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Nutritional Status of Women in Child-Bearing Age of Rabat Salé

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ABSTRACT

During the recent decades, the alarming increase in obesity proportions in Morocco contributed to the rise in prevalence of non transmittedchronic diseases. This article is the result of a representativecross-sectionalsurvey that was conducted in 2009-2010 in the region of Rabat-Salé. The sample stemsfrom a two stage cluster random survey of895 women aged from 20 to 49.It focuses specifically on the impact of the socio-economic factor on women's nutritional status, in terms of overweight and its relationship towardnon transmitted chronic diseases .The high prevalence of metabolic syndrome and the high rates of the excess weight among women in childbearing age in the region of Rabat-Salé show that the Moroccan population is on the same path as developed countries, in terms of health negligenceconditions due to socio-economic transitions. Therefore, in order to track the phenomenon, it becomes legitimate to adapt as soon as possible the means of prevention as the evolution of obesity and chronic diseases related to nutrition come to lightbefore the statistics of overweight women become difficult to remedy.

Keywords: *Obesity; abdominal obesity; chronic diseases; Nutritional status; women; procreation age; Morocco.*

INTRODUCTION

In spite of an overall improvement of the nutritional situation in the world over the last several decades, malnutrition problems (in their both forms: plethoric and per deficiency) persist in some countries, particularly in low or middle income countries.

During these recent years, studies realized by the Organization World Health Organization (WHO) and the United Nations for Food and Agriculture (FAO), in Particular those made on epidemiological data of populations focus more and more on malnutrition problems. This interest rests on the main role of diet in the prevention of non communicable diseases and deficiencies linked to the fight against morbidity.

In developing countries, the data shows that one person in five suffers from chronic malnutrition (WHO, 1995) following the quickchange in dietary habits, lifestyles, which is the fruit of industrialization and urbanization , economic development and globalization of the market and rising living standards. This contributes to a significant effect on public health and nutritional status, especially in developing countries and countries in transition, even if the food is more diverse and abundant. However, we observe very harmful consequences towards the population, such as inadequate dietary habits and decreased physical activity. In addition, more than two billion people worldwide have micronutrient deficiencies (FAO, 2001), where the most affected population are women and children in developing countries.

In the global scale, 42% of African-American women have low plasma levels (Lindsay & all, 2011).

This change represents a key element for the development of obesity and related chronic diseases. The epidemic has gained ground in

recent decades courtyard in Morocco (Benjelloun, 2002), it has progressed at an astonishing pace, 21.3 % of women have at least one chronic disease against 14.9 % for men (ENPSF, 2011).

This study is part of the " Obe-Maghreb " which purpose was to contribute to the development of obesity prevention strategies and related chronic diseases, adapted to the context of Morocco and Tunisia. In Morocco, the project has included an assessment of the prevalence of obesity , biological and behavioral risk factors among women of reproductive age living in urban areas in Rabat -Salé. Moroccan urban women being the most affected by the effect of overweight and obesity , and their situation probably prefigures what will be the situation of a large part of the Moroccan population .

This article focuses specifically on the impact of socio -economic on the nutritional status of women, in terms of overweight / obesity and chronic non communicable diseases, and to investigate the associated factors.

MATERIAL AND METHODS

Study Type, Location and Sampling

This is a cross-sectional survey conducted in urban population in Rabat -Salé. The source of the sample population consists of households with at least one non-pregnant women aged from 20 to 49. Households were randomly selected as a cluster sampling procedure to ensure the representativeness of the samples. The survey was conducted in March 2009 for a period of 10 months. A sample of 45 clusters was drawn by the Statistics Division of the High Commission for Planning , from the sampling frame consists of all enumeration areas (secondary units) of the 2004 census In each cluster 20 households were drawn. In each household, the women surveyed were randomly chosen. In total, 895 women were surveyed at their houses.

Households and Women Characteristics

Sociodemography

Several variables were collected to characterize the households and women surveyed, including the household size,the occupation of thehousehold head, woman's age, marital status, number of children, educational level,and occupation. From these elements are determined environmental conditions and socio -economic level in which the surveyed people live.

