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Prevalence of Obesity in Northwest Morocco: Kénitra Region

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Abstract **Introduction:** Obesity is defined as an excess of body fat resulting in a high cardiovascular risk. Its pandemic development spares no country. This study aims to analyze the trend of nutritional status (obesity and overweight) depending on gender and age in Kénitra region, the Northwest of Morocco, from 10 December 2020 to 25 January 2021. **Methods:** This work focused on a sample of 100 subjects over the age of 18. The obesity assessment was based on Body Mass Index (BMI), the weight and height measurements taken according to criteria recommended by the World Health Organization (WHO). **Results:** The studied parameter is the body mass index (BMI) that revealed to be higher in men than women with 25.94 kg/m^2 and 23.77 kg/m^2, respectively. In addition, the age groups of 50-60 years and 40-50 years represent a maximum BMI (body mass index) respectively with 27.93 kg/m^2 and 27.23 kg/m^2. **Conclusion:** The results of our study show that obesity affects men more than women and specifically the age groups between 40 and 60 years, which requires an adequate strategy to fight obesity in this sample population.

Keywords Obesity, BMI, Prevalence, Kénitra, Morocco

1. Introduction

Obesity has been on the rise worldwide. According to the WHO, 13% of adults aged 18 years and older were obese and 39% were overweight [1]. In addition, obesity is a chronic disease responsible for many complications, sometimes severe and even fatal. One of the etiologies of the development of obesity is lifestyle.

Industrialization resulted in sedentarization which led to a reduction of the level of physical activity, especially in industrialized countries [2].

Obesity has become a significant public health problem globally. Its growing prevalence and its numerous medical, psychological and socio-economic consequences affect all countries, all social classes, and all age groups [3].

Although the nutritional situation has improved in recent years in Morocco, there is an epidemiological and nutritional transition resulting in a double burden of nutritional disorders related to globalization, urbanization, demography, and changes in lifestyles and diet [4].

The objective of our study is to find the impact of sex on obesity on the one hand and the impact of age on obesity on the other hand on the chosen sample.

2. Material and Method

2.1. Study Medium and Sample

This cross-sectional study was carried out in Kénitra, from December 2020 to January 2021. We adopted the precautionary measures during the covid-19 pandemic by

the Ministry of Health and WHO. The study was carried out on 100 individuals with a balanced sex ratio (50% of women and 50% of men) after the exclusion of cases which did not correspond to the desired criteria and cases which refused to participate in this study, and the cases aged 18 years old to 60 years old, excluding pregnant women and the handicapped people. In each sample of 50% of women and 50% of men respondents are randomly selected in Kénitra, a city in Morocco.

2.2. Measurements and Anthropometric Indices

Weight and height measurements were taken according to the criteria recommended by the World Health Organization (WHO) [5]. An electronic scale, Terraillon, was mostly used to obtain the weight within an accuracy of 0.1 kg, and a height rod locally made with an accuracy of 0.1 cm used to measure the height. The people were weighed (weight in kg) and measured (height in m) with slightly light clothing and without shoes. The assessment of obesity based on the Body Mass Index (BMI) (kg / m2) (Table 1) refers to WHO.

Table 1. Meaning of BMI according to WHO criteria

BMI (kg/m^2)	Indicator	Risk of associated morbidity
<18.50	Thinness	Low
18.50-24.99	Normale corpulence	Intermediary
25.00-29.99	Overweight	increased
>30	Obesity	Massive

2.3. Statistical Analysis

Results expressed as means ± standard deviation or frequency (percentage). Data entered and analyzed by Statistical Package for Social Science SPSS 17.5 and SAS 9.3 for DUNCAN test. The correlation between BMI and age was assessed by Pearson test and the means based on the Student's T-test. Statistical tests are considered significant if the p-value <0.05.

3. Results

3.1. Relationship between Obesity and Specific Parameters

The statistical results obtained show that there is a significant difference between the two sexes, noting that women have a normal BMI (18.5 <23.77 <24.99) unlike men who suffer from a high BMI, which corresponds to an overweight (25 <25.94 <29.99). Table 2 shows a significant difference in BMI between women (23.77 ± 4.59) and men (25.94 ± 3.84) (P = 0.012).

Table 2. Comparison of BMI by Gender

Gender	Workforce (N; kg/m^2)	BMI (Mean±Standar deviation)	student test
Women	(N=050; 50 kg/m^2)	23,77±4,59	*P*=0,012*
Men	(N=050; 50 kg/m^2)	25,94±3,84	
Total	(N=100; 100 kg/m^2)	24,86±4,22	

*Significant difference

3.2 Relationships between Obesity and Age Groups

The mean BMI value is 24.26 kg/m^2 for all age studied groups. The 50 to 60 age group is overweight, and it is statistically associated between the age groups and corpulence (p = 0.000) and the study was based on the Persean test.

