Study of the anthropometric profile of urban students in the city of Mohammedia (Morocco)

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ABSTRACT

Malnutrition is a public health problem approved by domain managers around the world. The main objective of this study is to develop some anthropometric parameters and to determine the rate of malnutrition in a well educated population of the city of Mohammedia (center of Morocco). The study was conducted as a result of an investigation, prospective, on a sample of 625 students chosen at random in six institutions of urban origin with 321 of female students 51.4% and 304 male students 48.6%. An examination and a clinical examination involving the measurement of the weight and the size have been practiced. The average weight of our population is 43.71 ± 0.56 kg. The Student t test shows no difference in average weight between the two sexes (p <0.53). The average size is 1.47 ± 0.009 meters no difference in size has been reported between the two sexes (p<0.87). The distribution of students according to their BMI shows that 40.3% in state of underweight, 7.5% are overweight and 0.8% is considered obese students. It is necessary to take adequate measures in order to limit this elevation of the prevalence of malnutrition, knowing that this phenomenon is closely linked to the rapid change of mode of life.

Keywords: Anthropometric; Prospective; Educated population; Malnutrition

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INTRODUCTION

Malnutrition affects the physical growth, morbidity, cognitive development, reproduction and the capacity of the physical work, and consequently it to an impact on the human performance, health and survival [1] it is also one of the main factors which are at the origin of many diseases as well in children than in adults. The factors that contribute to malnutrition are many and varied. These factors are including the number of children in the family, the occupation of the parents, the civil status, the family income, the intellectual level of the parents [2].At the global level, it is estimated that 161.5 million of children less than 5 years of age had a delay in growth in 2013 and that 50.8 million had a low weight in relation to their size. This is mainly due to a poor diet and infections to repetition, while 41.7 million children were overweight or obese [3].

In Morocco, the surveys carried out in recent years on micronutrient deficiencies by the Ministry of Health showed that 37.2% of pregnant women, 31.5% of children aged 6 months to 5 years, 32.6% of women of childbearing age

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and 18% of men are anemic [4]. A study conducted by [5] in the city of Kenitra, on 295 children aged 6 to 16 years, has shown that 8.9% of children suffer from growth retardation and 12.6% of the insufficiency Weight.

MATERIALS AND METHODS

Middle and sample of the study
The study is carried out on the period of December 2014 to November 2015, the sample for the survey consists of 625 students; 304 boys (48.6%); and 321 girls (51.4%) in six institutions of urban origin in the city of Mohammedia: Two primary schools (Ghazali and wallada); two middle schools (Mohammedia and Allal Ibn Abed Allah) and two high schools (Eljoulane and Jaber Ibn Hayan).

Anthropometric evaluation
Anthropometric measures have been based on the standardized method of the World Health Organization 2007. Body weight was measured with a precision to the 0,1kilogramme on a numerical scale and the size was measured using a spacer with a precision of 0.1 cm.
The BMI for age (BMI=weight/ size2) has been calculated according to the references of growth of the World Health Organization 2014.

Statistical analysis
After you have entered and filtered data on a media Excel, on transferring on statistical analysis software. The results are given in the form of tables and figures; all statistical tests are considered significant if the p value is less than 0.05.

RESULTS

The table (1) presents the statistical characteristics of the anthropometric parameters according to the sex of the respondents. The average weight of pupils is 43.71±0.56 kg, with a minimum of 18 kg and a maximum of 86 kg. The Student t test shows no difference in average weight between the two sexes (p < 0.53). Similarly, the average size is 1.47± 0.009 meters, of which the smallest size is 1 meter and the larger size is 1.80 meter. No difference in size has been reported between the two sexes (p< 0.87). The values of asymmetry and flattening show that the two distributions weight and size are Gaussian.

