Discription of Changes in Species Composition of Intestinal Bacterial Community in the Urbanized North Environment


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Abstract: To establish that the persons living in the North, in a half (56.0 %) are observed intestinal dysbiosis on the 3rd, 4th or more indicators. In children under the age of microbiotsenoz is formed with a significant increase in the number of coccid forms of microorganisms, opportunistic Enterobacteriaceae, hemolytic E. coli in reducing the number of bifidobacteria lactobacteria-Reay and typical E. coli. In older children and adults in the overwhelming majority of cases of intestinal bacteria overgrowth is caused by a reduced content of lactic acid bacteria (92.0 and 87.0 %, respectively), less bifidobacteria and typical coliform of bacteria in a significant increase in the number of coccid forms of microorganisms and representatives of opportunistic enterobacteria.

Key words: Intestinal dysbiosis • People in the North

INTRODUCTION

The state of the intestinal microflora is affected by aggregate factors of endogenous and exogenous nature. Exogenous factors include climatic, geographical, environmental, occupational and living conditions. The qualitative and quantitative composition of microflora is affected by somatic and infectious diseases, antibiotic therapy, as well as presence of congenital and acquired immunodeficiency diseases [1, 2, 3, 4]. In recent times, violation of microflora, the immune reactivity status and the disease manifestation are considered as a whole; at that, the triggering function in each case can be initiated by any of these triad components [5, 6, 7].

The most important feature of children is the existence of critical periods of growth and evolution, when the sensitivity of the infant’s body to the pathogenic external influences (xenobiotics and physical factors) increases [8, 9, 10]. Leading role in the development of certain children’s pathological conditions belongs to genetic factor, as well as to anti- and perinatal factors. However, environmental pollution factors, overlapping with mentioned risk factors, can have a decisive effect in the development of pathological states in a certain period of a child's life. Preschool age (4-6 years) refers to the critical period of child’s evolution, characterizing by reduced activity of tissue immunity. In this period delayed manifestations of immunodeficiency are usually revealed, as well as variety of chronic illnesses [11].

Analysis of the species composition of the microorganisms in the intestinal biocenosis abnormality was not carried out among northerns.

The Aim of the Work: Was to study the features of the species composition of the intestinal bacterial community in the urbanized North environment.

MATERIALS AND METHODS

A clinical and laboratory study of patients with intestinal dysbacteriosis has been performed. Patients were divided into groups depending on their age: children under 1 year (group 1; n = 53), children from 2 to 15 years (group 2; n = 52) and individuals from 16 to 29 years (group 3; n = 52), who had lived in the North not less than 15 years.
The studies were carried out at the laboratory of "Clinical and Experimental Pathology" of the Medical Institute, Surgut State University (Head of Laboratory, Ph.D., Professor A.V. Kuyarov), bacteriological laboratory of the Surgut District Clinical Hospital (Head of Laboratory, O.E. Horeva), day surgical hospital MBUZ "Municipal Polyclinic No 4", department of clinical immunology and allergology of the "Center of Diagnosis and Cardio-Vascular Surgery" at the BU KhMAO "District Cardiology Dispensary".

RESULTS AND DISCUSSION

To evaluate changes in the intestinal microbial community at dysbacteriosis, a comparative analysis of the intestinal microflora state was carried out based on the indicator deviation from the normal parameters of eubiosis (Figure 1).

It was found that in a group of children under 1 year, laboratory abnormalities of one indicator were observed in 9% of cases, two indicators - in 36% of cases, three indicators - in 25% of cases and four or more indicators - in 30% of cases. On average, in the group 1 this indicator was 2.7±0.1. Similar abnormalities were observed in the older age groups, where the average indicator was 2.8±0.1 and 2.6 ± 0.1, respectively. It is important to note that in more than half cases (56.0%), the individuals, living in the North, had intestinal dysbacteriosis that was indicated by three, four, or more laboratory abnormalities.

The studies of the species composition of the intestinal microflora revealed that changes in the species composition of the microflora in the age group of children under 1 year (Fig. 2) manifested by abnormality of one indicator have been largely associated with an increase in the number of coccoid forms of microorganisms (60.0% of cases), as well as an increase in the number of hematolytic *E. coli* and opportunistic pathogenic enterobacteria (20.0% of cases).

The manifestation of dysbacteriosis by two indicators, along with the rise of coccoid forms of microorganisms (CFM) (up to 52.0% of cases), increasing the number of hematolytic *E. coli* (HEC) (37.0%) and opportunistic pathogenic enterobacteria (OPEB) (31.0% of cases), followed by reduction in the total number of *E. coli* (TAEC) (5.0% of cases), the amount of lactobacilli (LB) and bifidobacteria (BB) (up to 26.0% of cases) with increasing the amount of enterococci (EC), clostridia (clostr.) and yeast-like cells (YC).

