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Quality of life of children with diabetes melitus associated with iron deficiency anemia

Abstract: On the basis of studies found the impact of anemia on the course of diabetes in children and adolescents is characterized by increased appearance of symptoms of the disease decompensation, decreased physical abilities, intellectual and psychosocial functions of patients.

Key words: diabetes, iron deficiency anemia, quality of life, children and adolescents

Topicality. Diabetes mellitus (DM) is the most widely spread endocrine disease which is recently called world non-infectious epidemics: it is supposed that the number of DM patients will exceed 300 million to 2025. It means that remote complications, appearing as a result of metabolic disorders caused by hyperglycemia, will also increase. It is well known that the duration and quality of DM patients' life is conditioned by the development and progress of the complications [2, 8–9; 4, 62–63]. Opposite to that, in the case of one-moment patients' examination in one of Australian diabetic clinics it was detected that 23% of them were diagnosed anemia according to WHO criteria [5, 1165–1667]. There are cogent data of the latest researches proving that anemia has unfavorable impact on the progress of

diabetic complications, it increases the risk of cardiovascular diseases and rise of lethality.

We found a lot of works dedicated to interrelation of anemia and diabetes mellitus in adults in scientific-research references. Though, that problem is not clarified in children yet, and the available works are inconsistent [3, 2–4]. Besides that, we didn't find works dedicated to the quality of children's life with diabetes mellitus complicated by anemia.

In relation with that, we consider it reasonable to study the effect of anemia on the progress and quality of life of children with pancreatic diabetes.

Materials and methods of the research: the research includes the results of examination of 72 children with the 1st type diabetes mellitus aged

from 5 to 18 years old sick and getting insulin therapy from one to ten years.

For the evaluation of anemia impact on the quality of life of children with diabetes mellitus the patients were divided to two groups: the first group ($n = 43$) included children with DM and anemia, and the second group ($n = 29$) — children with DM without anemia.

The evaluation of QL of sick children was performed using international standard inquirer PedsQL™: its common and diabetic modules. PedsQL™ (Pediatric QL inquirer) is one of the most popular inquirers in the world [1, 7].

That inquirer is meant for the study of QL of patients aged from 2 to 18 years old inclusive suffering DM. The mentioned instrument consists of 28 questions united in the following scales:

«Diabetes» (clinical manifestations of hypoglycemia, keto acidosis) — 11 questions;

«Therapy» (problem situations appearing due to the necessity of daily glycemia self-control, insulin therapy, complaints of painful feelings) — 11 questions;

«Anxiety» (the risk of acute and chronic diabetic complications development, worry about the efficiency of performed therapy) — 3 questions;

«Communication» (complications in patients communication with medical staff and surrounding people) — 3 questions.

The answers to the questions in both modules are presented in 5-point Likert's scales (horizontally located variants of answers to the questions, each of which correspond to certain number). The amount of points in the answer varies from 0 to 4 (0=never, 1=almost never, 2=sometimes, 3=often, 4=almost always). There are from three to five answers suggested for each question (dependently on the age of children).

The respondent can choose only one of the suggested answers. Each question is estimated according to the frequency of proposed situation appearance for “the last month”. The final results of each scale of the inquirer are presented in points from 0 to 100: the greater is the total value the better the quality of life is.

The results of the research: in manifestation period of DM all examined patients had prevailing typical symptoms of the disease such as thirst, polyuria and progressing loss of body weight.

The structure of DM 1st type complications among children the first place is occupied by diabetic neuropathy (79,2%), less percentage — nephropathy (5,6%), retinopathy (4,2%) and diabetic cataract (1,4%).

