Research Article

Obesity and Eating Habits among Adult Population in Constantine

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ABSTRACT

Prevalence of obesity is particularly high in some industrialized countries, also increasing in developing countries. In Algeria as in countries in nutritional transition, overweight and obesity are increasing. Obesity results from an energy imbalance caused by changes in eating habits, mainly in urban areas. Yet no regime has now provided an effective and lasting solution to obesity problems. Everything suggests that mastery of overweight requires the simultaneous consideration of the quantity but also the quality of our food. This article examines rates of overweight and obesity and food consumption of Constantine adults aged 18 years and older. We studied the prevalence of obesity in a sample of 1143 adults Constantine. Body mass index is calculated in 2010-2011, rates of overweight and obesity in adults are high. It shows that the prevalence of obesity is 30.9%. Approximately 64.4% of obese individuals have at least two risk factors for cardiovascular diseases (CVD). The nutritional profile of overweight patients, established through a food survey, is characterized by excessive caloric intake, 82.8% of the subjects consume more than 3 meals per day. The excess calories are consumed as snacks and come from fatty and sugary foods. According to BMI, 84.2% of obese eat more than 3 meals a day compared to non-obese. There is little difference in quality between the eating habits of obese and non-obese. Nevertheless the first appear to be the most likely to consume the fat (p=0.001) and chicken (p=0.01) at least two times per week and cakes (p=0.05) at least three times per week. Obese appear to be the most likely to consume the fat and sugary drinks. In view of these results, obesity and related diseases in Constantine is high and can represent in the near future a serious public health problem.

Keywords: Constantine, prevalence, obesity, physical activity, diet.

INTRODUCTION

Obesity considered one of the most important nutritional disorders, has now reached alarming levels both in industrialized countries than in developing countries[1]. Despite the few studies that have looked at obesity in Algeria, the resulting information allows us to see that the prevalence of obesity and overweight are increasing rapidly and they are still more pronounced in urban areas and among women[2] . This increase is part of a global phenomenon that the World Health Organization has described as an epidemic[1]. Obesity is recognized as a risk factor for many metabolic complications significantly decrease life expectancy or seriously affects its quality. Obesity and diseases associated progressing rapidly in middle-income countries such as the Maghreb countries. This increase is related to the nutrition transition (changes in diet and physical activity) and deep technical and societal changes[3]. Although the causes of obesity are complex, overweight is ultimately determined by the difference between the energy from food and beverages consumed and energy expenditure related to basal metabolism and in daily physical activities. However, other factors, genetic and environmental can influence daily energy and daily energy expenditure[4]. Obesity caused by changing eating habits has become a real public health problem in some countries, especially those who have abandoned their traditional diet in favor of more high-fat and high-sugar foods. In Algeria, people move from a traditional diet to processed foods. Knowing before, Algerians food was based much more on grains, vegetables and some dairy products. In Algeria, obesity is being recognized today as a major public health problem. Indeed the two studies that exist show that the prevalence of obesity is increasing rapidly, especially in women. Nationally, 18% of urban women were obese in 1995[2]. This prevalence does not reflect regional differences in geographical, economic, ethnic, cultural and food availability. It is therefore important to determine the prevalence of obesity in different regions in Algeria and to identify the factors that determine its prevalence.

The aim of this work is to assess the nutritional status of adults Constantine, to determine the prevalence of obesity in relation to food intake. And its relationship with certain risk factors for cardiovascular disease on the one hand and with the types of eating behavior on the other. In order to contribute to the development of obesity prevention strategies and associated diseases adapted to the context of nutritional transition.

MATERIALS AND METHODS

Population and Sample

We performed a descriptive cross-sectional cluster sample survey which was conducted in 2010-2011 among a representative sample of adults. So the target population was all the older Constantine adults. The inclusion criteria was subjects of both sexes, Constantine residents, aged 18 and more and present on the day of the survey. Exclusion criteria was, unwilling subjects,

incomplete questionnaire, sick and pregnant women. The study was conducted in the city of Constantine in northeastern Algeria, is located 439 km far from the capital Algiers. Formerly called Cirta, it was the capital of the Roman province of Numidia. It was destroyed in 311 but was rebuilt by Constantine the Great and given his name. Constantine It is considered as the third largest city of Algeria in terms of population. The resident population of the city of Constantine was 448374 inhabitants. The adult population aged 18 and more is 340428 [5].

