Prevalence and factors favoring overweight and obesity in Algerian child and adolescent; case of the population of Constantine / Algeria

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Abstract

**Background:** Obesity today affects almost the entire planet, including many emerging countries such as Algeria. According to the World Health Organization / WHO; 39% of adults worldwide are overweight and 13% are obese in 2019, so the number of obesity cases has almost tripled since 1975. Our main goal through this paper is to measure the prevalence of overweight and obesity in children between 5-11 years and in adolescents between 12-17 years among the population of the province of Constantine / Algeria.

**Methods:** This is a descriptive, transversal survey which focused on a representative sample of children and adolescents during the month of July 2018. The study population consisted of 1022 children and adolescents aged 5 to 17 years, who frequent a municipal swimming pool located in the province of Constantine / Algeria. These children and adolescents were selected by chance for a few days over the four weeks of July 2018. Information concerning the socio-demographic characteristics, eating habits and sedentary behaviour for each individual was specified by means of a questionnaire.

**Results:** Among the results of this study: overweight affects 14% of children between 5-11 years old, while with moderate obesity, it affects 4% of children in this age category; for adolescents aged 12-17 years, 17% of them are overweight, and 7% have moderate obesity; several factors contribute to gaining extra pounds (gender and age, some hereditary factors, eating habits and physical inactivity).

**Conclusion:** Identifying the risk factors for overweight and obesity, in children and adolescents under 18 years old, would help identify risky habits and behaviours in order to propose appropriate prevention measures. These measures must be included in a health education strategy and a health promotion strategy.

**Keywords:** Overweight and obesity, prevalence, associated factors, risk factors.

Résumé

**Objectif :** L’obésité concerne aujourd’hui la quasi-totalité de la planète, dont de nombreux pays émergents comme l’Algérie. Selon l’Organisation mondiale de la santé/OMS ; 39% des adultes dans le monde sont en surpoids et 13% sont obèses en 2019, ainsi le nombre de cas d’obésité a presque triplé depuis 1975. Notre principal objectif à travers ce papier est de mesurer la prévalence du surpoids et de l’obésité chez les enfants entre 5-11 ans et chez les adolescents entre 12-17ans parmi la population de la wilaya de Constantine/Algérie.

**Méthodes :** Il s’agit d’une enquête descriptive, transversale qui a porté sur un échantillon représentatif d’enfants et d’adolescents durant le mois de juillet 2018. La population d’étude était composée de 1022 enfants et adolescents âgés de 5 à 17 ans, qui fréquentent une piscine municipale situé dans la wilaya de Constantine/Algérie. Ces enfants et adolescents étaient sélectionnés par hasard, et cela durant quelques jours sur les quatre semaines du mois de juillet 2018. Des informations concernant les caractéristiques sociodémographiques, les habitudes alimentaires et le comportement sédentaire pour chaque individu ont été précisées au moyen d'un questionnaire.
Résultats: Parmi les résultats de cette étude : le surpoids touche 14% des enfants entre 5-11ans, quand à l’obésité modérée, elle touche 4% des enfants de cette catégorie d’âge ; concernant les adolescents âgés entre 12-17ans, 17% d’entre eux présentent un surpoids, et 7% présentent une obésité modérée ; plusieurs facteurs contribuent à prendre des kilos en trop (le sexe et l’âge, quelques facteurs héréditaires, les habitudes alimentaires et la sédentarité).

Conclusion: L’identification des facteurs de risque du surpoids et de l’obésité chez l’enfant et l’adolescent de moins de 18 ans, permettrait de dépister les habitudes et les comportements à risques, afin de proposer des mesures de prévention adaptées. Ces mesures doivent être figurées dans une stratégie d’éducation pour la santé et celle d’une promotion de la santé.

Mots-clés : Surpoids et obésité, prévalence, les facteurs associés, les facteurs de risque.

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Introduction

The prevalence of overweight and obesity has risen at an alarming rate in recent decades, particularly among children and adolescents, becoming one of the greatest challenges for public health in the 21st century [1,2]. Childhood and adolescent obesity is a global problem, affecting both developed and low- and middle-income countries, particularly in urban areas [3].