Abnormality of the intestinal microflora by three indicators was additionally characterized by further increase in the number of cases with lactose-negative *E. coli* (LNEC) (up to 23.0% of cases). We observed decrease in lactobacilli and bifidobacteria (up to 38.0% of the cases), total amount of *E. coli* (15.0%) at increasing the content of coccoid forms of microorganisms (up to 84.0% of cases), opportunistic pathogenic enterobacteria (81.0% of cases), clostridia (38.0% of cases), lactose-negative *E. coli* (up to 23.0% of cases), as well as yeast-like cells (15.0% of cases), hemolytic *E. coli* and enterococci.

At abnormality of the intestinal microflora by four or more indicators, most often we observed the cases of increased content of coccoid forms of microorganisms (up to 94.0% of cases), opportunistic pathogenic enterobacteria (81.0%), at the reduction in the amount of lactobacilli and bifidobacteria (up to 50.0% of cases).

Changes in the species composition of the intestinal microflora at dysbacteriosis in the age group of children from 2 to 15 years (Fig. 3) were significantly different from the indicators of the previous age group.

As well as in the case of dysbacteriosis manifested by just one indicator, in case of a more significant abnormality of eubiosis, vast majority of the tested children showed the decrease in lactobacilli (87.0-100% of cases). Abnormality of flora manifested by two or more indicators was associated with a significant increase in the number of individuals who have shown a decrease in the total amount of *E. coli* (up to 81.0% of cases) at the increase in content of coccoid forms of microorganisms (94.0%) and opportunistic pathogenic enterobacteria (56.0% of cases). Changes in the species composition of the intestinal microflora at dysbacteriosis for the individuals over 16 years (Fig. 4) were similar to abnormalities of eubiosis in the group 2. In most cases, there was decrease in lactobacilli (88.0-100% of cases). The abnormality of the flora was associated with a significant increase in the number of individuals who have shown a decrease in the total amount of *E. coli* (up to 71.0% of cases) at the increase in content of coccoid forms of microorganisms (86.0%) and opportunistic pathogenic enterobacteria (57.0 % cases).

The assessment of changes in the species composition of the intestinal microflora at dysbacteriosis in different age groups (Fig. 5) made it possible to reveal that children under 1 year showed intestine microbiocenosis with a significant increase in the amount.
Fig. 1: Indicators of the intestinal microflora state in the studied groups depending on number of laboratory abnormalities

Fig. 2: The frequency of changes in species composition of the intestinal microflora at intestinal dysbacteriosis in the group of children under 1 year, n = 53 (↑TAEC, ↑LNEC, ↑HEC, ↑OPEB, ↑CFM, ↑YC, ↑EC, ↑Clostr., ↑LB, ↑BB)

Fig. 3: The frequency of changes in species composition of the intestinal microflora at dysbacteriosis in the group of children from 2 to 15 years (↑TAEC, ↑LNEC, ↑HEC, ↑OPEB, ↑CFM, ↑YC, ↑EC, ↑Clostr., ↑LB, ↑BB)
Fig. 4: The frequency of changes in species composition of the intestinal microflora at dysbacteriosis in the group of individuals from 16 to 29 years (TAEC, LNEC, HEC, OPEB, CFM, YC, EC, Clostr., LB, BB).

Fig. 5: Changes in species composition of the intestinal microflora at intestinal dysbacteriosis in different age groups, % (TAEC, LNEC, HEC, OPEB, CFM, YC, EC, Clostr., LB, BB).

of coccoid forms of microorganisms (73.0%), opportunistic pathogenic enterobacteria (49.0%) and hemolytic *E. coli* (21.0%) at reduction in the amount of bifidobacteria (34.0%), lactobacilli (23.0%) and the typical *E. coli* (17.0%). The intestinal dysbacteriosis of preschool- and school-age children, as well as the individuals over 16 years, in the vast majority of cases was caused due to reduced amount of lactobacilli (92.0 and 87.0%, respectively), more rarely bifidobacteria (36.0 and 40.0% of cases) and typical *E. coli* (50.0 and 37.0% of cases, respectively) at significant increase of coccoid forms of microorganisms (56.0 and 47.0% of cases) and some of opportunistic pathogenic enterobacteria (36.0 and 27.0% of cases).

Thus, conducted studies of the species composition of the intestinal microflora at dysbacteriosis in different age groups revealed that more than half (56.0%) of the total population, living in the North, is subjected to intestinal dysbacteriosis manifested by abnormality of 3, 4 and more indicators. Children under 1 year are subjected to intestine microbiocenosis with a significant increase in the amount of coccoid forms of microorganisms, opportunistic pathogenic enterobacteria and hemolytic *E. coli* at reduction in the amount of bifidobacteria, lactobacilli and typical *E. coli*. The intestinal dysbacteriosis of preschool- and school-age children, as well as individuals over 16 years, predominantly was caused due to reduced amount of lactobacilli (92.0 and 87.0%, respectively), more rarely bifidobacteria and typical *E. coli* at significant increase of coccoid forms of microorganisms and some of opportunistic pathogenic enterobacteria.
REFERENCES