Anthropometry

Weight and Size

Body weight was determined to nearly 100g using impedance scales Bodymaster® (Tefal , France). Height was measured on a standing position using a measuring rod of 2 meters graduated in millimeters. A training and special instructions were given to investigators about weighing the subjects in light clothing as well as the respect of a good position for the measurement of the size(feet together, legs straight, heels on the wall and look laying the horizon) . These two measurements are performed according to procedures described by Lohman (1988). From the measurement of the weight and size wehave calculated the body mass index (BMI). Underweight was defined as BMI < 18.5KG / m², overweight with a IMC≥25 kg / m² and obesity by IMC≥30 kg / m² (WHO, 2003).

Waist Circumference

Waist circumference was measured using a non-elastic tape measure, graduated in millimeters, in a standing position at the thinnest part of the torso between the last rib and the iliac crest horizontally (Lohman, 1988). Waist circumference is used to define abdominal obesity with a tour of size ≥ 88cm (WHO, 2003).

Fat mass

Fat mass measurement is performed by bio impedance meter Bodymaster® (Tefal, France). The woman is brought into an upright position, the contact between the legs is avoided by a fabric or a sheet of paper. Fat mass given by this device is in percentage. Excess fat has been defined by a fat level ≥39 % before 40 ad ≥41% starting from 40 years (Gallagher &al, 2000).

Malnutrition-Related Diseases

The questionnaire was used to obtain information on family history of the women surveyed as well as thechronic diseases related to malnutrition in order to develop the prevalence of these diseases.

Bioassays

Blood samples were taken on an empty stomach from812 women in the studied population. The samples were taken and analyzed at the Laboratory for Research and Medical Analysis of the Fraternal Royal Gendarmerie (LRAMFGR).

Blood analysis included blood glucose, cholesterol, triglycerides and blood count (CBC). The results are recorded on the card analyzes then entered and analyzed.

Data Management and Analysis

Data were entered using the Epidata Entry software (version 3.1; and Statistics Database Program for Public Health, The Division of Surveillance and Epidemiology, CDC, Atlanta and The EpiData Association, Odense, Denmark). Data quality was ensured by automatic controls and double entry validated data. The management of data files and the calculation of derived variables were performed using SAS version 9.2 (SAS Institute, Cary, NC, USA).

The results are presented having taken into account after taking on consideration the sampling plans, as averagesand standard error of the mean (S.E.M) for continuous variables, and as percentages for categorical variables .A comparison of means by the analysis of variance was used to examine the association between a continuous variable and categorical response variable. The relationship between the durations of activities and the 9 sociodemographic factors were adjusted by linear regression. An alpha risk of 5% threshold was chosen.

Ethics and Investigation Authorization

Obe - Maghreb The project was submitted to the Ethics Committee of the Medical Faculty of Rabat, as well as tothe Advisory Committee on Ethics of the Research institute for Development (IRD). The Ministry of Health has given permission for conducting the survey (letter No. 623 of 16 March 2009). And the Ministry of the Interior has subsequently given permission through the wilaya of Rabat -Salé (authorization No. 1823 and No. 1824 Sale to Rabat on 7 April 2009). Finally, an information text, prepared in Arabic and French, was distributed to eligible women,and a free and informedconsent was collected on a form also preparedin Arabic and French.

RESULTS

Socio-Demographic Characteristics (Table 1)

The socio-demographic data shows that 62.3% of women surveyed own their housing, 26.1% are tenants and 28.3% are hosted for free (Table 1). 48.5 % of women surveyed live in households with 1-4 people.

66.2% of the surveyed women are married, and 39.2 % have more than 2 children. Only 19.19 % of the surveyed women have a profession and about 4 in 10 women are illiterate (41.3%).

Table1: *Women'sSocio-demographiccharacteristics*

	N	%
Residential area		
Modern	178	19,9
Médina	558	62,3
Precarious	159	17,8
Household size		
1 to 4 people	434	48,5
5 people and more	461	51,5
The head of household has a profession	651	72,7
The woman has a profession	168	19,9
The womanismarried	654	66,2
Level of the woman's education		
None	351	41,3
Primary or incompletesecondary	410	43,8
Secondary or superior	134	14,9
The woman'sage		
20-29yearsold	255	28,3
30-39 yearsold	313	31,5
40-49 yearsold	327	40,2
Children'snumber		
0	219	30,0

1 or 2	337	30,8
3 and more	339	39,2

Women's Anthropometric Characteristics (Table 2)

The table number 2 shows the anthropometric characteristics of women. The average age of the women surveyed was 36.4 years old, the weight is 69.6 kg, with a minimum of 33.5 kg and a maximum of 128.0 kg. Body mass index (BMI) is installed in the overweight category with 27.6 kg / m². The average waist circumference was 86 ± 0.56 cm, which is close to the threshold 88 cm threshold at which women have abdominal obesity (Table 2).

