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CORRELATION BETWEEN CHILDHOOD OBESITY AND GLYCOSYLATED HEMOGLOBIN IN CHILDREN 12 YEARS OF AGE OF THE SCHOOL LIC. ISIDRO FABELA

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ABSTRACT: *In the present work was carried out as an object the analysis of correlation between childhood obesity and the glycosylated hemoglobin, taking as a case study to two school groups from sixth grade to perform anthropometric measurements, plicometría, takes blood pressure and glycosylated hemoglobin, thus obtaining as a result 6 children with childhood obesity (4 boys and 2 girls), and a glycosylated hemoglobin average of 5.2%, with a minimum of 5.1% and a maximum of 5.4%, giving as a result that the value of glycosylated hemoglobin is not a significant fact to diagnose a metabolic syndrome, the average of greater impact in children with obesity is the blood pressure, in where the diastolic presented an elevation with respect to the normal parameters, subsequently the fat percentage with respect to children, we have a greater variation of 6%, where particularmnente accumulated in the abdominal area, which indicates a central obesity. It is important to note that children generally have acanthosis nigricans which implies a resistance to insulin.*

KEYWORDS: Childhood Obesity, glycosylated hemoglobin, body mass index.

INTRODUCTION

Obesity is characterized by an increase in deposits of body fat, which is reflected in "a weight gain caused by a positive balance of energy, as a result of supply with a high caloric density by the excess consumption of carbohydrates and fats" (Muñoz, 2017), in the last decades, rates have increased rapidly at the global level, first through the developed countries of the world and more recently in developing countries (Ruiz, 2014), what has been regarded as a pandemic.

The parameter most widely used today is the Body Mass Index (BMI) as diagnostic criteria, is obtained by dividing the weight in kilograms between the height in meters, elevated to the square; which allows to determine weight low, normal weight, overweight and obesity (NOM 043, 2012). In the case of children of 5 to 19 years, according to the World Health Organization (WHO, 2018) the overweight and obesity are defined as follows:

1.- The overweight is the BMI-for-age with more than one standard deviation above the median established in the WHO Child Growth Standards.

2.- Obesity is greater than two standard deviations above the mean established in the WHO Child Growth Standards.

In Mexico, according to OMENT (2016), there is a prevalence of combined 33.2%, overweight and obesity, which makes the country with the highest incidence in the world. It is important to point out that it is one of the triggers of the metabolic syndrome.

The social determinants of child obesity are associated with the life styles that are the reflection of combined genetic factors, habits learned in the family and powerful environmental influences measures by the school and the social environment (Moreira, 2018), this is involved the three core areas, the biological, psychological and social (Loarte, 2018). This problem of public health is currently known as the great pandemic of the twenty-first century (Mercado, 2013), since the prevalence of obesity between os infants, children and adolescents is on the rise throughout the world (WHO, 2016), What has caused health problems at the level of cardiovascular diseases which are the first cause of death in the world, associated with the metabolic syndrome. During the first years and before the age of 18, Obesity has important implications for the physical and mental health in where infants are more likely to suffer from chronic degenerative diseases such as diabetes, arterial hypertension, dyslipidemia, heart disease, kidney and orthopedic problems, among others, in the short term (Cuevas, 2018).

In regard to possible cognitive disorders associated with obesity, in humans has been related Neurohormonal changes hypothalamic with obesity, on the other hand, in the hippocampus of the obese patient can evident metabolic changes that can cause deterioration of this, accompanied by alterations in the learning and loss of memory as a substrate for amnesia and other forms of cognitive impairment (Alcaraz, 2015).

There is a direct relationship between obesity and hyperglycemia, which causes a high concentration of glucose steadily within the agency this alters the Biochemical System of Medicine in the same, a bookmark this is the glycosylated hemoglobin which indicates the level of risk of developing possible complications secondary to diabetes mellitus. The glycosylated hemoglobin (HbA1) is constantly generated during the 120 days of the erythrocyte, that is why a simple measure of this hemoglobin reflects the average number of glucose during the past 3 months; in general, shows the characteristics of prediction of development and progression of the possible complications micro basculares with diabetes (eye, kidney, and vascular peripheral nerves), (Pereira and collaborators, 2015). While higher the level of HbA1, this may increase the risk for the patient to develop multiple complications.

According to the WHO (2017), in 2016 there were 1.9 billion adults are overweight, and 650 million with obesity at the world level; the prevalence has almost tripled between 1975 and 2016. Each year die at least 2.8 million people to cause of obesity or overweight.
In Mexico, according to OMENT (2016), three out of every 10 children are overweight or obese, with a prevalence of combined 33.2% what is really worrying to overweight and

obesity with non-Communicable Diseases (NCD) associated to them many of which are consequences of the box and other causing the same (Cáceres, 2018). While ENSANUT Survey (2016), in the year 2016 notified that the prevalence of overweight/obesity in children was slightly lower than in 2012 (32.1 per cent) compared to 2016 (34.1%). And that the 82.8 per cent of the children were classified as physically inactive (Medina and collaborators, 2018).