Table 3. The prevalence of obesity by age group

		BMI (kg/m^2)					Persean test
Age (years)	N	<18,5	18,5-25	25-30	30-35	>35	
<20	21	17,13	22,17	26,50	0,00	0,00	P= 0,000*
20-29	34	11,19	22,34	27,59	31,79	35,88	
30-39	9	0,00	22,46	26,52	30,02	0,00	
40-50	15	0,00	23,56	27,03	32,03	0,00	
50-60	21	0,00	21,47	27,19	31,64	36,94	

*Significant correlation between age and BMI

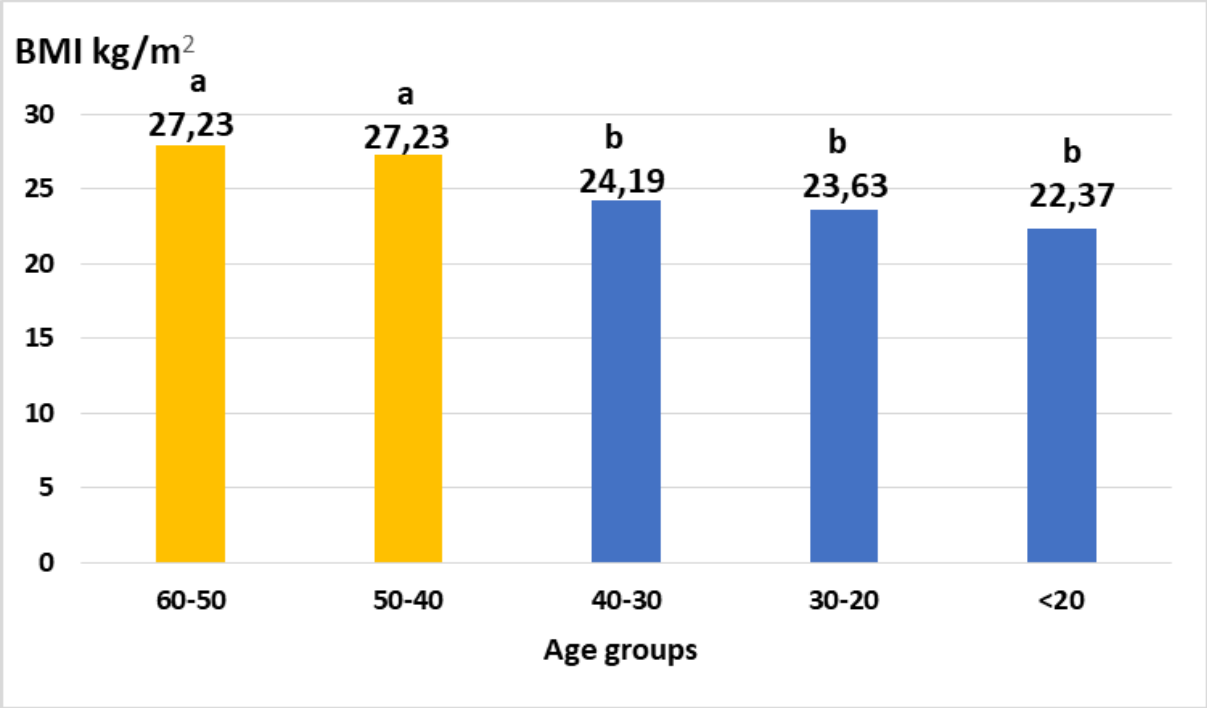

Figure 1. Average distribution of BMI by age group

The correlation coefficient between age and BMI was significant (p=0,000), which indicates that there is a strong correlation between the two parameters.

The Duncan test (Fig. 1) confirmed the results obtained by the Persean test (Tab. 3). The same test revealed two groups a and b, and we remarked that the age groups 50-40 and 60-50 are in group (a) with a maximum BMI value exceeding 27 kg/m^2 (overweight), followed by the age groups 40-30, 30-20 and <20 in group (b) with a BMI between 22,37 and 24.19 kg/m^2 (normal weight).

4. Discussion

The WHO (World Health Organization) in 2003 indicated that obesity is qualified as an international pandemic. Obesity is defined as an excess of fat mass with somatic, psychological, and social consequences which have an impact on the quality of life [6].

The obesity was established as a cardiovascular risk factor associated with pathologies such as diabetes, psychological disorders, bone, joint damage, respiratory disorders, and certain cancers [7, 8].

In our study, the sample consists of 100 individuals, 50 women (50%) and 50 men (50%). The research shows the coexistence, in Kénitra (Morocco) population, of higher obesity and overweight in men than women. Our results are similar to another study in France in 2016, which presents a prevalence of overweight with 41.0% in men and 25.3% in women [9].

Women significantly have a more normal weight than men. At the same time, the prevalence of obesity and overweight is much higher among men due to the decrease in physical activities and distantial work at home (remote work) instead of moving to the work premises during the confinement period [10]. These trends, reminiscent of the results of many previous studies, explain that this difference is due to the importance of muscle and bone mass in men. The width and length of the bones of men are higher than those of women and the muscle mass is 30% less in a woman compared to a man of the same height and weight as well as the size of the liver of women is 20% less than that of men, which reduces the storage of muscle glycogen and consequently transforms it into reserve fat [11, 12, 13, 14].

Indeed, during this period of confinement imposed by the covid-19 pandemic, we noticed that women were physically more active than men because of the household tasks while men, according to a Moroccan study [15], were reported to have a very limited physical activity which increased the level sedentary time.

Likewise, we noted that the BMI is much higher in the elderly than in the young, and this prevalence increases with age. Furthermore, young people are more active than the elderly. The results are similar to Eastern Morocco in 2014 and France in 2015, which indicates that BMI in adults is higher than that in children [16, 17, 18].

5. Conclusions

Our result revealed that older people are more likely to be obese compared to younger people. Moreover, our results showed that there is a relationship between gender

and obesity which shows that age and gender have an impact on obesity. Our study suggests the need for an integrating strategy to reduce the prevalence of obesity, including physical activity and knowledge about obesity within the population of the Kenitra region.

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