Table2. *Women'santhropometriccharacteristics*

	Mean	**Standard error of the mean**	**Minimum-Maximum**
Age (years)	36,4	0,4	20-49
Weight (kg)	69,6	0,7	33,5-128,0
Taille (cm)	159,0	0,3	133,4-180,5
IMC (kg/m²)	27,6	0,2	14,6-48,2
	Prevalence	**IC 95%**	
overweight (includingobesity)	66,2%	62,3-70,0	
Obesity	32,4%	28,4-36,4	

Prevalence of Non-Transmissible Chronic Diseases in Women

Table 3 :shows the biological characteristics of women.

Tha PAS average is an average of 124.8 ± 0.6 mm Hg, with a range from 94 to 220 mm Hg and the PAD averaged 80.0 ± 0.4 mm Hg, with a range of 55-128 mm Hg.

The prevalence of blood hypertension (HT) was estimated by the percentage of individuals with at least one of the following criteria: PAS ≥ 140 mm Hg, PAD ≥ 90 mm Hg is 25.2 %. On the other hand, 7 % of women have diabete and 14% have diabetic hyperglycemia at the time of the study. 23.3% of women have high cholesterolemy (> 2 g / l) and 3.3 % have hypertriglyceridemia ((> 1.40 g / l) , and 35.1% a metabolic syndrome according to IDF references (Table 4) .All these chronic dysfunction increase with age especially above 40 years old.

Table 3. *Biological characteristics of women of age 20-49 of Rabat-Salé*

	N	Average	Standard deviation	Minimum-Maximum
Systolic pressure(mm Hg)	895	124.8	0.60	94-220
Diastolic pressure(mm Hg)	895	80.0	0.40	55-128
Fasting blood glucose (g/l) (mmol/l)	812	1.0 (5.57)	0.01 (0.055)	0.74-4.32 (4.1-24.0)
Total cholesterolemia (g/l) (mmol/l)	812	1.76 (4.54)	0.022 (0.056)	0.9-3.5 (2.32-9.03)
HDL cholesterolemia (g/l) (mmol/l)	812	0.51(1.32)	0.0060 (0.015)	0.2-1.0 (0.52-2.58)
Ratio total cholest / HDL cholest.	812	3.64	0.041	1.4-10.5
Triglyceridemia (g/l) (mmol/l)	812	0.97 (1.10)	0.025 (0.028)	0.3-7.1 (0.34-8.07)

Table 4. *Prevalence of non-transmissble chronic deseases of women*

	n	Prevalence	Confidence Level95%
Arterial hypertension	895	25.2%	21.9-28.6
Diabetes	812	6.7%	4.8-8.6
Total hyperglycaemia	812	14.0%	4.8-9.8
Hypercholesterolemia	812	23.2%	18.1-28.2
Hypertriglyceridemia	812	3.3%	2.0-4.5
Metabolic syndrome	810	35.1%	31.0-39.1

Table 5. *Sociodemographic factors vesus the prevalence of non-transmissble chronic deseases of women of Rabat-Salé*

		Overweight		**Obesity**		**Hypertension**			**Total hyperglycaemia**			**Diabetes**		**Metabolic syndrome**	
	N	%	P	%	P	%	P	N	%	P	%	P	%	P	
Residential area															