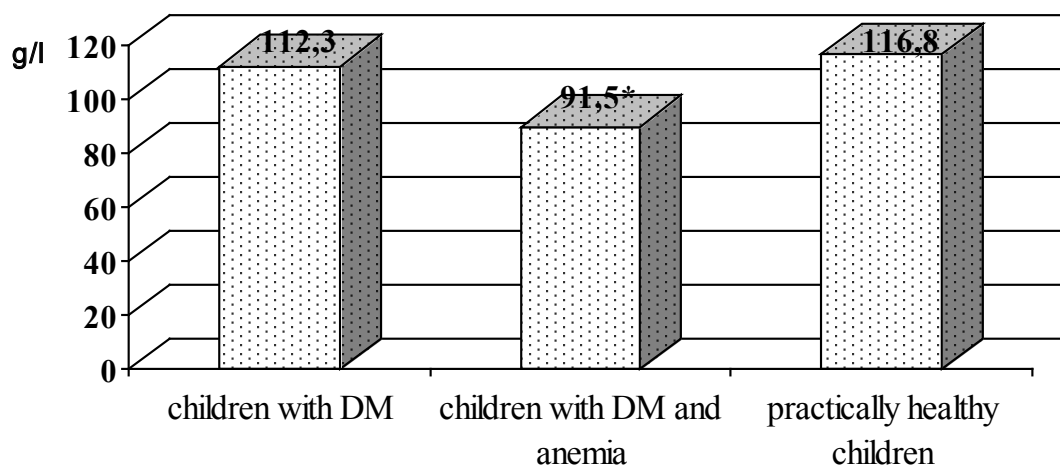
Specific weight of iron deficiency anemia (IDA) frequency among children with DM is 59,7%.

Several reasons were detected in the analysis of anemia development in children with pancreatic diabetes. Among these reasons there is inflammation, insufficient nutrition, accompanying autoimmune diseases, renal diseases, drugs and hormonal alterations.

According to the received data it was detected that anemia in children with DM increases the risk of unfavorable progress of diabetic retinopathy, nephropathy, neuropathy and cardiac-vascular complications.

Thus, the given group of children more often had registered cardiac-vascular diseases in comparison with DM patients without anemia (52,9% con 34,5% correspondingly), and it is evidently linked with the independent factor contributing disorder of the work of heart and blood vessels.

Children with DM associated with anemia have average HbA1c value $9,2 \pm 0,12\%$: 23,2% patients had the values of metabolic control corresponding to sub-compensation level, and 76,7% — de-compensation level.



* — reliability of the data in comparison with practically healthy children and children with DM ($P < 0,01$)

Figure 1. Concentration of hemoglobin in peripheral blood of children with DM

Children with DM without anemia had HbA1c average value $7,1 \pm 0,14\%$: 12 patients (41,4%) had sub-compensation state, 17 patients (58,6%) — carbohydrate exchange compensation state.

Study of hemoglobin level in children with DM with anemia showed that hemoglobin concentration in the patients of that group was much lower than that of the comparison group ($P < 0,01$) (fig. 1).

The given contingent of children had decrease of appetite, physical abilities, intellectual and mental functions because of the background anemia.

The analysis of the values of life quality was conducted in three age groups in compliance with methodic standards: from 5 to 7 years old inclusive, from 8 to 12 years old inclusive, from 13 to 18 years old inclusive.

The group of children with DM associated with anemia had prevailing patients aged 5–7 years old (44,2%), though in case of DM without anemia prevailing age group was 8–12 years old children (34,5%) and 13–18 years old (37,9%). Reliable decrease of the level of physical, emotional, social and psycho-social functioning, functioning in kindergarten and school (tab. 1) in all age groups was detected in the analysis of the values of life quality of children and adolescents with DM associated with anemia.

According to the data of diabetic module children of kindergarten and junior school age gave the lowest evaluation of “Diabetes” scale among patients of the 1st and 2nd groups, and the highest values in that age group were given to “Therapy” (unit 1) and “Anxiety” scales.