All patients enrolled were present throughout the study period that spanned the months of November 2010 to June 2011.The sampling strategy was developed and implemented in collaboration with the National Statistics Office of Constantine (ONS). It is a two-stage random sampling; first degree the survey unit is the district and second level unit is the ordinary household, whatever its size. The sample was made taking into account the geographical division of the municipality into 10 distinct areas by population density[5]. Depending on the size of each sector, it has been calculated a number of districts to the sample. In each sector 1 to 3 districts were drawn respecting the quota for each area that is to say a total of 30 districts have been identified and defined geographically. Twenty households in each district have been drawn. Two people in each household aged 18 and over were interviewed. A total of 1200 people aged 18 years and more were surveyed.

Data were collected by a trained personal meeting at the home of the respondents. For about recruiting, anthropometric measurements (weight, height, waist circumference) are made. Blood samples are taken at the elbow, in heparinized tubes, on fasting subjects, intended for a lipid profile and for the determination of blood glucose. Samples are taken at the laboratory of the public hospital in the town of Constantine. Body mass index (BMI, kg/m2) was used to study obesity. The World Health Organization (WHO) defines underweight, normal weight, overweight and obesity as BMI<18.5, 18.5<BMI<25, 25<BMI<30 and BMI>30, respectively[1]. We speak of abdominal obesity when waist circumference >88cm[6].

In addition, data collection is carried out through an interview, based on a validated questionnaire; including different aspects, namely, personal and family history, the socio- economic context and educational, psychological status and other factors such as the notion of smoking, assessment of physical activity and a food survey. The dietary survey precise food rhythms and research the factors increasing the caloric density of the diet (kcal/g), excess dietary fat (butter, cheese, cooking fats, fried ...) and excess of sugary drinks (sodas).But given the complexity of determining the actual quantitative consumption of individuals, only the types of food and consumption frequency for the month preceding the survey were defined. Food questionnaire validated and adapted to Constantine population was used[7].

Statistical analysis

Data analysis was carried out using the following software: SPSSv18 and Microsoft Excel 2007. ANOVA was used to compare means and Pearson test adjusted or not to age for the comparison of the percentages and used to calculate the correlation coefficient between the variables studied. A multivariate binary logistic regression was then performed to determine the relationship between each variable and obesity, independently of other variables. The variables used in the model are the variables associated with overweight and obesity (BMI≥25) with $p<0.2$ in univariate analysis[8]. For an individual to be taken into account in the multivariate analysis, it must have filled the information about all the variables involved in the model construction.

RESULTS AND DISCUSSION

Epidemiological Profile

From the 600 households initially selected, a total of 1200 subjects would be recruited in this study, but 57 (4.7%) questionnaires are incomplete. In the end the final sample consisted of about 1143 (response rate: 95.2%), with a sex ratio M/W of 0.70. Women with more than four children represent 48.2% of the effective. The average age was 41.3 with a range from 18 to 95 years. The average age of male respondents was 38.3 years and for women 43.5 years. The characteristics of the sample according to the gender are shown in table 1.

Table 1: Main anthropometric variables

Variables	Total population			Obese population		
	Men	Women	p	Men	Women	p
	Mean			Mean		
Weight (kg)	74.9	72.9	0.04	95.7	88.1	$<10^{-3}$
Size (cm)	170.7	160.2	$<10^{-3}$	169.1	159.1	$<10^{-3}$
BMI (kg/m²)	25.6	28.4	$<10^{-3}$	33.3	34.6	0.001
Waist circumference (cm)	93.1	94.2	$<10^{-3}$	110.9	106.0	$<10^{-3}$

BMI: body mass index, * Significant at $p < 0.05$

The prevalence of overweight and obesity is estimated to be 32.5% and 30.9% respectively. The frequency of different class of BMI and abdominal obesity according to IDF by sex is shown in the table 2.

