

Epidemiological approach to overweight in the town of Ain Fakroun in 2012 (east of Algeria)

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Abstract: Objective: The ultimate objective of this study is to help discern the epidemiological and clinical profile and factors associated with the risk of overweight and obesity, through a representative sample of a population, overweight, from a urban agglomeration located in east of Algeria. Methods: The present descriptive epidemiological study, realized on a representative sample of the adult population, of both sexes, aged 18 to 75 years, the city of Ain Fakroun. Thus, of the 64 districts of the municipality of Ain Fakroun, 12 urban districts are drawn. In each household 1-4 between 18 and 75 people were randomly. In total 273 households corresponding to a set of 1091 people surveyed. For recruiting, the anthropometric measurements are made, arterial pressures, blood samples are taken, anticoagulants in heparinized tubes, on fasting subjects, intended for a lipid profile and blood glucose. In addition, data collections were carried out through an interview. Results: The data results are shown that; more than 1/3 of the population is excess weight ($BMI > 25 \text{ kg/m}^2$). The prevalence increased significantly ($p = 0.0014$) among young adults and then gradually decreases with age and fall markedly among seniors over 60 years. The frequency of overweight patients is 36.41%; it is relatively identical in both sexes. However, the proportion of obese is predominant (60.98%) with obesity class I predominant in both sexes while severe obesity ($BMI \geq 40 \text{ kg/m}^2$) is more common in women. The result on the association between BMI and vascular risk factors reinforce conventional notions. Conclusion: The descriptive point of view at men as well at women, the overweight seems due to social, biological and environmental factors.

Keywords: Epidemiology, Nutrition, Adults

1. Introduction

The human obesity has been recognized as a disease by the World Health Organization in 1997, since she became the first non-infectious disease in history. This is an epidemic that affects both industrialized countries those developing countries. It is a public health problem that affects all age groups and all professions. WHO is currently up its prevention and care as a priority in the field of nutritional pathology [7].

In fact, obesity is currently experiencing a real epidemic outbreak affecting electively countries with economies in transition such as Algeria. The projections for the coming

decades are alarming. In addition, obesity is associated with much happy intricate comorbidity that increase the risk of mortality, shorter life expectancy, hinders quality of life and involves considerable expense to the company.

The prevalence of obesity varies depending on the criteria and standards adopted and used for diagnosis, age, gender, race and cultural and socio-economic level. Risk factors are now well identified, they involve non modifiable biological factors in this case, age, sex, heredity and ethnicity, and modifiable environmental factors dominated by nutritional factors, physical inactivity, stress, social status, alcohol and artificial feeding.

Very few epidemiological studies have examined the

prevalence of obesity in Algeria. Demographically, the Algerian population is composed mostly of young adults (20-59 years represent 41.5%) and the dramatic increase in life expectancy over the past 40 years announced a gradual aging of this population and an increase in the weight of chronic diseases [12].

Thus, as in many countries, the situation of overweight and obesity in our country is disturbing. In fact, national health survey conducted in 2005 revealed that 55.90% of people aged 35-70 years were overweight and 21.24% were obese [11]. Today, with the advent of industrialization, bank loans and medical care, the trend is towards an alarming development that plagues following the drastic change in the lifestyle found among citizens, and city-dwellers seem to be the major cause.

In this context, this study's main objective is to help discern the epidemiological and clinical profile and factors associated with the risk of overweight and obesity, through a representative sample of a population, overweight, from a urban agglomeration located in east of Algeria.

2. Material and Methods

2.1. Population and Sample

We performed a partial cross-sectional descriptive epidemiological study on a representative sample of the adult population, of both sexes, aged 18 to 75 years, the city of Ain Fakroun situated southeast of Algeria, in the province of Oum El Bouaghi. All patients enrolled were present throughout the study period that spanned the months of March to June of 2012.

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.

Thus, of the 64 districts of the municipality of Ain Fakroun, 12 urban districts are drawn. In each household 1-4 between 18 and 75 people were randomly. In total 273 households corresponding to a set of 1091 people surveyed. Patients with overweight ie, overweight individuals (BMI between 25 and 29.9 kg / m²) and obese individuals (BMI ≥ 30 kg / m²) were recruited for this study.