All studies in both industrialized and developing countries indicate a rapid increase in the number of overweight and obese children. In 2010, according to World Health Organization/WHO standards, 43 million children (including 35 million in developing countries) were considered overweight or obese; 92 million being at risk of overweight. The prevalence of overweight (including obesity) in children increased from 4.2% in 1990 to 6.7% in 2010, and this trend is expected to reach 9.1% in 2020, representing approximately 60 million children. The rate of obesity in developed countries is twice as high as that of developing countries [1].

According to the WHO, about 53% of women and 36% of men in Algeria are overweight or obese; indeed this phenomenon does not spare children. The trend towards overweight is rather on the rise in a society prone to a sedentary lifestyle and an excessive consumption of fast-food products [1]. Another study conducted by the National Office of Statistics/NOS reveals that 9.3% of children under 5 are obese or overweight. The trend is more pronounced in urban areas, and among kids whose mothers have a high level of education [4].

We conducted an investigation by a sample of children and adolescents under 18, who attend a municipal swimming pool in the province of Constantine in eastern Algeria, to answer the following questions: What is the prevalence of overweight and obesity in children and adolescents according to this sample? What are the factors that promote the incidence of overweight and obesity? And what measures must be adopted in order to counteract this phenomenon?

Materials and Methods

This is a descriptive, cross-sectional survey of a representative sample of children and adolescents conducted during the month of July 2018.

The study population was made up of 1022 children and adolescents aged 5 to 17, who attend a municipal swimming pool located in the province of Constantine / Algeria. These children and adolescents were selected by chance for a few days during the four weeks of July 2018.

In 2000, the Childhood Obesity Working Group of the International Obesity Task Force/IOTF, a working group under the auspices of WHO, developed a new definition of childhood obesity with curves for boys and girls aged between 2-18 years old according to the thresholds proposed by Cole et al., with grades 1 (overweight) and 2 (obesity) different from the French reference thresholds where the threshold defining obesity is higher [5]. This definition has the advantage of establishing continuity between the definition of childhood obesity and that of the adult: it uses the same index (BMI) and refers to the same thresholds (see figure1). Body mass index /BMI was calculated by dividing weight by height squared BMI = Weight / Height2 (kg / m2). The International Obesity Task Force offers 5 groups of BMIs [6]:

- Group BMI 1 <20: subjects with a weight deficit;
- BMI group 2 between 20 and 25: normal population;
- BMI group 3 between 25 and 30: overweight;
- BMI group 4 between 30-40: moderate obesity;
- BMI Group 5> 40: Frank Obesity (morbid).

In children and adolescents curves have been developed to deal with the specificity of gender and age (Fig. 1).
Using a standardized questionnaire, respecting confidentiality, anonymity and after informing families. We registered some refusals, since we distributed 1200 copies of questionnaires, and we recovered only 1022, thus a percentage of recovery which approaches the 85.16%. Most non-recovery copies are those of teenagers between 12-17 years old.

According to the questionnaire, two kinds of information were collected: information about the parents of the young people, and others about these young people themselves.

We used Microsoft Excel to do some basic data analysis task: to develop figures that represent sample responses on each question; as we tried to apply the feasibility test, in order to build an idea about the factors favoring overweight and obesity.

Results

1. Layered demographic distribution of the study sample

The sample of the study consists of 1022 young people, among these young people: 509 children between the ages of 5 and 11, among them 235 males and 274 females (*Table 1*); 513 adolescents between the ages of 12 and 17, of whom 297 are male and 216 are female (*Table 2*). Referring to the IOTF thresholds, we have organized the intervals of children and adolescents respectively according to the five strata corresponding to the five BMIs proposed by the IOTF.

