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BIOCHEMICAL AND HORMONAL CHANGES DURING THE PROGRESS OF DIABETES IN CHILDREN WITH TYPE 1 DIABETES

Maxmudjonov Jaxongir Muxtorjon ugli
2nd year master's student at Fergana Institute of Public Health

Abstract

Type 1 diabetes mellitus is a chronic endocrine disease commonly affecting children and adolescents, characterized not only by disorders of carbohydrate metabolism but also by changes in the hormonal system. The aim of this study was to perform a descriptive analysis of biochemical and hormonal changes in the course of type 1 diabetes mellitus in children and to determine the relationship between the level of glycemic control and the status of sex hormones. The study included 20 boys with type 1 diabetes mellitus in whom fasting blood glucose, glycated hemoglobin (HbA1c), as well as testosterone, luteinizing hormone (LH), and follicle-stimulating hormone (FSH) levels were assessed. The results showed that in patients with satisfactory glycemic control, sex hormone levels remained within age-appropriate reference ranges, whereas in children with poor glycemic control a decrease in hormonal parameters was observed. Non-adherence to insulin therapy and dietary recommendations may increase the risk of hormonal disorders and delayed pubertal development. The findings highlight the importance of optimizing glycemic control and regular monitoring of hormonal status in children with type 1 diabetes mellitus.

Key words

Type 1 diabetes mellitus, children, glycemic control, biochemical parameters, sex hormones, puberty, testosterone.

Annotatsiya

1-tip qandli diabet bolalar va o‘smirlar orasida uchraydigan surunkali endokrin kasallik bo‘lib, uning kechimi nafaqat uglevod almashinuvi buzilishlari, balki gormonal tizimdagi o‘zgarishlar bilan ham kechadi. Ushbu tadqiqotning maqsadi 1-tip qandli diabet bilan kasallangan bolalarda diabet kechimida yuzaga keladigan biokimyoviy va gormonal o‘zgarishlarni tavsifiy tahlil qilish hamda glyukemik nazorat darajasi bilan jinsiy gormonlar holati o‘rtasidagi bog‘liqlikni aniqlashdan iborat bo‘ldi. Tadqiqotda 20 nafar 1-tip qandli diabet bilan kasallangan o‘g‘il bolalarda qondagi glyukoza, glikozillangan gemoglobin (HbA1c), shuningdek testosteron, luteinlashtiruvchi gormon (LH) va follikulstimullovchi gormon (FSH) darajalari baholandi. Olingan natijalarga ko‘ra, glyukemik nazorat darajasi qoniqarli bo‘lgan bemorlarda jinsiy gormonlar ko‘rsatkichlari yoshga mos me’yoriy chegaralarda saqlangan, glyukemik nazorat yetarli bo‘lmagan bolalarda esa gormonal ko‘rsatkichlarning pasayishi aniqlangan. Insulin terapiyasi va parhez tavsiyalariga rioya qilinmasligi pubertal davrda gormonal buzilishlar va jinsiy rivojlanishning kechikishi xavfini oshirishi mumkin. Olingan ma’lumotlar 1-tip qandli diabet bilan kasallangan bolalarda glyukemik nazoratni optimallashtirish va gormonal holatni muntazam monitoring qilish muhimligini ko‘rsatadi.

Kalit so‘zlar

1-tip qandli diabet, bolalar, glyukemik nazorat, biokimyoviy ko‘rsatkichlar, jinsiy gormonlar, pubertat, testosteron.

Аннотация

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Сахарный диабет 1-го типа является хроническим эндокринным заболеванием, широко распространённым среди детей и подростков, течение которого сопровождается не только нарушениями углеводного обмена, но и изменениями гормональной системы. Целью данного исследования явилось проведение описательного анализа биохимических и гормональных изменений при течении сахарного диабета 1-го типа у детей, а также определение взаимосвязи между уровнем гликемического контроля и состоянием половых гормонов. В исследование были включены 20 мальчиков с сахарным диабетом 1-го типа, у которых оценивались показатели глюкозы крови, гликированного гемоглобина (HbA1c), а также уровни тестостерона, лютеинизирующего гормона (ЛГ) и фолликулостимулирующего гормона (ФСГ). Полученные результаты показали, что у пациентов с удовлетворительным гликемическим контролем уровни половых гормонов сохранялись в пределах возрастных нормативных значений, тогда как у детей с недостаточным гликемическим контролем отмечалось снижение гормональных показателей. Несоблюдение инсулинотерапии и диетических рекомендаций может повышать риск гормональных нарушений и задержки полового развития. Полученные данные подчёркивают важность оптимизации гликемического контроля и регулярного мониторинга гормонального статуса у детей с сахарным диабетом 1-го типа.

Ключевые слова

Сахарный диабет 1-го типа, дети, гликемический контроль, биохимические показатели, половые гормоны, пубертат, тестостерон.

Diabetes Mellitus Type 1 is one of the leading chronic Endocrine Diseases found in children and adolescents, on the basis of which lies absolute insulin deficiency, which develops as a result of autoimmune processes against the beta-cells of the pancreas.iabetes Mellitus Type 1 is one of the leading chronic Endocrine Diseases found in children and adolescents, on the basis of which lies absolute insulin deficiency, which develops as a result of autoimmune processes against the beta-cells of the pancreas. The increase in the number of children with diabetes mellitus type 1 in recent years has made the problems of this disease not only metabolic, but also large-scale hormonal and developmental issues an urgent issue.