For about recruiting, anthropometric measurements (weight, height, waist circumference) are made, Blood samples are taken at the elbow, anticoagulants in heparinized tubes, on fasting subjects, intended for a lipid profile (total cholesterol, triglyceride, HDL-cholesterol and LDL-cholesterol) and for the determination of blood glucose. Samples are taken at the laboratory of the public hospital in the town of Ain Fakroun.

In addition, data collection is carried out through an interview, based on a validated questionnaire; including different aspects, namely, a food survey, assessment of physical activity, personal and family history, the socio-

economic context and educational, psychological status and other factors such as the number of pregnancies for women or the notion of smoking and alcohol, pain in the legs when walking.

3. Results

3.1. Epidemiological Profile

Compared to the scale of reference values [14], BMI of patients surveyed in 1091 revealed that 401 individuals are overweight, BMI ≥ 25 kg / m². An overall prevalence is about 36.75% with a female predominance of 48.92%. In contrast, the prevalence among men is 21.60%, is a sex ratio in the order of 0.35 (Table 1).

Thus, we note that nearly one in two adult woman is overweight (18.18%) or obese (30.74%). The overall prevalence of overweight and obesity are estimated at 13.38% and 23.37%.

Table 1. Prevalence of excess weight by sex

Sex	Effective	Age	Prevalence (%)		
			Excess weight BMI ≥ 25kg/m ²	Overweight 25 ≤ BMI ≤ 29.9	Obesity BMI ≥ 30 kg/m ²
men	486	18-75	21,60	7.41	14.20
Woman	605	18-75	48,92	18.18	30.74
Total	1091		36,75	13.38	23.37

The distribution by sex and age, reported in Fig. 1 indicates that in both men and women, overweight affects more particularly the younger individuals. The age group 29-39 years and 40-50 years more than patients are electively affected by overweight. The prevalence recorded for this age group was respectively 31.43% and 30.48% men and 29.39% and 26.35% in women. As the global registered prevalence is 29.92% for the age group 29-39 years and 27.43% for 40-50 years. It remains relatively high in young patients, 20.2% for 18-28 years. In contrast, the prevalence is much lower in the elderly, there is 5.49% for the age group 62-72 years and only 0.5% for more than 72 years.



Figure 1. Distribution of overweight patients by sex and age

The main measures of anthropometric variables, shown in (Table 2), reveal that the average weight of the general population recruited for this study is 85.68 ± 14.58 kg and the average size of 163.51 ± 8.54 cm. The average BMI calculated in relation to this population is estimated at 31.98 ± 4.51 kg / m² with an average waist circumference 107.15 ± 10.42 cm.

Compared against the reference weight as defined by WHO [4], and data reported indicate that patients are

majorities obese (BMI ≥ 30 kg / m²). The central or visceral obesity defined according to the IDF classification, a waist circumference greater than or equal to 80 cm size in women and 94 cm for men Europeans [2] and / or a threshold in the American people, recommended by the U.S. NCEP ATP III, greater than or equal to 88 cm in women and 102 cm for men [13], is characterized by its frequency among both men (65.70%) than females (62.90%) and the classification according to IDF.

Table 2. Main anthropometric variables

variables	men Mean \pm SEE	Women Mean \pm SEE	Total Sample Mean \pm SEE
Weight (kg)	96.58 \pm 14.06	81.82 \pm 12.70	85.68 \pm 14.58
Size (cm)	174.13 \pm 6.36	159.74 \pm 5.50	163.51 \pm 8.54
BMI (kg/m ²)	31.80 \pm 3.90	32.04 \pm 4.72	31.98 \pm 4.51*
Waist circumference (cm)	108.61 \pm 9.47	106.63 \pm 10.70	107.15 \pm 10.42

BMI: body mass index, SEE, Standard error of estimate, * Significant at $p < 0, 05$.