Table 2: Frequency of class of BMI by gender

	Men%	Women%	p
thinness	5.2	3.1	0.3
Normal	41.8	25.9	0.01
Overweight	32.2	32.5	$<10^{-3}$
Obesity	20.8	38.3	$<10^{-3}$
Common obesity	15.1	23.9	$<10^{-3}$
Severe obesity	3.6	9.8	$<10^{-3}$
Morbid obesity	1.7	4.5	$<10^{-3}$
Abdominal obesity (IDF)	46.4	83.5	$<10^{-3}$

Overall, the prevalence of obesity increased significantly ($p<10^{-3}$) with age between 18 and 64 years (18.1% to 41.9%) and fall in the age group 65 and over (30.5%). The age group most affected is 55-64 years. The distribution by sex and age indicates that the two most common age group affected by obesity among men are 35-44 years (30.4%) and 55-64 years (22.5%). 43.3% of obese women are aged 45-54 years (Fig. 1).

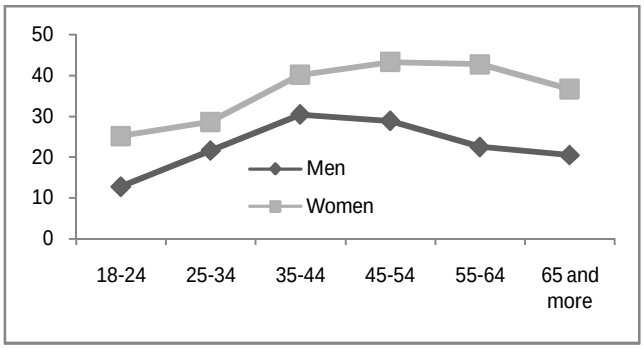

Figure 1: The frequency of total obesity by sex and age

The investigation of educational level reveals that only 24.1% of the population has a higher level and 13.4% are illiterates. The frequency of illiterate women is increased compared to that of men (19.7% vs 4.4% $p<0.005$). In addition, nearly 69% o the population is inactive and does not have a stable income. This is significantly dominant ($p<10^{-3}$) in women (78.5%). The practice of physical activity was noted in only 13% of patients, most of them are male, however, it is regular only in 2.49%, a significant difference was observed by sex (p=0.01). Time spent in front of a screen as the TV, video games or a computer is long lasting (>2 hours) in 72.8% of the population. The frequency of sedentary is estimated at 67.2% of men, it seems even more important for women (76.7%). Smoking status is noted especially for men, the prevalence of smoking was 21.2%, of which 18.3% are daily smokers and 2.9% of occasional smokers. Ex-smokers are 16.3% and 62.5% say they have never smoked. For men 31.7% of smokers aged 25-34, 22.5% were 45-54 and 12.5% are over 65 years old.

The results of the logistic regression analysis show that after adjustment for socioeconomic variables and lifestyle, the prevalence of obesity is higher among adults in the older age group than among the younger age group. Rate of obesity is 1.7 times higher among married. Compared to the reference category, the significantly higher rate of obesity is observed among housewives (OR=1.6). The prevalence of obesity is higher among adults who have a primary level of education (OR=1.6 women, OR=3.3 men). Among the studied lifestyle, physical inactivity is retained as a variable significantly associated with obesity among women (adjusted OR=2.6) and men (OR=2.9).

Cardiovascular disease risk factors

The risk factors for CVD are the elements of the metabolic syndrome, according to the new harmonized definition[6], which is based on the presence of at least three factors. Approximately 49.4% of adults have at least two risk factors for CVD, 46.8% men vs 50.5% women. Approximately 64.4% of obese have at least two risk factors for CVD (Tab. 3).

Table 3: Frequency of cardiovascular disease risk factors in obese individuals, by sex

Variables	Men	Women	p
Hyperglycemia	44.4	31.9	0.3
HypoHDLemia	44.4	77.3	$<10^{-3}$
Hypertriglyceridemia	33.3	46.2	0.3
Hypertension	16.1	34.2	0.03
Abdominal obesity	78.1	98.9	0.08
At least two risk factors of CVD	70.4	63.0	0.5

Nutritional profile

The nutritional profile of overweight patients, established through a food survey, is characterized by excessive caloric intake, 82.8% of the subjects surveyed consume more than 3 meals per day. In addition, the survey reveals that the distribution of energy nutrients in the daily caloric intake is unbalanced in favor of excess fat consumption in both sexes. According to BMI 84.2% of obese eat more than 3 meals a day compared to non-obese.