Table1: Anthropometric characteristics of respondents on the basis of sex

Variable	Sex	Aver±SE	min	max	CI in 95%	Asym	Flati	Fisher
	Male	44,08±0,84	19	86	42,42-45,74	0,33	-0,63	0,40 (p<0,53) NS
Weight in kg	**Feminine**	43,37±0,74	18	75	41,91-44,83	0,027	-0,76	
	Male	1,47±0,01	1	1,8	1,45-1,49	-0,54	-0,59	0,02 (P<0,87) NS
Size in meteres	**Feminine**	1,47±0,009	1	1,72	1,45-1,48	-0,84	-0,15	
Aver :Average ;SE: Standard Error ; min : minimum ; max : maximum, Asym :Asymmetry ; Flat :Flattening; NS:Not significant								
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The distribution of student respondents according to their BMI table (2) shows that 40.3% (n=252) of these students are in a state of underweight, 7.5% (n=47) are overweight and 0.8% are considered obese children. However, 51.4% are supposed to normal children. The chi-square test of independence shows no connection between sex and the state of nutrition (Chi- square = 0.31; p<0.96). Therefore the half of the investigated children is malnourished.
 The table (2) summarizes the results of the distribution of student respondents according to their profiles of anthropometric by institution. The chi-square test of independence shows a strong association between these two factors (Chi-square =95,72; p<0.000). In addition, the average rate of malnutrition is 48,64%, with rates moderately low of 30.94% and 32,76% displayed respectively to the two high schools Jaber ibn hayane and Eljoulan and maximum rate of 74.80% and 56,92% recorded respectively to the two primary schools Ghazali and Wallada. In addition, the distribution of students who are in a state of overweight or in a state of obesity reveals that among 52

children identified, 13 cases are in the primary school (25%), 14 cases are of middle school (26.92%) and 25 cases in high school (48.08%).

Table 2: Distribution of student respondents according to their profiles of anthropometric by institution

Etablissement	Anthropometric profile				Total	PPV	chi-square	P-value
	Underweight	Normal corpulence	Overweight	Obeses				
Primary school Ghazali	86	31	5	1	123	74,80%		
Primary school Wallada	67	56	6	1	130	56,92%		0,000*
Middle school Mohammedia	25	33	4	0	62	46,77%	95,72	
Middle school Allal ben Abed allah	37	66	10	0	113	41,59%		
High school Jaber Ibn Hayan	26	96	15	2	139	30,94%		
High school Eljoulane	11	39	7	1	58	32,76%		
Total	252	321	47	5	625	48,64%		

*PPV: Positive predictive value; *: difference very highly significant*

The results of this analysis table (3) show, by the Chi- square test of independence, that the two factors are strongly related, with a p-value sufficiently lower than 1 for 1000. In addition, the age category of the most concerned is that of students with an age less than 7 years where the PPV exceeds 85% followed essentially by the slices of ages between 7 and 10 years and also the age group between 10 and 13 years respectively with rates of underweight of 61.19% and 55,78%. In addition, 67,31% (35/52) of students in overweight or obese have an age between 13 and 19 years. It may, therefore, draw a decreasing relationship very highly significant between malnutrition and the age of a hand ($R^2=0.96$) and the school level on the other hand ($R^2=0.90$).

Table 3: Distribution of student respondents according to their ages

Category Age in Years	Anthropometric profile							
	Underweight	Normal corpulence	Overweight	Obese	Total	PPV	chi-square	p-value
< 7	18	3	0	0	21	85,71%		
7 <> 10	82	46	4	2	134	61,19%		
10 <> 13	82	56	9	0	147	55,78%		
13 <> 16	53	130	18	1	202	26,24%	115,4	0,000*
16 <> 19	17	74	14	2	107	15,89%		
> 19	0	12	2	0	14	0,00%		
Total	252	321	47	5	625	40,32%		

*PPV: Positive predictive value; *: difference very highly significant*

DISCUSSION

Malnutrition among 625 students is considerable: insufficient key weight 40.3%, 7.5% of students in overweight and 0.8% are considered children obeses.

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In our study, malnutrition among children is very high; these percentages are only valid for the children who attend public schools of the city of Mohammedia. These results lead us to consider that there is a very strong link between the high rate of prevalence and socio-economic status which is very low for the majority of children.

No significant difference between girl and boys is observed for the different forms of malnutrition (p<0.96).This was also found in other studies carried out in Morocco and other paid in track of development [5, 6, 7].

The test Chi-square of independence shows a strong relationship between the distributions of school children in function of their anthropometric profiles by level of education. We note that the underweight decreased while the level of education increases and it is the opposite for the overweight and obesity.

