Prevalence of overweight and obesity Compared to CRP and uricemia in SALE, MOROCCO

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Abstract:

Background/Objectives: The evolution of food consumption and the change in lifestyle has made Morocco, like other developing countries, experiencing a large level of Obesity, which is the principal cause of non-communicable diseases, related to diet that has a high social cost. The main aim of this study was to determine the prevalence of overweight and obesity compared to inflammatory state and uric acid level in a population of SALE city.

Methods/Statistical analysis: Data collection was done using a questionnaire developed and validated locally; including social demographic data, with the measures of anthropometric parameters, All the blood test was measured by Hitachi biochemistry of the PLC 904 using enzymatic methods, All statistical analyzes were performed using SPSS software, Quantitative variables were described using mean, standard deviation (SD) and limits. Categorical variables were described using proportions and percentages. For the comparison of groups, we used the $\chi 2$ test for frequencies and Student's test for means. The confidence interval was adopted $p <0.05$ **Findings**: Obesity and overweight were very common (11.6% and 35% respectively) especially in older people. Study also shows a significant association between High CRP level, Hyperuricemia and Obesity.

Keywords: inflammation, Obesity, Overweight, Nutrition, Uric acid.

I. Introduction

The importance of nutrition in the social and economic development is recognized, and particularly because of its long-term consequences and effects between generations. For centuries, civilizations know that good health begins with a healthy diet and regular physical activity (1). Currently the world is experiencing an epidemiological transition resulting in the decline of infectious diseases and increased storage diseases in a context of rapidly changing socio-economic environment, demographic and food. In developing countries, indicates a nutritional transition, characterized by the coexistence of overweight and obesity and nutritional deficiencies problems (2).

In Morocco, as in all emerging countries, food habits have changed more in the last thirty years than in the previous centuries. New foods were introduced, while others have virtually disappeared from the composition of meals. The nutritional situation of the Moroccan population has improved due to three factors: the country's economic development, improved health services and the development of other sectors such as agriculture, education, agro-industry food and other socio-economic services. However, Morocco knows persistent nutrition problems but also other emerging issues related to globalization, urbanization and changes in living and eating patterns (3). In comparison with the countries of The Eastern Mediterranean Regional office of the World Health organization (EMRO), Morocco is ranked among the countries with early nutrition transition characterized by moderate levels of overweight moderate levels of undernourishment with a high level of Micronutrient deficiencies (4). Morocco, therefore, with regard to developing countries, undergo the consequences of a deviation from the Mediterranean dietary pattern (3).

This transition is characterized by the coexistence within the same social segments or even the same families, different pathologies: obesity malnutrition in adult and young children (3).Obesity which is responsible for the development of diabetes, cardiovascular diseases and certain cancers, contributing to an epidemiological transition. Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health.

II. Materials And Methods

2.1. Study Subjects and Data Collection

This is a descriptive cross-sectional study, conducted from July to September 2015 taking place in the city of SALE North west of MOROCCO. A total of 300 subjects participated in the study which 46.7 % male and 53.3 % female. The choice of the sample was random. Data collection was done using a questionnaire developed and validated locally; including social demographic data, with the measures of anthropometric

parameters, Weight was measured using an electronic scale (variation 600g). The size was measured by the measuring board. Waist circumference was measured at the navel. The Blood pressure was recorded in a sitting position after 15 minute of rest, at two intervals of 5 minutes. These measurements were performed with a standard mercury sphygmomanometer on the right arm, and the average of the two measures was recorded used for comparison. A venous blood sample was taken from each subject while sitting from 7:00 to pm 9:00 after 12-14 hours of fasting. All the blood test was measured by Hitachi biochemistry of the PLC 904 using enzymatic methods, all these acts were performed in the laboratory of medical analysis of prefectural hospital of SALE.

2.2. Clinical Definitions
Body mass index (BMI) is a simple measure of weight relative to the size commonly used to estimate overweight and obesity in adults. It corresponds to the weight divided by the square of height, expressed in kg / m2.WHO defines: Overweight as a BMI equal to or greater than 25; Obesity as a BMI equal to or greater than 30.BMI is the most useful measure of overweight and obesity in the population as in adults; the scale is the same regardless of the sex or age of the subject. However, it gives a rough guide because it may not correspond to the same degree of adiposity from one individual to another. As for CRP (C - reactive protein) the limit was 6 mg/l so we defined inflammation when CRP> 6 mg/l, and for Hyperuricemia which is an abnormally high level of uric acid in the blood, for Female when uricemia> 60 mg/l and, for Male >70mg/l.

2.3. Statistical Analysis
All statistical analyzes were performed using SPSS software, Quantitative variables were described using mean, standard deviation (SD) and limits. Categorical variables were described using proportions and percentages. For the comparison of groups, we used the χ^2 test for frequencies and Student's test for means. The confidence interval was adopted $p < 0.05$.

III. Results

3.1 General Characteristics of the Subjects
In total ,300 subjects participated in the study which 46.7 % male and 53.3 % female, a sex ratio M / F 0.87 Of these subjects 56 % were in urban areas and 44 % in rural areas, the average age was 31.64 years (standard deviation: 12.47, range: 18-65). Table (1)

Table 1. General Characteristics of the Subjects

Characteristics	Participants (n = 300) Nbre (%)
Median age (years)	31.63 (SD=12.47)
Sexe Female Male	 160 (53.3) 140 (46.7)
Place of residence Urban Rural	 168 (56) 132(44)
Study level Illiterate Primary Secondary Superior	 40(13.3) 68(22.7) 152(50.7) 40(13.3)
Marital status Single Marry Divorce Widow	 168(56) 124(41.3) 7(2.3) 1(0.3)

SD= standard deviation

3.2. Mean Values of Obesity and overweight
Table 2 describes a cross between BMI and other parameters. There was a statistically significant difference between age classified as ≥ 40 and < 40 years of the participants with BMI < 25 [mean 27.2 years] and participants with BMI ≥ 25[mean = 36.7 years] (P < 0.05).

