

PRESENT ASPECTS OF WEIGHT DEVELOPMENT IN CHILDREN AND ADOLESCENTS

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Abstract: The analysis of Pearson's correlation shows that the body mass index (BMI) is the best indicator of the subcutaneous fat quantity. Having in view the fact that the largest quantity of fats in the organism is subcutaneously placed, we can say that the BMI is the optimum anthropometrical indicator of the fat mass. This conclusion is strengthened by the fact that by the age of 18, FAT is the most strongly correlated with the BMI. The weight corresponding to age is best correlated with the sum of the circumferences, which are made up of the fat mass + low mass, so we can say that that it reveals more the mass and not the fat quantity. The correlation coefficient for the weight index (IP) registered the lowest value in most of the cases.

Keywords: BMI – body mass index, weight mass, IP – weight index G – weight corresponding to age, sum of the skin, tricipital, abdominal folds, shank level, sum of circumferences, arm, waist, shank

Rezumat: Analiza corelațiilor Pearson arată că indicele de masă corporală (IMC) este cel mai bun indicator al cantității de grăsime subcutanată. Având în vedere că cea mai mare cantitate de grăsime din organism se află depozitată subcutanat, putem afirma că IMC este indicatorul optim antropometric al masei grase. Această concluzie este întărită și de faptul că la vârsta de 18 ani FAT se corelează cel mai puternic cu IMC. Greutatea pentru vârstă se corelează cel mai bine cu suma circumferințelor, care sunt alcătuite din masa grasă + masa slabă, deci relevă mai pregnant masa, nu cantitatea de grăsime. Coeficientul de corelație pentru IP a avut în majoritatea determinărilor valoarea cea mai mică.

Cuvinte cheie: IMC- indice de masă corporală, IP- indice ponderal, G- greutatea pentru vârstă, suma pliurilor cutanate, tricipital, abdominal, gambier, suma circumferințelor, braț, talie, gambă

adipocitary waist, without changing the number of adipocytes.

In children, the increase of the fat mass occurs both by increasing the number of adipocytes, and their height, obesity being hyperplastic-hypertrophic.

3. Obesity occurred in childhood and which maintains during adulthood too, is difficult to be treated.
4. Child obesity causes multiple complications, although in children and adolescents, their frequency is much lower than in adults.
5. The incidence of obesity in children is increasing.

For these reasons, we conclude that a large part of the solution to this metabolic disorder may be a paediatric resolution.

OBJECTIVES OF THE STUDY

1. In order to unitarily approach the issue of overweight and obesity, the paper aims to answer the following questions:
 - Which of the parameters used to define obesity and overweight: body mass index (BMI), weight index (IP), weight according to age (G), best expresses the right amount of body fat?
 - Which are the percentiles' values that define overweight and obesity?
2. The paper aims to determine the prevalence of overweight and obesity among the population aged between 7 and 18 of the city of Sibiu, as well as the appreciation of the evolution of overweight and obesity at the age groups of 11 and 14, respectively.

Mention must be made of the fact that we did not find any anthropometric study in the specialized literature, indicating which parameter used for defining obesity and overweight: BMI, IP best expresses the amount of fat quantity in the organism.

INTRODUCTION

Paper motivation:

Child obesity is an important public health problem because:

1. it conditions a good part of adult obesity (between 60-80% of obese adolescents become obese adults);
2. there are essential differences between adult obesity and child obesity.

Adult obesity is a hypertrophy by increasing the

WORKING METHOD

For the statistical accuracy, we should determine whether the variables measured or calculated: BMI, IP, weight, thickness of the tricipital fold, thickness of the abdominal skin, the sum of the skin folds (tricipital skin fold, abdominal skin fold, shank skin fold), the sum of circumferences (circumference of the arm, waist, shank), fit into a Gaussian model.

The appreciation of the distribution of these

variables is done by applying the Kolmogorov-Smirnov test.

In terms of test results, the value of the Asymp coefficient is relevant. Mention must be made of the fact that this is a coefficient calculated through the Kolmogorov-Smirnov test, which revealed the following:

- If the Asymp coefficient is > 0.05 , the distribution of variables is normal - the Gaussian model is observed;
- If Asymp coefficient is < 0.05 , the distribution of variables is not normal – it does not comply with the Gaussian model.

The subsequent statistical analysis – estimating the Pearson's correlation coefficient – aims only at the values of the Asymp coefficient which are higher than 0.05, a necessary requirement to correctly calculate the correlation coefficient.

Regarding the values of variables that have an abnormal distribution (coefficient Asymp less than 0.05), in order to be statistically processed, mathematical operations should be applied, such as: logarithms, square root, inverse of the values.

By applying the Kolmogorov-Smirnov test for each variable mentioned above, the Asymp coefficient that is higher than 0.05, was found in the batch of boys in a percentage of 85.71%, while in the group of girls, it was found in 95.31% of the cases.

In conclusion, in 90.47% of the cases, the distribution of variables was normal. Regarding the variables that did not have a normal distribution, the mathematical operations listed above were applied.

After their application, by using the Kolmogorov-Smirnov test and by calculating the Asymp coefficient, the normal distribution was revealed in all cases.

We took as reference parameters for the establishment of overweight and obesity the BMI, IP and G.

With a normal distribution of variables studied in all cases, the Pearson's correlation coefficient was calculated, which indicated the existence or the absence of the relation between two variables, which were specific items that were part of the same population.

A value of the Pearson's correlation coefficient above 0.5 indicates that the studied variables are well correlated.