The weight Delays are most often the result of a mismatch between the inputs and the energy needs of the individual, the mismatch that can result from multiple mechanisms. The inadequate intakes may be the result of a limited access to food (poverty of the country or of the individual), a voluntary restriction of inputs (abuse), swallowing disorders (neuromuscular pathologies), a lack of appetite (fatigue, depression, psychosocial problems), vomiting, iterative with a defect in the process of digestion or absorption (malabsorption syndromes). The excessive spending can result from a poor use of energy from nutrients (chronic hypoxia), nutritional losses pathology (Nephrotic syndrome, Protein-losing enteropathy…), and an increase in energy expenditure: inflammatory syndrome, cancer… Often found several factors associated who come to explain the failure to thrive of the Child [8]. There is usually a time lag between the slowdowns in growth in weight and statural; it has a patho-physiological significance considerable. In effect, whatever the cause of the deficiency absolute or relative of intake protein-energy, there has initially use of fat mass reflected by a loss of weight, then if the process persists, slowing statural growth linked to a reduction of the cellular mass active [9].

In Congo underweight is 45.5% according to [10] almost the same result that our study .Unlike in Algeria the rate of underweight is of 7.24% [11]. These results are hardly comparable because of the heterogeneity of the reference used for the classification of the Retardation of growth and of underweight, of socio-demographic conditions specific to each population and of the nature of the study (if it is carried out on a small scale in the schools, in the urban or rural or large-scale at the level of the whole country). The socio-economic status is a risk factor likely to influence the evolution toward the underweight and growth retardation.

In Morocco, in the most deprived social classes, the child is more exposed to a lack of food by lack of means, the lack of comfort of the accommodation and the absence of hygiene, which can lead to certain infectious diseases. Many studies have shown that repeated infections particularly affect the growth of the children of the poor classes in developing countries [12, 13]. This association, the delay of growth, of underweight and social classes at low socio-economic level, has been reported by several studies from around the world [14, 10, 15].

According to UNICEF The underweight, even if there is no meaning, the prevalence increases when the income of the father decreases. Children belonging to the poorest households are at risk more than two times greater to present an underweight that those who live in the wealthiest households [16].

According to a study carried out in Nigeria [17]. The profession of parents reflects the socio-economic level. In the majority of cases these mothers are forced to work to improve their economic situation, they are faced to work schedules individual's .they begin their work very early in the morning, returning at the end of the day. They do not have the time to take care of their children or their prepare meals especially the breakfast. This has a negative effect on the school performance by lack of concentration during the course and on the state of health of the child in general.

In our study the prevalence of overweight including obesity was 8.3%. This percentage is only valid for children who attend public schools, the majority of which have a low socio-economic status. In effect, if we compare our results with other countries of the Maghreb, they are close to those of Tunisia, which the prevalence of overweight and obesity is 8.7% [18], while in Algeria, the prevalence appears to be superior to the Ours, since it is 23.10% [11]. These data are hardly comparable of made of the heterogeneity of the reference used for the Classification of Overweight and obesity and the socio-demographic conditions of each population. In Algeria the public schools are frequented by all social categories. For some African countries, such as Togo, the prevalence of obesity and overweight is lower than that of our country; it is respectively 2.86% and 1.72% [19].

The situation of Morocco is different from that of certain countries in Europe and the United States. In France, 14% of children aged 10 to 12 years were overweight [20]. In Canada the prevalence of overweight and obesity in children 12 to 17 years of age is 29% [21]. Other countries reach and even to exceed the 30% as the United States, Italy and Greece [22, 23, 24].

In our study we noticed that the age group most affected of overweight including obesity is between 13 and 19 years this can be explained by the genetic side according to [25] A child has eight times more at risk of becoming obese

when its two parents are already and this compared to a child with parents of normal weight. However, the fact that of obese subjects has at least one parent who is obese is undoubtedly related to the fact that the families share the same style of life, the same power supply and a socio-economic context similar [26].

A study made in Algeria [11] note that the prevalence of overweight and obesity increases when the income of the parents is high. This can be translated by the fact that the parents provide a better level of life to their children and greater accessibility to the rapid restoration.

A negative relationship between the level of physical activity and various indicators of obesity is observed in many cross-sectional studies [27]. Conversely, the sedentary occupations are associated with a higher risk of obesity. Watch television two or more hours per day multiplies by 2 the risk of not to participate in any physical activity [28].

CONCLUSION

The malnutrition among children of school age to the city of Mohammedia is considerable. The results of this study show that the problem of malnutrition among high respondents achieves half of the sample. For the sex, we found no significant difference between boys and girls for the different forms of malnutrition.

In On the other hand, the coexistence of over nutrition between 13 and 19 years and malnutrition between 7 and 13 years requires establishing strategies to fight very adequate is well targeted in these age groups.

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CONFLICTS OF INTEREST

All of the authors have contributed to the conduct of this work. All the authors also claim to have read and approved the final version of the manuscript.

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