3.2. Socio-Cultural and Economic Level

The proportion of people overweight, married is about 70.57%. A significant predominance ($p = 0.025$) was found between sex and marital status. Women with more than four children represent 36.22% of the effective.

The investigation of educational level reveals that only 21.20% of the population has a higher level while study, 25.70% are illiterates. A highly significant difference ($p < 0.005$) was found between sex and educational level. The frequency of illiterate women is increased compared to that of men, it is 29.70% versus 14.30%.

In addition, nearly 50% of the population is inactive and does not have a stable income. This is significantly dominant ($p < 0.001$) in women (66.60%).

3.3. Profile Clinicobiological

Patient assignments are overweight according to the classes of obesity and sex, reported in Fig. 2, indicates that more than 30% of patients are overweight with a relatively similar prevalence in both sexes; it is of the order of 34.3% in men and 37.1% among women.

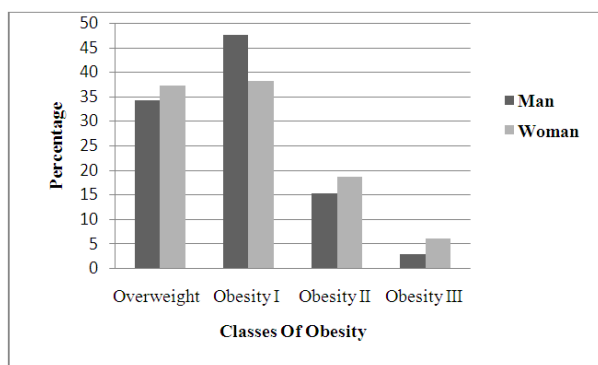


Figure 2. Distribution of patients by sex according to obesity class

In addition, nearly 60% of obese patients with obesity class I ($30 \leq \text{BMI} < 35$ kg / m²) predominant in both sexes, it is partially higher among men (47.6%) than women (38.2%). Morbid obesity class III (BMI ≥ 40 kg / m²) appears to be relatively infrequent; it affects more women than men with respective frequencies of the order of 6.1% and 2.9%. The prevalence of obesity class II is almost similar in both sexes; it is 15.2% for males and 18.6% for women.

The assay parameters were performed on all patients enrolled and compared to the usual standard values [10]. According to the results, shown in (Table 3), on average more than 24% of patients with hypertension, 16.03% showed hypercholesterolemia, hyperglycemia evoke 21.21% and 41.51% unveiled hypertriglyceridemia.

With the exception of hypertension where women seem to be most affected with 27.77% of hypertensive against only 10.52% for men, the results indicate a more dominant trend among men to develop metabolic complications. Indeed, the average rate of male individuals beyond the standard norms is higher than that of women, 19.23% versus 15% in the case of hypercholesterolemia 43.48% versus 14.47% for hyperglycemia and 69.23% versus 32.5% for hypertriglyceridemia.

Table 3. Clinical features of patients overweight by sex

Variables	men (%)	Woman (%)	Total sample (%)
Hypertension	10.52	27.77	24.77
Hypercholesterolemia	19.23	15.00	16.04
Hyperglycemia	43.48	14.47	21.21
Hypertriglyceridemia	69.23	32.50	41.51

3.4. Evolving Profile

The survey of medical history revealed that the evolving profile of patients is characterized by the frequency of complications (27.20%). They are dominated by the metabolic complications (62.72%), mechanical (63.60%), cardiovascular (33%) and respiratory (6.40%).

Cardiovascular disorders (55.56%) and mechanical (69.30%) are more common in women, whereas diabetes (52.63%) and asthma (15.79%) met mainly men Fig. 3.