Food survey showed low consumption of fish for this population, since 26.2% use less than once a week this commodity. As against 54.6% consume eggs at least four times a week, 52.5% consume chicken at least twice a week and 12.6% of the red meat. 51.6% of respondents reported eating fresh vegetables at least twice a week and 86.5% of the bread at least five times a week. Concerning starchy there is insufficient consumption. Nearly half of the sample (44.6%) consumes fried food 1 to 3 times per week. 18.6% of respondents consume sugary drinks daily and 42.8% of sugary foods 1-4 times a week.

Overall, table 4 shows that there is little difference in quality between the eating habits of obese and non-obese. Nevertheless the first appear to be the most likely to consume the fat (p=0.001) and chickens (p=0.01) at least two times per week and cakes (p=0.05) at least

three times per week. Obese appear to be the most likely to consume the fat and sugary drinks.

Table 4: Food Habits Frequency

Variables	Non obeses	Obeses %	p
Fish	10	8.2	0.1
Eggs	11.3	10.2	0.1
Chiken	16.1	36.4	0.001
Red meat	4.1	8.5	0.1
Fresh vegetables	17.3	14.4	0.5
Bread	26.9	59.5	$<10^{-3}$
Grain-Starchy	24.1	28.4	0.8
Fried and greasy	8.5	42.8	$<10^{-3}$
sugary drinks	5.5	22.8	0.001
sweet products	5.4	27.3	$<10^{-3}$
dairy	27.7	29.8	0.6
salted taste	6.2	7.4	0.3
bold taste	4.3	12.9	0.4
sweet taste	13.0	15.4	0.5
Salted and boldtaste	12.3	16.7	0.1
Fat-sweet taste	12.0	16.0	0.1

Non obèses (18,5<IMC<25) Obèses (IMC>30)

The daily intake of fruits / vegetables and dairy products are insufficient with respect to consumer guidelines of the National Health and Nutrition Program (PNNS).This under consumption concern 89% of the sample for dairy products, 32% do not consume every day. In terms of knowledge, respondents feel it is necessary to consume an average of 2 fruits / vegetables per day to be healthy; only 2% is estimated to eat at least 5 fruits or vegetables per day, corresponding to PNNS guidelines. For the group of dairy products 28.2% think it takes at least 3 dairy products per day (the daily average frequency is estimated at 2).

Poorer perceived health was observed in obese, about a quarter of men and women with obesity report having an unbalanced diet. In the presence of overweight, there is no significant difference in the perception of a balanced diet compared to those without overweight. A balanced diet is perceived differently depending on the age of the subjects with young people reporting more frequently poor diet. Finally, eating disorders were seen in more than three quarters of the patients (78.6%), they are dominated by snacking (63.10%) and compulsive eating (24.6%). However the Night eating syndrome, Binge eating syndrome and bingeing are rarer, the respective frequencies are 13.17%, 9.27% and 5%. Snacking, compulsive eating and the night eating syndrome and binge eating syndrome appear to be more common in obese.

Frequency of meals: practices and knowledge

The Algerian traditional model is characterized by daily feeding rhythm based on three main meals, which can be added a snack. Breakfast is the most frequently missed meals in 8.2% of cases, especially among young people: 18% of 18-34 year olds, 11.3% of 35-54 year olds and 5.2% of those 55 and more. However, respondents recognize the equal importance of the 3 main meals of the day. On the sample of people reporting taking breakfast almost 48% take a drink as a meal. Only 10% take a full breakfast namely dairy product + starch. Few people take a fruit in the morning. Therefore, only 2% of the sample had a great breakfast, which consists of a starch, a dairy, fruit and a drink. However, unlike the practice, all the respondents (77%) restore the definition of a perfect breakfast. The house is the privileged place of meals, fast food is popular for lunch in 19.6% of cases.