Modern	178	66.4	0.98	28.3	0.35	21.2	0.57	162	10.5	0.42	5.2	0.78	30	**0,018**
Médina	558	66.3		32.2		25.9		505	15.2		6.9		38.7	
Precarious	159	65.4		37.4		27.1		145	13.1		7.6		27.3	
Household size														
1 to 4 people	434	66.6	0.86	29.7	0.29	23.8	0.43	384	13	0.5	7.1	0.71	35.4	0,91
5 people and more	461	65.9		34.1		26.2		428	14.6		6.4		34.9	
The head of household has a profession														
Yes	651	69.7	**0.0024**	34.6	0.069	25.9	0.59	592	13.6	0.74	6.4	0.62	35.7	0,58
No	244	58.9		27.9		24		220	14.8		7.4		33.9	
The woman has a profession														
Yes	168	67.2	0.81	25.9	0.12	22.7	0.44	148	11.1	0.26	8.3	0.41	30	0,25
No	727	65.9		34		25.9		664	14.7		6.3		36.3	
The womanismarried														
Yes	654	75.8	**$<10^{-4}$**	39.6	**$<10^{-4}$**	27.9	**0.022**	603	15.7	0.12	7.6	0.14	39.2	**0,006**
No	241	47.3		18.3		20		209	10.4		4.8		26.7	
Level of the woman's education														
None	351	71.8	**0.016**	39.1	**0.0004**	28.6	0.081	327	16.7	0.077	7.5	0.28	42.3	**0,00005**
Primary or incompletesecondary	410	65.1		32.3		24.6		368	13.3		6.9		31.9	
Secondary or superior	134	53.5		14.1		17.8		117	8.1		3.7		23.6	
The woman'sage														
20-29yearsold	255	40.9	**$<10^{-4}$**	11.4	**$<10^{-4}$**	13.5	**$<10^{-4}$**	218	4.6	**$<10^{-4}$**	2.6	**0.0003**	13.6	**$<10^{-4}$**
30-39 yearsold	313	69.1		31.9		23.7		282	9		3.4		31.3	
40-49 yearsold	327	81.6		47.6		34.8		312	23.6		11.7		51.6	
Children'snumber														
0	219	39.9	**$<10^{-4}$**	10.5	**$<10^{-4}$**	17.7	**0.0001**	188	7	**0.0058**	3	**0.0059**	19.8	**$<10^{-4}$**
1 or 2	337	69.7		34.7		23.2		303	14.2		6.1		38.6	
and more	339	83.4		47.3		32.6		321	18.8		9.7		43.4	
Total	**895**	**66.2**		**32.4**		**25.4**		**812**	**14**		**6.7**		**35.1**	

Table 5 details the correlations between several chronical diseases and sociodemographic factors (residential area, household size, profession of the household's head, educational level, profession and matrimonial status of the surveyed women) and physiological (age and number of children).

It appears from the above results that the residential area and household size do not represent risk factors. Yet, we can establish the correlation between the type of neighborhood and **metabolic syndrome.**

On another hand, it's obvious that all the risk factors are highly associated with woman's age and number of children. The prevalence of overweight / obesity and metabolic syndrome were higher among married women who have not attended school. The same trend is observed for the hypertension and the total hyperglycemia butwith less significant or marginal associations.

STUDY'S DISCUSSION

The nutrition and health condition of women vary considerably from one country to another and within the same country depending on various factors such as the education level, the access to health information and health care, the level of poverty,the environmental degradation, and the urban migration (World Bank (1995)).

In this context, the study done at Rabat Salé provides a detailed inventory of the nutritional condition of women of child-bearing age, especially in the age group of 20-49 years. The results showed that the average size recorded for women is 159.00 cm. This medium size is well

above the critical value, which is consistent with the results of surveys conducted by the Ministry of Health and the High Commissionfor planning since 1992at the national level. The results of these two surveys also match for weight and BMI (ENPSII 1992);

Obesity and nutrition- related chronic diseases (NRCD) such as diabetes, hypertension, dyslipidemia and heart disease are now a major public health problem. Indeed, the prevalence of NRCD according to a survey by the Health Ministry in 2004 is 13.8 % of the population (ENPSF, 2011).

In this case, we note that the observed prevalence of overweight and obesity reaches very high levels: approximately two out of three women are in overweight (66.6%) and one in three is obese (32.4%).However, we found these prevalence rates are high compared to national ones published in recent decades: 4.5% in 1984 (HCP 1984) and 17.4 % in 2011 (HPC 2011). These alarming figures confirm that these are real public health and social problems in urban areas that affect an increasing part of the population. This trend would be related, first to the socioeconomic level relatively high in Rabat Sale compared to other Moroccan regions, and on the other hand to the evolution and change in lifestyle and eating behavior that Morocco has experienced in the last decade like other countries in transition (Maire.B et all, 2004).