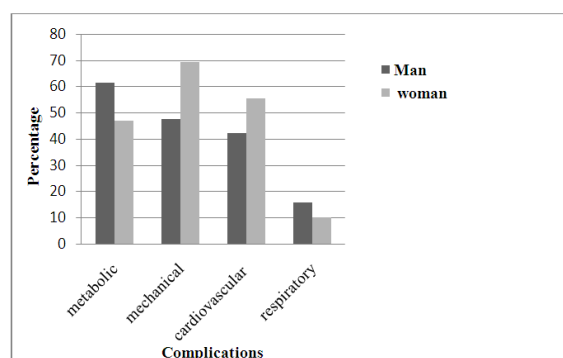


Figure 3. Distribution of patients by sex according complications

3.5. Nutritional Profile

The nutritional profile of overweight patients, established through a food survey, is characterized by excessive caloric intake, 36.15% of the subjects surveyed consume more than 4 meals per day (Table 4).

Table 4. Distribution of patients according to the number of meals eaten per day

Number of meals	men		Woman		Total	
	n	%	n	%	n	%
3 meals	64	60.95	192	64.86	256	63.84
> 4 meals	41	39.04	104	35.13	145	36.15

n = effective

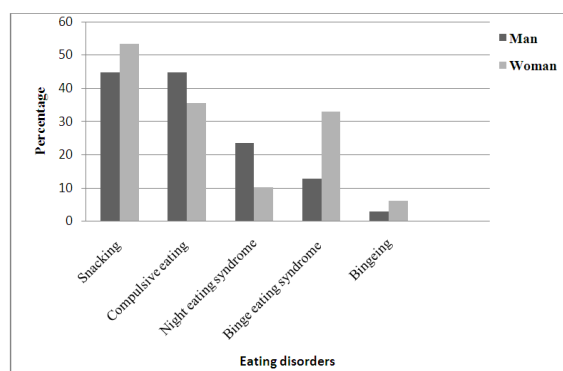


Figure 4. Distribution of patients by sex in the feeding behavior

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. Finally, eating disorders were seen in more than three quarters of

the patients (76.60%), they are dominated by snacking (51.10%) and compulsive eating (37.56%). However the Night eating syndrome, Binge eating syndrome and bingeing are rarer, the respective frequencies are 13.17%, 9.27% and 5%.

The Night eating syndrome and binge eating syndrome appear to be more common in men, whereas bingeing mostly affect women Fig. 4. However, comparison of averages says that there is no significant difference between the two sexes.

3.5. Risk Behaviors and Environmental Factors

Regarding risk behaviors, the survey shows that 79.80% of people suffer from stress. Women appear to be significantly ($p = 0.02$) more affected (86.10%) than men (61.90%). More than 40% of patients report that stress is immediately followed by disorders of eating behavior.

The practice of physical activity was noted in only 12% of patients, most of them are male, however, it is regular only in 3.49%, a significant difference was observed by sex ($p = 0.01$). In addition, time spent in front of a screen as the TV, video games or a computer is long lasting (> 2 hours) in 35.91% of the population. The frequency of sedentary is estimated at 75.23% of men, it seems even more important for women (92.56%).

Smoking status and alcohol concept are noted especially for men, with a frequency of 66.6% among former smokers (29.50%) and current smokers (37.10%). It is about 11.42% for the notion of alcohol with 7.60% of former users and 3.80% are current smokers.

Family history of obesity all combined degrees were observed in 81.30% of overweight patients, with heredity of 1st degree in 55.80% of cases. In addition, nearly 83% of cases, parents have a chronic disease; blood pressure (59.46%), cardiovascular disease (55.85%), diabetes (53.75%) and respiratory complications (29.73%).

4. Discussion

The use of body mass index (BMI) for the respective diagnosis of overweight and obesity in a representative sample of the population of the town of Ain Fakroun in eastern Algeria indicates an overall prevalence of overweight of 36.75% with a sex ratio of 0.35 in favor of a slight female predominance. The overall prevalence of overweight individuals is 13.38%, while obese is estimated at 23.37%.

In addition, the prevalence of overweight increased significantly ($p = 0.0014$) with age group between 18 and 50 years (20.2% to 27.43%) and falling in the age group 60-70 years (5.49%).

Anthropometric measurements in this population indicate that nearly one third of patients are overweight (36.41%) and 2/3 are obese (63.59%). Obesity Class I is predominant in both sexes (47.60% in men and 38.20% women). However, severe obesity is more common in women (6.10% vs. 2.90%). In addition, the frequency of

abdominal obesity according to IDF classification [5] is characterized by its frequency in both sexes; it is 65.70% for males and 62.90% for women.