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI 1</td>
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<td>43</td>
</tr>
<tr>
<td>BMI 2</td>
<td>182</td>
<td>167</td>
</tr>
<tr>
<td>BMI 3, 4 and 5</td>
<td>31</td>
<td>64</td>
</tr>
</tbody>
</table>

*Table 1: BMI of children aged 5-11*

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI 1</td>
<td>30</td>
<td>14</td>
</tr>
<tr>
<td>BMI 2</td>
<td>197</td>
<td>146</td>
</tr>
<tr>
<td>BMI 3, 4 and 5</td>
<td>70</td>
<td>56</td>
</tr>
</tbody>
</table>

*Table II: BMI of adolescents aged 12-17*

2. The prevalence of overweight and obesity in the study sample

2.1. The prevalence of overweight and obesity among children aged 5-11

We can distinguish between children who have a normal body mass index / BMI2 of around 70%, those who are underweight / BMI1 represent 13% of the sample, children who are overweight / BMI3 represent 14% of the total sample in the study, and those with moderate obesity / BMI4 represent 4% of this sample. Thus, the percentage of children with BMI3, 4 or 5 is around 19% of this age group (*Fig. 2*).
The body mass index / BMI2 normal is around 78% for boys and 61% for girls. For those who are underweight / BMI1 it represents 9% and 18% of the sample for males and females respectively. Children who are overweight / BMI3 represent 10% of boys and 18% of girls, and those with moderate obesity in males and females respectively represent 3% and 5% of all the sample of the study. Thus, the percentage of boys and girls with BMI3, 4 or 5 is around 13% and 23% respectively of the total sample of both genders (Fig. 3).

**Figure 3: Prevalence of overweight and obesity in children by gender F / M**

2.2. The prevalence of overweight and obesity among adolescents aged 12-17

According to (Fig. 4); adolescents with a normal body mass index / BMI2 are around 67%, those who are underweight / BMI1 represent 9% of the total sample in this age group. We found that 17% of adolescents are overweight / BMI3, while adolescents who are moderately obese / BMI4 they represent 7%. Thus, the percentage of adolescents who have BMI3, 4 or 5 is around 24% of the total sample for this age group (Fig. 4).

**Figure 4: Prevalence of overweight and obesity in adolescents (both sexes) aged 12-17**

To properly determine the prevalence of overweight among adolescents, we addressed this issue in each gender separately from the other. The normal body mass index / BMI2 are around 66% for boys and 68% for girls. For those who are underweight / BMI1 male and female represent respectively 10% and 6% of the sample. Adolescents who are overweight / BMI3 represent 16% of all boys and 18% of all girls, and those with moderate obesity / BMI4 represent respectively 7% and 8% of the study sample, obesity free or morbid / BMI5 is present among boys with 1% of all males for this age group. Thus, the percentage of boys and girls with BMI3, 4 or 5 is around 24% and 26% respectively of the total sample for this age group (Fig. 5).

**Figure 5: Prevalence of overweight and obesity among adolescents by gender M / F**
2.3. Factors associated with overweight and obesity by study sample

We asked several questions about these risk factors that may be responsible for the overweight or obesity of young people under 18: we did not find a relationship with the socioeconomic status of the family and the BMI of the family of the young peoples. On the other hand, other factors may be a major risk to take extra pounds by these young people, among these factors:

2.3.1. Background of the child / adolescent and his parents

We asked this question in order to get an idea about this situation of excess weight; if it was always or temporarily present in child/adolescent body (Fig. 6).

![Figure 6: Child / adolescents and parents' antecedents as a factor associated with overweight and obesity](image)

According to (Fig.6): 85% of parents of children aged 5-11 admit that their child's BMI was the same since birth; the remaining 15% confirm that their child's BMI changes sometimes. Girls suffer more from weight change for this age group. Adolescents say they have practically the same BMI forever without a significant change for 75% of the entire sample for this age group, while 25% admit that their BMIs change sometimes. According to responses in this age group, adolescent girls are more likely to have BMI changes than boys.

For those who are overweight or obese: 52% of children and 48% of adolescents have one or both parents who are overweight.

2.3.2. The food hygiene culture of the child / adolescent and his / her family

This question was asked to gauge young people's and / or their parents' responsibility for the situation of these overweight or obese youth (Fig. 7).

![Figure 7: Food hygiene culture of children / adolescents and their parents as a factor associated with overweight and obesity](image)

This culture is almost absent in the family of children and adolescents respectively for 53% and 24%, this kind of culture is not enough in 32% of families of children and 52% of adolescents, this culture is fairly present in 14% of families children and 24% of adolescents. Among those who are overweight or obese: 73% admit the total or partial absence of this culture in their daily lives or their families.