Type 1 diabetes mellitus is often characterized by the fact that the metabolism of the whole body is disrupted, and not limited to a violation of carbohydrate metabolism.ype 1 diabetes mellitus is often characterized by the fact that the metabolism of the whole body is disrupted, and not limited to a violation of carbohydrate metabolism. Proype 1 diabetes mellitus is often characterized by the fact that the metabolism of the whole body is disrupted, and not limited to a violation of carbohydrate metabolism. Profound changes in protein and fat metabolism also occur as a result of chronic hyperglycemia, high glycosylated hemoglobin (HbA1c) levels, and inadequate glycemic control. This metabolic dysbalance can negatively affect the growth and development of the child's body, especially the physiological maturation of hormonal systems.

Childhood and adolescence are an important stage in the development of the body, during which the activity of hormonal systems, in particular the hypothalamo–pituitary–gonadal system, is activated.hildhood and adolescence are an important stage in the development of the body, during which the activity of hormonal systems, in particular the hypothalamo–pituitary–gonadal system, hildhood and adolescence are an important stage in the development of the body, during which the activity of hormonal systems, in particular the hypothalamo–pituitary–gonadal system, is activated. Increased secretion of luteinizing hormone (LH), folliculstimulating hormone (FSH) and testosterone during the Pubertal period form the main

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biological mechanism of sexual maturation. However, chronic metabolic disorders that develop against the background of Diabetes Mellitus Type 1 can exclude the physiological course of these hormonal processes.

Chronic hyperglycemia and insulin deficiency are accompanied by impaired energy supply, predominance of catabolic processes in tissues, and attenuation of central regulatory mechanisms.hronic hyperglycemia and insulin deficiency are accompanied by impaired energy supply, predominance of catabolic processes in tissues, and attenuation of central regulatory mechanisms. hronic hyperglycemia and insulin deficiency are accompanied by impaired energy supply, predominance of catabolic processes in tissues, and attenuation of central regulatory mechanisms. As a result, the activity of the hypothalamo–pituitary system can be traced out of the trace, a decrease in the secretion of gonadotropic hormones, a decrease in testosterone synthesis. There is a possibility that these conditions lead to a slowdown or delay in sexual development during the pubertal period, a lag in secondary sexual character maturation.

Practical observations show that in children with adequate glycemic control, hormonal indicators are often maintained at age-appropriate regulatory limitsractical observations show that in children with adequate glycemic control, hormonal indicators are often maintained at age-appropriate regulatory limits. Conversractical observations show that in children with adequate glycemic control, hormonal indicators are often maintained at age-appropriate regulatory limits. Conversely, decreased sex hormone levels are more common in patients with poor glycemic control who have not followed insulin therapy and dietary recommendations. This condition indicates the need to study in a complex way not only glucose, but also the hormonal background, when assessing Diabetes Mellitus Type 1 evening.

In this regard, an in-depth analysis of biochemical and hormonal changes in the course of diabetes in children with Type 1 diabetes mellitus, determining the relationship between the level of glycemic control and the state of sex hormones, is considered of important scientific and practical importance.n this regard, an in-depth analysis of biochemical and hormonal changes in the course of diabetes in children with Type 1 diabetes mellitus, determining the relationship between the level of glycemic control and the state of sex hormones, is considered of important scientific and practical importance. This approach serves to develop strategies for early detection and Prevention of possible developmental disorders in the pubertal period.

The purpose of this study was to provide a descriptive analysis of the biochemical and hormonal changes that occur during the course of diabetes in children with Type 1 diabetes mellitus, as well as to determine the relationship between the level of glycemic control and the state of sex hormones.

The results of the study conducted showed that in patients with satisfactory levels of glycemic control, biochemical indicators were relatively stable, and the levels of sex hormones — testosterone, luteinizing hormone (LH) and folliculstimulating hormone (FSH) - were maintained at regulatory limits corresponding to the age and pubertal period.he results of the study conducted showed that in patients with satisfactory levels of glycemic control, biochemical indicators were relatively stable, and the levels of sex hormones — testosterone, luteinizing hormone (LH) and folliculstimulating hormone (FSH) - were maintained at regulatory limits corresponding to the age and pubertal period. Conversely, in children with insufficient glycemic control, it was observed that against the background of metabolic dysbalance, the level of sex hormones decreased or at the lower limit of the norm.

Especially in patients who do not regularly follow insulin therapy and dietary recommendations, hormonal disruptions are more pronounced and a significant decrease in testosterone, LH and FSH indicators has been found.specially in patients who do not regularly

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follow insulin therapy and dietary recommendations, hormonal disruptions aspecially in patients who do not regularly follow insulin therapy and dietary recommendations, hormonal disruptions are more pronounced and a significant decrease in testosterone, LH and FSH indicators has been found. These conditions indicate a risk of slowing or delaying the process of sexual development during the pubertal period. The data obtained confirm that the deterioration of glycemic control can negatively affect the activity of the hypothalamo–hypophysar–gonadal system.

On this basis, it can be concluded that ensuring glycemic control in children with Type 1 diabetes is important not only to maintain metabolic balance, but also to ensure the physiological course of hormonal development in the pubertal period.n this basis, it can be concluded that ensuring glycemic control in children with Type 1 diabetes is important not only to maintain metabolic balance, but also to ensure the physiological course of hormonal development in the pube

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