According to the study realized in 2010 by the National Institute of Public Health [2], in Algeria, the prevalence of overweight, obesity and that of abdominal obesity are higher in women than in men. Overall prevalence increases significantly with age in young adults and fall in the age group 60-70 years. The same characteristics are reported by investigations in Tunisia where the prevalence of pre-obesity and obesity were respectively 24.5% and 14.2% always with a female predominance. Central obesity is very common especially among men (94.6% vs. 87%) [4].

Results on the association between BMI and cardiovascular risk factors show that 57.55% of overweight people receiving treatment for dyslipidemia, 21.21% to 24.77% for diabetes and hypertension. According to Professor Arnaud Basdevant [3]; the prevalence of a combination of three risk factors assessed through treatment, is 12 times higher in the population of subjects with a BMI greater than 30 kg / m² compared to the population with a BMI less than 24.9 kg / m².

The linear regression of the risk of obesity achieved, to examine the role of different factors related to social status, biological and environmental factors, reported in Table 5 indicates that overweight patients is not marked by an age effect. Indeed, young adults aged between 18 and 50 have more pre obese and overweight than average, the overall prevalence observed in this age group is of the order of 77.55%. The risk is also primarily related to education level, waist circumference, medical history, family history, as well as stress. The profession and the notion of tobacco are barely significant.

From a descriptive point of view, in men as in women, overweight seems strongly linked to social, biological and environmental factors.

Table 5. Linear regression of factors related to BMI

factors	Coefficient	P-Value	significant link
Social Statu			
Age	-0,043	0,001453	**
Level of education	-0,667	0,000009	***
Profession	-0,085	0,010714	*
biological Factors			
waist circumference	0,338	0,000000	***
medical antecedents	2,363	0,000003	***
family history	2,436	0,001277	**
environmental Factors			
Stress	1,884	0,008761	**
tobacco	-0,899	0,018628	*
Physical Activity	-1,376	0,001828	**

Abbreviation: * Significant at p <0.05, ** Significant at p <0.01, *** Significant at p <0.005.

5. Conclusion

Individual data obtained from a representative sample of more than 18 years, the population of the town of Ain Fakroun east of Algeria, indicate that more than one third of the population is excess weight (BMI > 25 kg / m²). 36.41% of patients are overweight with a relatively equal frequency in both sexes.

The proportion of obese is 63.59%. Obesity Class I is predominant in both sexes, however, severe obesity (BMI ≥ 40 kg / m²) is more common in women.

In addition, the prevalence of overweight increased significantly (p = 0.0014) among young adults and then gradually decreases with age and decreases significantly among seniors over 60 years.

The increasing prevalence of overweight continues in our country significantly in both men and women. This increase is the result of a radical change in lifestyle found among citizens where food habits observed were marked by a high consumption of fatty and sugary products and low in fruits associated with low-intensity physical activity.

Indeed, in recent years a new trend clearly; it is a more rapid increase in the prevalence of overweight and obesity in young adults and dramatically in women than in men.

The results on the association between BMI level and vascular risk factors reinforce traditional notions. What is striking is the increase in risk factors treated in recent years in our country. This data underscores the relevance of public health concerns and health economics of the World Health Organization.

According to recent studies, the vital risk could be the lowest for a slight overweight (BMI = 27 kg / m²) and the highest for BMI above 30 kg / m². The major risks associated with overweight and obesity, and more to the abdominal distribution assessed by waist fat, are represented by diabetes and cardiovascular disease. Overweight and obesity multiply by 2 and 4 respectively, the prevalence of hypertension, 2 and 3 by the dyslipidemia and 3 and 7 that type 2 diabetes.

This underlines the need for a multidisciplinary management and the urgency of a strategy to cope with the scale of the problem for overweight which is not yet identified in our country, and numbers of elements suggest that the situation is not much different than that prevailing in the country at the same level of development.

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