across varying BMI ranges.

In conclusion, our study's comprehensive examination of food group consumption and BMI categories provides valuable insights into dietary patterns. The consistent preference for "< 250 g" consumption within several food groups emphasizes the need for further investigation into underlying factors driving this behavior. These findings contribute to the growing body of knowledge on dietary choices within different weight contexts, highlighting the importance of tailored health interventions that address both weight management and balanced nutrition.

Our study delves into the relationship between health estimation levels and Body Mass Index (BMI) categories, offering insights that parallel the observations of previous research conducted by Hsu al. (22). The data unveil a nuanced interaction between perceived health and weight categorization, highlighting the need to consider both factors when evaluating overall well-being.

Our findings illuminate the interplay between health estimation levels and BMI categories. The patterns observed suggest a tendency for individuals to associate better health with the "18.5-25" BMI range, while also avoiding the extreme ends of the BMI spectrum. These insights contribute to the broader understanding of self-perceived health and its potential impact on weight management behaviors. As future interventions are developed, it is important to recognize the interconnection between perceived health, weight perception, and objective BMI measurements to create effective strategies that promote holistic well-being.

The limits of the study

While this study provides valuable insights into the relationship between dietary habits, physical activity, and Body Mass Index (BMI) among university students, several limitations should be acknowledged. First, the study's cross-sectional design limits the ability to establish causality between the observed behaviors and BMI categories, as it only captures a snapshot of the participants' health at a single point in time. Second, the reliance on self-reported data for dietary intake and physical activity may introduce bias, as participants might overestimate or underestimate their behaviors due to recall issues or social desirability. Additionally, the sample was drawn from a specific population (female students at a single university in Morocco) which may limit the generalizability of the findings to other populations or regions. Finally, the study did not account for other potential confounding factors such as socioeconomic status, stress levels, or genetic predispositions, which could also influence BMI and health behaviors. Future research could address these limitations by employing longitudinal designs, including a more diverse sample, and incorporating objective measures of dietary intake and physical activity.

Conclusion

This study offers valuable insights into the complex interplay between weight status, health estimation, dietary patterns, and physical activity among a group of Moroccan university students. The findings reflect both global trends and unique characteristics within the Moroccan context, shedding light on the state of health and wellness in the country. In the Moroccan context, the findings hold significance for public health initiatives. The recognition of the prevalence of normal weight individuals, coupled with the engagement in physical activity, provides a foundation for targeted strategies to promote healthier lifestyles among young adults. Leveraging the influence of educational institutions, such as universities, to foster health-conscious behaviors is a promising avenue for future interventions.

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