CONCLUSION

The use of body mass index (BMI) for the diagnosis of overweight in a representative sample of the population of Constantine indicates an overall prevalence of overweight of 63.4% in favor of a slight female predominance. In addition, the prevalence of overweight increased significantly (p=0.01) with age group between 18 and 50 years and falling in the age group 65years and more. The present study showed that the prevalence of obesity in Constantine is high compared to the European average[9-10] and to the Maghreb countries. Morocco, 13.3% of the population is obese[3], Tunisia obesity affects 15% of the population[11]. However, these data are difficult to compare because of the heterogeneity of references and their possible evolution. In this study, the prevalence of obesity is always higher among women as compared to men. The same trends are observed in Tunisia[11], Morocco[3], France[10], the United States and Canada[12]. Overall prevalence increases significantly with age, women aged 45 to 54 and 55 to 64 years are most affected by obesity. This significant association between age and obesity among women illustrates the concept of biological predisposition of women to obesity demonstrated by several studies[3].

This study shows that the increase is not limited to BMI, waist increases with age regardless of sex. Abdominal obesity according to IDF is more common in women (83.4 %). The same characteristics are reported by investigations in other countries[6].The second factor, which is strongly linked to obesity, is the social status. The prevalence of obesity and educational attainment are inversely correlated[3]. This study shows that obesity is higher ($p<10^{-3}$) among illiterate people (49%). Overall, the prevalence of obesity is significantly higher ($p<0.001$) among inactive adults (37.1%).

Metabolic abnormalities are frequent in obese, the majority of adults have at least two metabolic complications, of which 64.4% are obese and 47.4% are overweight. Hatira A[13] found that over two-thirds of obese (67%) had at least one metabolic complication.

Obesity results from an energy imbalance caused by changes in eating habits, mainly in urban areas, high-calorie foods are consumed frequently[14]. Snacking

between meals and non-compliance within two hours between dinner and bedtime are causes of taking weight[14]. Constantine adults move from a traditional diet to processed foods-based diet. Therefore, it generally results in lower micronutrient intakes which lead to an increase in the prevalence of obesity and other chronic diseases related to increased consumption of calories as carbohydrate and fat. Add to this a sedentary lifestyle associated with urbanization[14]. In this study the dietary survey showed low consumption of fish for this population. This can be explained by the low availability of this commodity view Constantine is not coastal. The sample eating habits are characterized by fairly frequent consumption of eggs, fresh vegetables and bread. The bread seems to be the staple food that provides the most significant contribution to energy. The survey found little difference in quality between the eating habits of obese and non-obese, as shown by other authors[14]. This may suggest that the differences appear in terms of quantities consumed. However obese appear much more frequently consume sugary foods and fat. This could be related to socioeconomic status, fatty and sugary food, cheap and readily available, competing with traditional food, more expensive and takes longer to prepare. Poor people are at great risk because of their perception towards obesity, still considered a sign of strength, power, good health and prosperity[4].

The determinants of obesity are environmental, behavioral and biological certainly corresponding to nutritional, genetic and psychological[4]. Thus it has been reported that the prevalence of obesity is increasing among the disadvantaged people and those with psychological problems[4]. This study reports that 26.5% of obese have symptoms of stress. Some authors have raised the effect of stress that can occur, for high blood pressure; hyperlipidemia and obesity[4]. Some eating disorders are common in obesity but neither mandatory nor specific. However, in this study the issue deserves further to better define certain parameters.

In view of these results, obesity and related diseases in Constantine is high and can represent in the near future a serious public health problem. This increase in the prevalence of obesity may be related to the nutritional transition and effects of stress. Diet is a factor that the possibilities of intervention exist in terms of public health and prevention[1]. According to nutrition experts, losing weight involves acting on the nutritional balance. It is moderately reducing daily calorie intake, and gradually increase the level of physical activity[1]. Thus, a calorie deficit is created and the body draws on reserves, the weight loss process is triggered. Health systems in our country are not prepared for this development whose health and economic consequences are enormous. The results of this survey underscore the need for awareness of the problem of obesity and the active involvement of public authorities and the media in the prevention of obesity. Intervention that will now have is less expensive since the beginning of the problem. Given the level of education and socioeconomic still being improved and the social norms that value overweight, getting preventive messages, promotes the adoption of healthy eating and regular physical activity, will difficult but essential.

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