MEDS Public Health and Preventive Medicine (2023)
Clausius Scientific Press, Canada

DOI: 10.23977/phpm.2023.030308
ISSN 2616-1915 Vol. 3 Num. 3

Analysis of endocrine hormone levels and their impact on growth and development in children with simple obesity

Wu Zuchuang

The First Affiliated Hospital of Yangtze University, Jingzhou, Hubei, China

Keywords: Children with simple obesity, endocrine hormones, growth and development

Abstract: The purpose of this study was to investigate the levels of endocrine hormones in children with simple obesity and their impact on growth and development. A research group of 50 children with pure obesity and a control group of 50 children with normal weight were selected. The levels of endocrine hormones in both groups were compared and analyzed. Additionally, indicators such as height, weight, and bone age of children with simple obesity were statistically analyzed to explore the relationship between endocrine hormones and growth and development. The results showed that serum insulin, thyroid hormone, growth hormone, and IGF levels were significantly higher in children with simple obesity compared to normal-weight children. The weight, BMI, and other indicators of obese children were significantly higher than those in the control group, but their height and bone age indicators remained relatively normal. In conclusion, the levels of endocrine hormones are higher in children with simple obesity compared to normal-weight children and are correlated with growth and development. The unique pattern of growth in obese children suggests that individualized treatment should be emphasized to fully utilize the regulatory role of endocrine hormones and promote healthy growth and development.

Obesity is a common nutritional disease, defined by the World Health Organization as a body mass index (BMI) greater than or equal to 30. Among obese patients, simple obesity is a condition of obesity without obvious metabolic syndrome, endocrine dysfunction, or other obvious diseases. Although simple obesity does not have a clear pathological basis, it affects the health and growth and development of children. [1]

Endocrine hormones are important regulators of children's growth and development, including insulin, thyroid hormone, growth hormone, IGF. 1, etc. Research has shown that there is a certain correlation between the levels of endocrine hormones in obese children and their growth and development, but there is no clear conclusion on the levels of endocrine hormones in simple obese children and their impact on growth and development. Therefore, this study aims to explore the levels of endocrine hormones in children with simple obesity and their impact on growth and development.[2]

1. Materials and Methods

1.1 Selection of research subjects

This study selected 50 pure obese children as the research subjects, and another 50 normal weight children as the control group. The age of children is between 8 and 12 years old, with both genders being equal. The selection criteria for children with simple obesity are BMI>85%, but there is no obvious metabolic syndrome, endocrine dysfunction, or other obvious diseases. The selection criteria for the control group are BMI between 25% and 75%. All children underwent physical examinations before the study, ruling out the influence of other chronic diseases or a history of medication treatment.

1.2 Indicator measurement

Measure the height, weight, BMI and other indicators of children with simple obesity, and calculate their BMI values. When measuring height, an upright children's height ruler is used, and when measuring weight, an electronic scale is used. The BMI calculation formula is the square of weight (kg)/height (m). The calculation of BMI value adopts the growth chart standard of CDC.

Meanwhile, bone age measurements were conducted on children with simple obesity. The bone age measurement method was evaluated using the Tanner. Whitehouse3 (TW3) method and left wrist X-ray. The bone age assessment is conducted by a skilled radiologist.[3]

Serum insulin, thyroid hormone, growth hormone, IGF. 1 and other endocrine hormones were measured in simple obese children. Blood collection adopts standard blood drawing techniques, and the levels of various endocrine hormones are measured after serum separation. Serum insulin concentration was measured by radioimmunoassay (RIA), thyroid hormone concentration was measured by chemiluminescence immunoassay (CLIA), growth hormone concentration was measured by radioimmunoassay (RIA), and IGF. 1 concentration was measured by chemiluminescence immunoassay (CLIA).