Table 1. – Comparative values of life quality of children and adolescents

Scales of inquirer	Estimation of age groups					
	5–7 years old		8–12 years old		13–18 years old	
	1 group	2 group	1 group	2 group	1 group	2 group
1. Common module						
Physical functioning	$69 \pm 1,2$	$80,5 \pm 1,4^*$	$72 \pm 1,1$	$92,5 \pm 0,5^*$	$72 \pm 0,9$	$94 \pm 0,8^*$
Emotional functioning	$68 \pm 1,1$	$74 \pm 0,9^*$	$77,5 \pm 1,1$	$82,5 \pm 1,2^*$	$80 \pm 1,3$	$90 \pm 1,1^*$
Social functioning	$75 \pm 1,2$	$79 \pm 0,9^*$	$82,5 \pm 1,2$	$95 \pm 1,2^*$	$90 \pm 0,8$	$95,5 \pm 0,9^*$
Functioning in kindergarten/school	–	–	$82,5 \pm 1,1$	$80 \pm 1,3$	$55 \pm 1,4$	$77,5 \pm 1,1^*$
Psycho-social functioning	$72 \pm 1,1$	$77 \pm 1,2^*$	$82,5 \pm 1,3$	$86 \pm 0,9^*$	$75 \pm 0,8$	$90,5 \pm 1,1^*$
Summary point	$71 \pm 1,0$	$78 \pm 1,2^*$	$81 \pm 1,1$	$89 \pm 0,9^*$	$74 \pm 1,3$	$89,5 \pm 0,9^*$
2. Diabetic module						
«Diabetes»	$63 \pm 1,2$	$64 \pm 1,3$	$59 \pm 1,2$	$86 \pm 1,2^*$	$64 \pm 1,1$	$79 \pm 1,3^*$
«Therapy» unit 1	$82 \pm 1,1$	$93 \pm 1,2^*$	$81 \pm 1,3$	$88 \pm 1,1^*$	$88 \pm 1,2$	$87 \pm 1,4$
«Therapy» unit 2	$86 \pm 1,3$	$85 \pm 1,2$	$64 \pm 1,4$	$100 \pm 0,8^*$	$89 \pm 1,1$	$93 \pm 0,9^*$
«Anxiety»	$80 \pm 1,4$	$84 \pm 1,1^*$	$75 \pm 0,9$	$67 \pm 0,9$	$58 \pm 1,6$	$87,5 \pm 1,3^*$
«Communication»	$69 \pm 1,2$	$67 \pm 1,3$	$75 \pm 1,2$	$83 \pm 1,2^*$	$100 \pm 0,9$	$100 \pm 0,6$

Note: * — reliability of the data between the groups ($P < 0,05-0,01$)

Initially at the debut of the disease all manipulations (self-control, glycemia values interpretation, count of bread units, insulin injection) of the patients of that age group are performed by their parents because of patients' young age. Though, as it was clarified in the process of individual interview, in future the situation does not change in most of the families. Children are more like detached onlookers and not active participants of the process. That's why most of the situations immediately linked with the process of pancreatic diabetes therapy are not considered to be problematic for them, except periodically appearing painful feelings relevant to insulin injection and/or taking blood samples for self-control of glycemia.

Because of young age these patients do not worry about diabetic complications and are not afraid of the

aforsaid complications, and it is reflected in the evaluation in “Anxiety” scale.

Respondents of the middle age group considered the situations linked with self-control and insulin injection less problematic and painful in comparison with younger children, and that can be conditioned by the adaptation to own disease, rise of pain sensitivity threshold with proceeding of DM.

Different from younger children, significant part of the respondents in the age of 11–15 are ashamed of their disease. Because of the same reason most of them avoid questions about their disease in communication with other people.

The wish of being similar to children of the same age is a distinctive feature of children at that stage of personality

development, and often it becomes the reason of deviation of therapy curriculum, leading in its turn to appearance of several conflict situations in relations with parents. That is proved by estimation in the "Therapy" (unit 2) scale.

In the analysis of the received data we pay attention to the fact that all three age groups estimated "Diabetes" scale, reflecting disease de-compensation symptoms, very low, proving labile progress of DM in overwhelming majority of inquired respondents. Though adolescents and children of senior school age are more concerned about the symptoms characteristic for hypoglycemic states (shivering, headache, hunger), while kindergarten age children, on the opposite, more often subjectively feel manifestations of hyperglycemia (thirst, often urination, rise of appetite).

The respondents of the senior group (mostly girls) differ from the other patients by the high degree of anxiety about developing and progressing of chronic diabetic complications reflected in extremely low estimation in the "Anxiety" scale. Among the patients with DM 1st type the worry about future characteristic for all teenagers [6, 63]

is additionally aggravated by the awareness of their disease as a new category of existence, reality of invalidity and possible limitation of workability.

We would like to notice, that reliable low values in the evaluation of diabetic module were received from the children of the 1st group ($P < 0,05-0,01$).

Thus, anemia has negative impact not only on the clinical progress of DM, intensifying the development of the disease and its complications, but also life quality of these children and adolescents.

Conclusions

1. The impact of anemia on the progress of pancreatic diabetes in children and adolescents is characterized by the increase of disease de-compensation symptoms, decrease of physical abilities, intellectual and mental functions of the patients.

2. The negative effect of diabetes mellitus associated with anemia on the quality of life of children and adolescents is proved and it is related to the decrease of the level of physical, emotional, social and psycho-emotional functioning.

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