Evaluation of some anthropometric parameters of students on the site of the Daloa University Campus

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Abstract
The objective of this study is to assess the body mass index (BMI) of some students from the Jean Lorouognon Guéde University in Daloa. The study was conducted on the Daloa campus and included 350 students of different gender and age. Anthropometric data such as weight (P), height (T), waist ratio (TT) and body mass index (BMI) were calculated. The boys in the study are mostly (171.34 ± 6.41 cm) taller than the girls (158.18 ± 5.47 cm), their body weight (64.01 ± 7.73 kg) is greater than that of girls (57.47 ± 9.42 kg). However, girls have a waist size (69.02 ± 7.49 cm) lower than that of boys (73.20 ± 5.23 cm). However, the BMI for girls (23.00 ± 3.85 kg / m²) is higher than that for boys (21.76 ± 1.92 kg / m²). The ratio (waist / waist) of girls (0.43 ± 0.04) is higher than that of boys (0.42 ± 0.02). This allowed us to show that the majority of students are overweight, however some are overweight and others have abdominal obesity.

Keywords: Weight, height, body mass index, abdominal obesity and students

1. Introduction
Throughout human history, weight gain and the accumulation of fat stores have been regarded as signs of health and prosperity (WHO, 2003) [8]. The body mass index (BMI) is today the most commonly used tool for measuring body build. This measure has since become the preferred instrument for studying underweight, overweight and obesity. The increase in the prevalence of obesity and the increase in mean BMI values are not without consequence (Roberts et al., 2012) [13]. These increases can cause harmful effects on the health of young people, both physically and psychologically (Lau et al., 2007; Roberts et al., 2012) [13].

Overweight and obesity is the fifth leading risk factor for death worldwide. At least 2.8 million adults die from it each year (WHO, 2013) [10]. Two societal causes of this galloping epidemic of obesity among young people are clearly identified: an increasingly unbalanced diet and a reduction in physical activity linked to changes in social habits in terms of food and leisure (WHO, 2004; Rauner et al., 2013) [9, 12].

It is clear that the students of the town of Daloa carry out little physical activity and have a limited diet due to lack of means. In order to limit the risks associated with insufficient physical activity and poor nutrition, the student must lead a healthy lifestyle. A study of this group therefore appears useful.

2. Material and methods
2.1 Material

2.1.1 Study population
This study involved 350 students, including 175 boys and 175 girls (Figure 1), who are studying at Jean Lorouognon Guéde University in Daloa. The data have been collected with respect for confidentiality and anonymity.

2.1.2 Inclusion and exclusion criteria
Students with the following characteristics: living in the city of Daloa; to be in a good health; be educated at Jean Lorouognon Guéde University in Daloa. On the other hand, Pregnant or breastfeeding students or physically disabled or sick students were excluded.
2.2 Methods

2.2.1 Determination of anthropometric parameters of the population studied

The anthropometric parameters of the study population included body weight, height, waist circumference and height/height ratio (Figure 1). Body weight was measured at less than 100 g using an electronic and portable scale (150 ± 0.1 kg) (Figure 1A). The size was measured to the nearest 1 mm using a graduated wooden measuring board (200.0 ± 0.1 cm) (Figure 1B) (IAEA, 2010). Waist measurement was measured to the nearest 0.1 cm using a measuring tape. The waist measurement was taken halfway between the last rib and the iliac crest and at the end of the normal expiration (Figure 1C). The size/size ratio was calculated by dividing the waist (cm) by the height (cm). The benchmark size-to-height ratio of 0.50 has been used to define abdominal obesity in boys and girls (McCarthy & Ashwell, 2006).

3. Statistical analyses

The processed data were presented as an average ± standard deviation and as a percentage before being subjected to a one-way analysis of variance (Anova) (Statistica 7.1). ANOVA is performed on the means of anthropometric parameters (weight, height, waist circumference, BMI, height/height), physical activity and eating habits. The normality of distribution was tested by the Kolmogorov-Smirnov test. Chi-square and Fisher's test were used to test the association between the models. The results of the quantitative variables were presented as an average and the comparative analysis was carried out by the Student test. The results of the qualitative variables were presented in percentages and analyzed by the chi-square test. The significance level for all statistical analyzes was set at p < 0.05.