By comparing group 2 (BMI <25) in group 1 (BMI ≥ 25), we found a significant difference in the weight, waist circumference, age, Uricemia, CRP .We noted no statistically significant difference in sex, rural-urban.

Table 2. Results of comparative data in both groups: Normal BMI and High BMI

Parameter (Mean Values)	Group 1 BMI < 25 (n=160)	Group 2 BMI ☐ 25 (n=140)	P
Age (years)	27.2	36.7	< 0.05
Weight (kg)	63	81.1	< 0.05
Height (m)	1.68	1.69	NS
Waist circumference (cm)	64	80	< 0.05
Uricemia (mg/l)	45	67	<0.05
CRP (mg/l)	2.8	14	<0.05

BMI: Body mass index (kg/m²)

3.3 Prevalence of Overweight and obesity

Table 3 shows the prevalence of Obesity and overweight.53% of our samples has normal BMI, and then 35% suffers from overweight only 11.66 % are obese.

Table 3. Prevalence Obesity and overweight

Classifier	Participants (n = 300)	(%)
Normal BMI < 25	160	53.3
Overweight 30 < BMI ≥ 25	105	35
Obesity BMI >30	35	11.66

3.4 Overweight and obesity compared to Uric acid and CRP levels

The table 4 shows a high frequency of inflammatory state found among obese (54%) in the second place overweight with 40%, and then only 6% with normal BMI have high CRP levels. As for table 5 it shows that obese suffers the most from the high level of Uric acid with a frequency of 44.8%.

Table 4. BMI compared to CRP

Parameter BMI	Normal CRP < 6 mg/l (n=250)	inflammatory state CRP > 6 mg/l (n=50)
Normal	157(62.8%)	3(6%)
Overweight	85(34%)	20(40%)
Obesity	8(3.2%)	27(54%)

Table 5. BMI compared to Uric acid

Parameter BMI	Normal Urecimia (n=253)	Hyper Urecimia (n=47)
Normale	147(58%)	13(27.6%)
Overweight	92(36.3%)	13(27.6%)
Obesity	14(5.6)	21(44.8%)

IV. Discussion And Conclusion

The results of the study show a prevalence (35 %) of overweight and (11.66%) of obesity, the rates of obesity and overweight were significantly higher in older people >40, an important determinant of body-fat mass is the relationship between energy intake and expenditure. Obesity occurs when a person consumes more calories than she/he burns. We need calories to sustain life and have the energy be active; yet to maintain a desirable weight, we need to balance the amount of energy we ingest in the form of food with the energy we expend (5). Weight gain occurs when the balance is tipped and we take in more calories than we burn. Most studies indicate that how much we eat does not decline with advancing age (6). Therefore it is possible that a diminution in energy expenditure, particularly in the 50- to 65-year-old age group, contributes to the increase in body fat as we age. In those 65 years of age and older, hormonal changes that occur during aging may cause the accumulation of fat. Aging is associated with a decrease in growth hormone secretions, reduced responsiveness to thyroid hormone, decline in serum testosterone, and resistance to leptin (7). Resistance to leptin could cause a decreased ability to regulate appetite downward (8).

In this study there was a significant difference in the weight, waist circumference, age; we noted no statistically significant difference in sex, rural-urban.
High frequency of inflammatory state was associated with obesity (54%) and overweight with 40, over the past decade, the search for a potential unifying mechanism behind the pathogenesis of obesity-associated diseases has revealed a close relationship between nutrient excess and derangements in the cellular and molecular mediators of immunity and inflammation. This has given birth to the concept of "metainflammation" (9) the inflammatory response triggered by obesity involves many components of the classical inflammatory response

to pathogens and includes systemic increases in circulating inflammatory cytokines and acute phase proteins (e.g., C-reactive protein), recruitment of leukocytes to inflamed tissues, activation of tissue leukocytes, and generation of reparative tissue responses (Spencer M, et al. Adipose tissue macrophages in insulin-resistant subjects are associated with collagen VI and fibrosis and demonstrate alternative activation. (10).

Matsuura et al.(1998) and Bonora et al.(1996) reported that obesity and central body fat distribution were associated with hyperuricemia which correlate with this study , obese suffers the most from hyperuricemia with a frequency of 44.8%, and in line with Feig and Johnson (2003)'s research. Researchers conducted studies to evaluate the relationship between leptin (gene production of obesity) and the cluster of hyperuricemia in order to clarify the pathogenic mechanisms associating obesity with hyperuricemia. They found that the serum uric acid concentration is independently associated with the serum leptin concentration (11). It was suggested that leptin could be a pathogenic factor responsible for hyperuricemia in obese patients.

In conclusion, the study shows that Obesity is significantly associated with Inflammation and Hyperuricemia. Considering the growing incidence of obesity worldwide, more emphasis should be put on the evolving morbidity prevalence of hyperuricemia and Metabolic syndrome in our country.

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