1.3 Data Analysis

The data analysis was conducted using SPSS statistical software. Firstly, conduct descriptive statistical analysis, including mean, standard deviation, minimum, and maximum values. To compare the differences between the two groups, statistical analysis was conducted using methods such as t-test and analysis of variance. Meanwhile, Pearson correlation analysis was used to explore the correlation between endocrine hormone levels and growth and development indicators.[4]

2. Results

2.1 Endocrine hormone levels

This study found that the levels of serum insulin, thyroid hormone, growth hormone, IGF. 1 and other endocrine hormones in simple obese children were significantly higher than those in normal weight children. The specific data is shown in the Table 1:

This table shows the comparison of different endocrine hormone levels in insulin, thyroid hormone, growth hormone and IGF-1 between simple obesity group and normal weight group. Through this table, we can see that the levels of all endocrine hormones in children with simple obesity are higher than those in normal weight children, with significant differences (P value<0.01). This indicates that there may be some abnormalities in the endocrine system of children with simple

obesity, leading to excessive hormone secretion and imbalanced regulation. Below, we will focus on providing a more detailed interpretation of each endocrine hormone.

Table 1: Comparison of endocrine hormone levels between the simple obesity group and the normal weight group

index	Simple obesity group	Normal weight group	P-value
Indicator insulin (μIU/mL)	17-02±4	8-62±2	<0.01
Thyroid hormone (mIU/L)	2-10±0	1-27±0	<0.01
Growth hormone(ng/mL)	5-48±1	3-20±0	<0.01
IGF-1 (ng/mL)	355-62±54	306-75±42	<0.01

One is insulin, which is an important hormone that promotes glucose absorption and utilization. The table shows that the insulin levels in the simple obesity group are higher than those in the normal weight group, indicating that children with simple obesity may have excessive insulin secretion, leading to excessive glucose absorption, which in turn affects metabolic rate and energy expenditure. The insulin levels of the normal weight group are within the normal range, which is in line with physiological laws.

The second is thyroid hormone, which is an important hormone to promote the synthesis and secretion of thyroid hormone. The table shows that the level of thyroid hormone in simple obesity group is higher than that in normal weight group, which indicates that thyroid metabolism of simple obesity children may be abnormal, leading to hyperthyroidism. The level of thyroid hormone in the normal weight group was within the normal range, in line with the physiological law.[5]

The third is growth hormone, which is an important hormone that promotes the growth of bones, muscles, and other tissues. The table shows that the levels of growth hormone in the simple obesity group are higher than those in the normal weight group, indicating that there may be abnormalities in the growth system of simple obesity children, leading to excessive secretion of growth hormone, which affects growth and skeletal development. The growth hormone levels in the normal weight group are within the normal range, in line with physiological laws.

The fourth is IGF-1, which is an important downstream effector molecule of growth hormone responsible for promoting the growth and development of bones, muscles, and other tissues. This table shows that the IGF-1 levels in the simple obesity group are higher than those in the normal weight group, indicating that the IGF-1 secretion in simple obesity children is excessive, leading to excessive activation of the growth hormone signaling pathway, affecting growth and skeletal development. The IGF-1 level in the normal weight group is within the normal range, which is in line with physiological laws.

2.2 Growth and development indicators

This study found that the weight and BMI of children with simple obesity were significantly higher than those of normal weight children. The specific data is shown in the Table 2:

Height, weight, and BMI are important indicators for evaluating a person's growth, development, and health status. This table shows the comparison of these three indicators between the simple obesity group and the normal weight group.

Firstly, it is height, which reflects a person's growth and development. The table shows that there is no significant difference in height between the simple obesity group and the normal weight group, with a P-value of 0.68. This means that simple obesity does not have a significant impact on the growth and development of height. This may be related to the relatively high levels of growth hormone and IGF-1 in obese children.

Table 2: Comparison of height, weight, and BMI between the simple obesity group and the normal weight group

index	Simple obesity group	Normal weight group	P-value
Height (cm)	145-81±13	146-37±12	0.68
Weight (kg)	52-47±8	38-69±6	<0.01
Body Mass Index (kg/square meter)	24-56±3	17-99±2	<0.01

Next is weight, which reflects a person's weight status. The table shows that the weight of the simple obesity group is significantly higher than that of the normal weight group, with a P value of<0.01. This indicates that simple obese children may be overweight, which increases the risk of diabetes, hypertension, cardiovascular disease and other diseases.

Finally, there is BMI, which is calculated based on weight and height, reflecting a person's level of obesity. The table shows that the BMI of the simple obesity group is significantly higher than that of the normal weight group, P<0.01. This indicates that children with simple obesity have a higher level of obesity, thereby increasing the risk of developing related diseases.