2.3.3. Dietary habits of the child / adolescent

We asked this question in order to get an idea about the eating habits of young people: the respect of recommended meals a day, the tendency towards fast food or home-cooked meals, the taking of sweets and sodas outside recommended meals (Fig. 8).

![Figure 8: Daily recommended meals for children / adolescents](image)

We recorded more dining trends for both age groups, and that at the same table at night in the presence of all members of the family; the responses are close to 96% for children and 90% for adolescents. What is worrying for both age groups is the fact that these young people do not have breakfast for 58% of
children and 60% of adolescents; the lack of breakfast at home is responsible for multiple snacks before lunch. The majority of those who answered that they tend to taste the afternoon, in this case after school hours, admit that they do it at home.

For overweight or obese children and adolescents, they tend to nibble during the day, in other words to take one or more snacks during the day. Thus, we asked this question for everyone, insisting each time to answer correctly; especially for those who are overweight or obese (Fig. 9).

According to the (Fig. 10); 22% of children and 38% of adolescents admit that they never practice, or rarely, physical activity during the week outside the school. On the other hand, 78% of the first age group and 62% of the second, admit the practice of a physical activity often or daily. The majority of “never” or “rarely” responses are from girls, who say they never or rarely do physical activity outside of school, close to 100% of adolescent girls.

We have ventured further by addressing the issue of sedentary lifestyles among young people by asking a question about the average time spent watching television, playing with a game box, or using a computer, etc. (Fig. 11).

2.3.4. Physical activity / sedentary lifestyle in children / adolescents

We asked a question about the practice of physical activity in both age groups, and for how many times a week, without counting the compulsory session within the school (Fig. 10).

According to the (Fig.11); 89% of children and 83% of adolescents admit spending more than an hour watching television or playing with a game box daily, even on school days. 37% of the first age group and 46% of the second admit spending more than two hours. Boys spend more time with game boxes, but girls spend more time watching television. Those who are overweight or obese spend more time sitting watching television or playing with a game box.

Discussion

1.1. The prevalence of overweight and obesity in Algerian children and adolescents

In our study, the prevalence of overweight including obesity is 18% in children between 5-11 years old, according to IOTF thresholds corresponding to 25-30 and 30-40 percentiles of BMI at adult age. The only overweight affects 14% of them, while the prevalence of obesity is 4%. According to the same study, females tend to gain weight more than males, since we recorded 10% overweight and 3% obesity in boys, while we recorded 18% overweight and 5% of obesity in girls between 5-11 years old. Thus, the female gender is 80% more likely to have overweight or obesity by comparing it with the male gender. Girls
have an additional 67% chance of becoming obese by comparing them with boys between 5-11 years old.

The proportions of overweight and obese children are close to those found in the national literature [7,8], but the situation evolves from one year to the next, since in 6 years: the prevalence overweight including obesity is 18% after she was 13.1%; if overweight has only affected 10% of children before, now it affects 14%; obesity reached only 3.1% of this age group at the beginning of this decade, now it is 4% overall according to the most recent study on this age group [9].

The prevalence of overweight including obesity is 24% according to the IOTF thresholds. The only overweight affects 17% of adolescents between 12-17 years old, while the prevalence of obesity is 7%. According to our study, females tend to gain weight more than males, since we recorded 18% of overweight girls adolescent and 16% of boys. About obesity, we recorded 8% of obese girls versus 7% of boys. There is no great difference between the two genders of adolescents in the probability of having extra pounds. The situation is changing quite quickly among adolescents, since through our study we recorded 17% of overweight adolescents, according to a study conducted in 2013 by the Algerian Society of Nutrition (SAN), 13% of adolescents aged 10 to 17 are overweight [10].