4. Results and discussion

4.1 Results

4.1.1 Anthropometric characteristics of the population studied by sex

The anthropometric characteristics studied are presented in Table 1. The majority of the boys in the study (171.34 ± 6.41 cm) are taller than the girls (158.18 ± 5.47 cm), their body weight (64.01 ± 7.73 kg) is more important than that of girls (57.47 ± 9.42 kg). However, girls have a waist size (69.02 ± 7.49 cm) lower than that of boys (73.20 ± 5.23 cm). However, the BMI for girls (23.00 ± 3.85 kg/m²) is higher than that for boys (21.76 ± 1.92 kg/m²). The ratio (waist/height) of girls is higher than that of boys (0.43 ± 0.04) is higher than that of boys (0.42 ± 0.02).

Table 1: Anthropometric characteristics of students by gender.

<table>
<thead>
<tr>
<th>Anthropometric characteristics of students by gender</th>
<th>Boys</th>
<th>Girls</th>
<th>P. Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (kg)</td>
<td>64.01±7.73</td>
<td>57.47±9.42</td>
<td>0.004</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>171.34±6.41</td>
<td>158.18±5.47</td>
<td>0.006</td>
</tr>
<tr>
<td>Waist size (cm)</td>
<td>73.20±5.23</td>
<td>69.02±7.49</td>
<td>0.007</td>
</tr>
<tr>
<td>IMC (kg/m²)</td>
<td>21.76±1.92</td>
<td>23.00±3.85</td>
<td>0.0008</td>
</tr>
<tr>
<td>TT/T</td>
<td>0.42±0.02</td>
<td>0.43±0.04</td>
<td>0.0064</td>
</tr>
</tbody>
</table>

4.2 Evolution of the body mass index (BMI) of the population studied

Figure 3 shows the evolution of the BMI of the population studied. In girls, 18.18% are underweight and 45.45% are normal weight. In contrast, 31. 82% of girls are overweight and 4.55% have moderate obesity. In boys, 3.85% are underweight and 89.74% are normal weight. 6.41% of boys are overweight and also do not have obesity (Figure 2).
5. Prevalence of abdominal obesity

Figure 3 shows the prevalence of abdominal obesity in the study population. Girls (13.64%) have abdominal obesity than boys (1.28%).

6. Discussion

This active population does not yet know socio-economic affluence. However, the prevalence of overweight exists and in addition increases significantly with age regardless of gender. Overall, there is 12% overweight and 1% obesity. However, the rate of overweight here is high and the rate of obesity is similar compared to previous work done in 16 public high schools in the district of Abidjan, which had shown that 1.42% were overweight and 0.9% obese (Lokrou & Nioblé C., 2008) [4].

Elsewhere, a study at a university in Douala also showed a different prevalence of overweight and obesity among students (19.4% overweight and 3.6% obese) (Ewane et al., 2012) [5]. The study also indicates that the prevalence of overweight increases with age for both men and women. This increase in overweight could be explained by a decrease in physical activity with age (Sallis et al., 1993; Kimm et al., 2002) [12, 3].

The prevalence of underweight (7%) found in our study is lower than that of 10% described by Sbaibi & Aboussaleh, (2011) [15]. Likewise, they differ from those revealed (17.6%) by Aboussaleh et al., (2007) for a population of 306 pupils whose ages varied from 12 to 16 years. The prevalence of underweight among adolescents could be explained either by the intervention of genetic factors (short stature in some adolescents) or by hormonal problems (growth hormones) (Sbaibi & Aboussaleh, 2011) [15].

This study found that the prevalence of abdominal obesity is higher in girls than in boys. Globally, 5% of mortality is due to overweight and obesity (WHO, 2009). Students with overweight and abdominal obesity are at risk for chronic diseases. However, several studies have shown that obesity is a real risk factor for chronic diseases such as hypertension (Moran, 1999; Cabrinety et al., 2002) [6].

The high BMI in girls can be explained on the one hand, by the high proportion of physical activity (lack of regular intense physical activity) and on the other hand, by physiological (hormones), genetic and nutritional factors. However, insufficient intense physical activity may be a risk factor for high BMI in adolescents (boys and girls) (Patrick et al., 2004).
7. Conclusion
This work consisted of studying the body mass index of the students. This enabled us to show that the majority of students are of normal weight, however there are some who are overweight and others who are obese. This overweight is much more common in women than in men. As for abdominal obesity, it is also much more prevalent in women.

8. Reference