This table displays a comparison of height, weight, and BMI data between the simple obesity group and the normal weight group. The results showed that the weight and BMI of the simple obesity group were significantly higher than those of the normal weight group (P<0.01), but there was no significant difference in height between the two groups (P>0.05). These results indicate that children with simple obesity need to pay attention to controlling weight and BMI to reduce the risk of related diseases.

Table 3: Comparison of bone age between simple obesity group and normal weight group

index	Simple obesity group	Normal weight group	P-value
Bone age (age)	9-62±1	9-22±1	0.12

Table 3 displays a comparison of bone age data between the simple obesity group and the normal weight group. The results showed no significant difference in bone age between the two groups (P value>0.05).

The results of this study indicate that the levels of endocrine hormones in children with simple obesity are higher than those in normal weight children, and there is a certain correlation with their growth and development. Simple obese children have higher body weight, BMI, and other indicators than normal weight children, but their height and bone age indicators are relatively normal. This suggests that obese children should pay special attention to individualized treatment in order to fully exert the regulatory effect of endocrine hormones and promote their healthy growth and development.

3. Discussion

Simple obesity in children refers to weight gain caused by changes in diet and activity levels, without significant disease or drug effects. Many factors can lead to childhood obesity, including genes, diet, daily activity levels, endocrine abnormalities, and so on. The results of this study emphasize the importance of endocrine abnormalities in childhood obesity.

The endocrine system is a key mechanism for regulating the body of children. It consists of a variety of hormones, including insulin, thyroid hormone, growth hormone and IGF-1. These hormones are related to energy balance, growth and development, and metabolism, which is also one of the reasons why endocrine abnormalities may affect childhood obesity.

The research results indicate that the levels of endocrine hormones in children with simple

obesity are higher than those in normal weight children, and there is a certain correlation with growth and development. The levels of insulin, thyroid hormone, growth hormone and IGF-1 were significantly higher than those of normal weight group. The weight and BMI of the simple obesity group were significantly higher than those of the normal weight group, but there was no significant difference in height between the two groups.

These results indicate that children with simple obesity may have lower metabolic rates, leading to energy accumulation and ultimately obesity. The levels of these hormones may have a certain impact on growth and development, especially the levels of growth hormone and IGF-1, which may indicate that the relationship between obesity and growth and development is not only a matter of weight, but also an interaction between endocrine hormones.

In summary, the research findings provide us with a deeper understanding of the relationship between endocrine hormone levels and growth and development in children with simple obesity, which will help us better prevent and treat childhood obesity. In the future, we need to further explore other types of obesity in order to develop more comprehensive and effective prevention and control measures to ensure the healthy growth of children.

Acknowledgement

This work was supported by Construction of Online Open Coursein Pediatrics (KX22005).

References

[1] Liu Junshan, Cui Ninghua. Analysis of blood glucose, lipid, and endocrine hormone levels in children with simple obesity [J]. Chinese Journal of Health Engineering, 2020, 19 (03): 438-439. DOI: 10. 19937/j. issn. 1671-4199-2020. 03. 049

[2] Wang Huijiao, Pang Suijun, Gao Yongwei. Changes in endocrine hormones in children with simple obesity [J]. Medical Theory and Practice, 2020, 33 (07): 1073-1075+1070. DOI: 10. 19381/j. issn. 1001-7585. 2020. 07. 015

[3] Gu Kefeng. Study on Blood Sugar, Lipids, and Endocrine Hormone Levels in Children with Simple Obesity [J]. Electronic Journal of Practical Gynecology Endocrinology, 2020, 7 (09): 119+161. DOI: 10. 16484/j. cnki. issn2095-8803. 2020. 09. 074

[4] Zhu Tianyi. Analysis of endocrine hormone levels and their impact on growth and development in children with simple obesity [J]. Mingyi, 2018 (10): 50

[5] Lv Ruili, Lu Xiaoyun. Analysis of the correlation between simple obesity in children and levels of blood lipids, blood sugar, and endocrine hormones [J]. China Maternal and Child Health, 2018, 33 (02): 347-349