High blood pressure (hypertension) is defined according to the World Health Organization "by a systolic pressure value equal or above 140 mm Hg and / or diastolic pressure equal or above 90 mm Hg.". According to the survey conducted by the Health Ministry in 2004, hypertension affects 5.2% of the population (EPSF, 2004), and 7.2% in 2011 (ENPSF, 2011) of women aged 15- 49 years whatever the area of residence. In our study, the prevalence of hypertension was 25.2% of the population. The distribution of the prevalence of high blood pressure show that it gradually increases with age: 13.5% for the women with age 20-29 years, 23.7% for the 30-39 years and 34.8% for the tranche of 40-49 years.

Theseprevalencesillustrate the rapid development of hypertension in Morocco, which is deemed responsible of 7.1 million premature deaths each year according to World Health Organization (ENPSF, 2011).We do consider, thus, that hypertension has become a very health scourge in the region of Rabat Sale.

On another hand, diabetes is an important public health indicator, which leads the World Diabetes Atlas to take it as a barometer; the number of diabetics in the world increased from 30 million in 1985 to 180 million in 2000 and 246 million in 2007. In fact, in our study, the total diabetes prevalence is estimated at 6.7%. This growth has been demonstrated by other previous studies: 1.9 % of women in 2004 (ESPF, 2004) and 3.3% of women in 2011 (ENPSF, 2011). Therefore, due to this very progressive prevalence associated with natural aging, we experience a significant amplification of the situation in the coming years if accommodated measures are not taken by the public authorities.

The lipid analysis showed elevated total cholesterol (>2g/l) was present reaches 23.2% of women while triglycerides (>1.4g/l) concerns 3.3%. High cholesterol represents also one of four major cardiovascular risk factors. The prevalence of these biological parameters (hypertension, blood sugar, cholesteroland triglyceride) gradually increases with age and even soars beyond 40 years. These results are consistent with a study by the Epidemiology Department of the Ministry of Health (Tazi et all, 2003).

The continuous increase of the above risk factors could result in women's heart diseases. Cardiovascular diseases kill more than twice the AIDS in developing countries (Abegunde et al 2007). In 2005, heart diseaseswere the cause of death of about 18 million people. Almost all of these deaths occurred in developing countries with more or less 80% (Abegunde et al 2007). In Morocco, national studies conducted by the Ministry of Health in 2003 revealed that 2.6% of women aged 15-49 had heart disease.

To better understand the increase in the prevalence of chronic diseases among women,it was interesting to study the association of risk factors for these diseases with some socioeconomic characteristics.

It is noted that the prevalence of all these biological risk factors for chronic diseases increase from the age group 30-39 years. The risk of obesity, hyperglycemia and metabolic syndrome are particularly high in the age group 40-49 years, regardless of socio-demographic characteristics of the women concerned. An early and even untargeted prevention will definitely be required with respect to the two major common behavioral risk factors which are diet and physical activity. Smoking and alcoholism are being uncommon and not

widespread behavioral risk factors with our sample population.

For overweight and obesity, their particular high prevalence does not match with the prevalence trend observed in industrialized countries or in other countries in economic transition. However, our study's sample covers only urban areas of the capital; and it is likely that the socio-economic and cultural environments of the subjects are more homogeneous and more obesogenic than at national level. Nevertheless, the revealed lack of relationship between the high blood pressure and the economic level of households in our sample is similar to the lack of connection between hypertension and level of economic development of countries observed by Ezzati et al (2005) at a national level.

CONCLUSION

In conclusion, Morocco is generally not familiar with the reasons that promote weight gain. The cultural norm does not recognize overweight as an illness. Among women aged 20-49, the overweight rate is important. Using these data and the results of our study, it is important to trackas early as possiblethe phenomenon to adapt the prevention strategies with regards to obesity and non-transmissible chronic diseases related to nutrition. The prevention should even start at the adolescenceage.

The high prevalence of the metabolic syndrome (35.1%) shows that the Moroccan population follows the path of developed countries on health status. Indeed, Morocco is a country going through a nutritional and epidemiological transition like other economically emerging countries.

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