Taking into account these alarming figures, according to the Pan American Health Organization (PAHO) and WHO in the Plan of Action for the prevention of obesity in childhood and adolescence revised in the year 2014, Mexico has implemented standards that have been adopted in order to reduce these figures, among which highlight:

1. Taxs on sugary drinks and products with a high caloric content and low nutritional value in order to reduce the consumption.

2. New policies to improve feeding in the school environment, in particular foods sold in schools.

We are looking for the appropriate strategies to reduce this public health problem in Mexico, so it is important to study the impact that have high levels of glucose in a constant way in blood and the damage that this may cause to the structures biochemical the body, because the conduct the study of HbA1, has a high impact on Mexican society.

METHODOLOGY

In this investigation is of type quantitative, transversal and field, where the correction is made between obesity and the parameters of glycosylated hemoglobin.
The BMI is performed according to the standard NOM 043, 2012.
For the glycosylated hemoglobin take a venous blood sample of participants and subsequently sent to disguise the samples.
The sample size will be 12 years that this obesity according to the parameters set by the standard NOM 043, 2012.

RESULTS

According to the results established found of the anthropometric measurements, Table 1 shows the parameters with which it was determined the obesity.

Table 1. Anthropometric measurements in schoolchildren from 12 years of age.

STUDENT	SEX	HEIGHT	WEIGHT	FAT	WAIST	HIP	BMI
1	M	1.41	47.5	27.8	85	85	23.98
2	M	1.4	51.4	28.7	87	89	26.22
3	F	1.51	64.5	35.7	95	105	28.2
4	F	1.49	53.9	30.6	88	88	24.27
5	M	1.47	57.4	23.8	89	98	26.5
6	M	1.47	57.2	29.5	93	94	26.4

Based on the measurements of blood pressure in schoolchildren with obesity, the results in table 2 show the values of systolic and diastolic blood pressures.

Table 2. Systolic and diastolic blood pressure in schoolchildrenfrom 12 years of age.

STUDENT	BP systolic	BP diastolic
1	110	60
2	100	80
3	120	80
4	110	80
5	120	80
6	110	80

Table 3 shows the results of plicometry measurements by body region (left bike, left abdominal, left quadripital, left peroneal, left subscapular, left trichipital, left suprailiac, right, right abdominal, right quadripital, right peroneal, right subscapular, right trichipital, right suprailiac).

Table 3. Plicometría in schoolchildren from 12 years of age.

Student	Left-abdominal	Left-subscapular	Right-abdominal	Right-subscapular
1	20	25	20	25
2	20	20	20	20
3	22	15	22	15
4	23	18	23	18
5	21	15	21	15
6	25	18	25	18

The made studies of glycosylated hemoglobin in the schoolchildren who were obese, it was obtained an average of 5.2% with a maximum value of 5.4% and a minimum of 5.1%; so that

it can be justified that the glycosylated hemoglobin is not a point of alarm for which may relate to childhood obesity.

DISCUSSION

According to the sample selected 13.33 per cent of the student population of the last cycle terminal presented obesity according to Body Mass Index according to the tables percentiles of the WHO (2017), has an average age of 10.83 years with a standard deviation of 0.75, where the 66.7% corresponds to the gender male and 33.3% the female gender.

The analysis correlate made there is a high significance between the BMI with respect to the waist perimeter and hip with a Pearson correlation of 0.821 and 0.915 respectively. Which indicates that this is a central obesity in where the accumulation of fat is directly invading the tissues visceral. The abdominal obesity is the most important factor that gives rise to the metabolic syndrome and the changes that it results in decreased when the patient loses weight (Rubio, 2014).
In the arterial pressure, reflected that 66 per cent of the student population presents an elevation of the diastolic blood pressure, while only 33% presented an elevation of the systolic blood pressure. Giving as a result, that 66 per cent of student population with obesity, also presented arterial hypertension. Indicating that its prevalence is increasing considerably among older children and adolescents, in relation with the alarming prevalence of obesity and metabolic syndrome, which occurs in our midst (De La Cerda, 2014).

The size and weight show a correlation of Pearson of .885 with the value of the accumulation of fat subscapular (left and right). The fold subscapular estimated the truncal obesity, and correlates with the blood lipid profile associated with a higher cardiovascular risk. (Montesinos, 2014).

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