At the global level, obesity rates among children and adolescents worldwide have dropped from less than 1% (equivalent to 5 million girls and 6 million boys) in 1975 to almost 6% among girls (50 million) and close to 8% of boys (74 million) in 2016. Combined, these figures are equivalent to multiplying by 10 the number of obese children and adolescents (aged 5 to 18) in the world, their number increased from 11 million in 1975 to 124 million in 2016. In addition, 213 million were considered overweight in 2016, but remained below the threshold of obesity (see figure 12). Fortunately, obesity in Algeria is below global averages, measures must be taken to counteract this scourge [11].

1.2. Factors Associated with Overweight and Obesity in Algerian Child / Adolescent

The prevalence of overweight is higher among girls than among boys, either in children between 5-11 years old or in adolescents between 12-17 years old. Thus, girls between 5-11 years of age are 1.77 times more likely to be overweight or obese, while adolescent girls are 1.08 times more likely to be overweight or obese, which is consistent with published research findings [12,13].

In this study, we arrived that age is a factor associated with overweight and obesity. Thus, 14% of children between 5-11 years old are overweight, and 4% are obese, against 17% of adolescents between 12-17 years old are overweight, and 7% are obese. So, over the years, weight gain seems inevitable, which is consistent with published research findings [14].

According to our survey, the birth weight of the child and the BMI of the parents are risk factors for being overweight or obese. Thus, 85% of parents of children and 75% of adolescents who have extra weight admit that they have always this extra weight since birth. In addition, those children or adolescents who suffer from being overweight say 52% and 48%, respectively, who have overweight or obese parents, which is consistent with the results of published studies [15,16].

This survey showed that: 86% of children's families and 76% of adolescents in this study are ignored or have little nutritional information about foods that eat daily. 73% of those who are overweight or obese admit that this culture is partially or totally absent from family habits at home, which is in line with the results of published studies [17].

According to the results of this study, few children and adolescents respect the meals recommended by dieticians; three to four meals a day. The most striking thing is that more than a third of the sample does not
have breakfast in the morning at home. For those who are overweight or obese, the majority of them take at least two snacks a day, which is consistent with the results of published studies [1-2].

In this study, we found that 22% of children and 38% of adolescents do not practice sport outside the school, in fact apart from the two hours of physical activity in the school. They have no other physical activity, which is in line with the results of published studies [19,20]. Most surprisingly, for those who do not practice physical activity or rarely outside the school, the percentage of girls between 5-17 years is close to 100%. This is essentially due to social taboos and the lack of sports infrastructure. More than two-thirds of those who have extra weight admit to doing sport rarely. In addition to sporting activity, sedentary lifestyle is gaining ground among young people. Our results show that 37% of children and 46% of adolescents spend more than two hours watching or playing without moving. Overweight or obese children and adolescents suffer more from this scourge, which become over time dependent on this kind of recreation, which is in line with the results of published studies [21].

Conclusion
The incidence of overweight and obesity has been increasing rapidly in recent years, particularly among children, becoming a public health problem worldwide. Algeria does not seem to be spared by this phenomenon, since the multiple transitions that Algeria has experienced since the 90s have brought about profound changes in Algerian society, in this case in children and adolescents population.

Our survey was done in July 2018 among children between the ages of 5-11 and adolescents aged 12-17, who frequent a municipal swimming pool confirms the importance of the prevalence of overweight and obesity in youth between 5-17 years old is increasing galloping.

Our results combine with those of other national and international research work, since it has become a global public health plague. Everyone is responsible for this situation: parents, school, media, food industry, etc. To counter the prevalence of overweight and obesity in children and adolescents, and to prevent these young people from chronic diseases: cardiovascular, diabetes, hypertension, etc. efforts must be made to fight the risks of overweight and obesity among our young people. Among these solutions: health policies must intervene early through textbooks in primary school; introduce periodic early detection through school medicine, encourage industry to reduce sugar and salt in cheap foods; encourage parents to be present during meals with their children; it is also important to reduce the amount of time children spend on screen entertainment activities; encourage young people to spend more time on physical activity outside the school. It is the responsibility of local elected officials and non-profit associations, thought to devote a few hours during the week for girls, teenage girls and adult women in stadiums, sports halls, swimming pools, to initiate a strategy to counteract overweight and obesity in the female gender.

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Conflit d’intérêt :
Aucun conflit d’intérêt.

Références