Starting from the definition of obesity - a nutritional disorder - characterized by the presence of excessive fat deposits - and given that the largest quantity of fat is placed subcutaneously, by determining the Pearson's correlation coefficient, we calculated which of the reference parameters – to which obesity and overweight are related (BMI, IP, G) – is best correlated with the subcutaneous fat.

At the age of 18, the parameters to which obesity and overweight were related were correlated with FAT – body fat percentage determined through the bioelectric impedance method.

By determining the Pearson's correlation coefficient between the *tricipital skin fold* thickness and

BMI, IP and weight, in boys and girls between 7 and 18 years old, we noticed that the best correlation is made with BMI (0,699), followed by IP (0,067) and weight (0,656).

By calculating the Pearson's correlation coefficient between the *abdominal skin fold* thickness and BMI, IP and weight in boys and girls between 7 and 18 years old, it results that the BMI is the most strongly correlated (0,798), followed by weight (0,758) and IP (0,752).

The correlation coefficient between the sum of the skin folds (tricipital, abdominal, at shank level) and BMI, IP and weight in boys and girls between 7 and 18 years old was the best correlated with the BMI (0,817), followed by (0,773) and IP (0,771).

The correlation coefficient between FAT (body fat expressed in percentages) and BMI, IP and weight, in the boys and girls of 18 years old showed the fact that the strongest correlation was obtained with the BMI (0,783), followed by IP (0,779) and weight (0,706).

In order to determine to what extent the reference parameters (BMI, IP WEIGHT) are correlated with the body fat mass + low body fat mass to define overweight and obesity, we calculated the correlation coefficient between these ones and the sum of the circumferences determined at the same levels of the organism where the skin folds were measured.

The calculation of the Pearson's correlation coefficient between the sum of circumferences (arm, abdomen, shank) and BMI, IP and weight in the boys and girls aged between 7 and 18 years old, revealed the following: the strongest correlation was that referring to weight - 0.869, followed by BMI - 0.852, and IP - 0.771.

Out of the analysis of these correlations, it results that **the BMI is the best indicator of the skin fat quantity**. Having in view the fact that the largest quantity of body fat is subcutaneously placed, we can say that the **BMI is the best anthropometric indicator of the fat mass**.

This conclusion is also strengthened by the fact that at the age of 18, FAT is the most strongly correlated with the BMI.

The weight corresponding to age is the most strongly correlated with the sum of the circumferences, which are made up of fat mass + low mass, so the body mass is more emphasized than the quantity of fats.

The correlation coefficient for IP registered the lowest value in most of the cases.

Therefore, we took the BMI as reference parameter for the establishment of overweight and obesity.

Obesity is a nutrition disorder involving the existence of the adipose tissue in excess, raising the question of how to define this notion of excess, because the incidence of obesity and overweight varies with the definition we give to this disorder.

Most authors agree that regardless of the reference population, or of the percentiles values used,

child analysis reveals the BMI limits based on international data and in relation to the accepted adult BMI. Under these criteria, most studies accept as the definition of overweight a BMI over 85 and for obesity, a BMI over 95%.

The paper in which we applied these criteria to define obesity and overweight is a transversal and prospective study. The anthropometric study addresses the population aged between 7 and 18, of the city of Sibiu. The anthropometric examination included a total of 1431 subjects, boys and girls in approximately equal proportions, representing 8.5% of the population of 1-18 years old.

By applying these criteria in order to define obesity and overweight in the studied population of 7-18 years old of the city of Sibiu, we have obtained the following results:

- Total: Boys – girls - 1431 subjects examined;
- In absolute figures, there are 148 cases of overweight children, representing 10,34%;
- In absolute figures, there are 63 cases of obese children, representing 4,40%.
- Total number of children with nutrition disorders – 211, representing 14,74%.

According to certain studies conducted in the Western part of the country, 14.77% children with nutrition disorders were identified. We cannot make a comparison between the reference system disorders of nutrition used by us (which is the BMI) and the reference system used by the Ministry of Health (which is the weight corresponding to age); otherwise, the tables containing the official reference system was developed in 1999 and have not been updated ever since.

In order to see the changes over the past 8 years of overweight and obesity cases and by using the 85-95 percentile BMI, we compared the nutritional status of certain age groups of 11 and 14 years old (which I found in the archives, the necessary data to the study) and who were examined in 2000, and the same age groups examined in 2008, resulting the following:

The frequency of overweight and obesity cases were recorded in 2000, in comparison with 2008, in the age groups of 11 and 14 years old.

Age: 11 years old

Gender	Year 2000	Year 2008	Increase percentage in the incidence of obesity and overweight
Masculine	Overweight 1,63% Obese 0%	Overweight 10,16% Obese 1,69%	Overweight 8,53% Obese 1,69%
Feminine	Overweight 1,66% Obese 1,66%	Overweight 11,53% Obese 3,84%	Overweight 9,87% Obese 2,18%

The average increase in the incidence of nutritional disorders in the age group of 11 years old -

boys and girls was of 11.13%.

Age: 14 years old

Gender	Year 2000	Year 2008	Increase percentage in the incidence of obesity and overweight
Masculine	Overweight 3,27% Obese 0%	Overweight 12,06% Obese 3,44%	Overweight 8,79% Obese 3,44%
Feminine	Overweight 8,19% Obese 3,27%	Overweight 11,11% Obese 3,27%	Overweight 2,92% Obese 0%

The average increase in the incidence of nutrition disorders in age group of 14 years, boys and girls was of 15.15%.

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