Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 4385 - 4390

Received 15 December 2020; Accepted 05 January 2021.

Alterations in Intestinal Micro Flora in Children with Allergic Rhinitis

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Abstract: The article considers the problems to study peculiarities in intestinal micro flora in children with allergic rhinitis (AR). Microbe flora settled in intestine have an active part in the maintenance of local and systemic immunity. It interacts with the cells of lymphoid tissue (physiological structure, performing protective function); and researches consider this interaction to be the basis for the relevance of allergy and intestine.In the article, children with AR were randomized to two groups. Inthebasicgroupchildrenreceivedbasictherapyforthemain disease with addition of probiotic BIFOLAK ACTIVE (BIOTACTDEUTSCHLAND), while in the control group children received only basic therapy. That agent was chosen as it is the only probiotic effecting all parts of gastrointestinal system, including large intestine.

Key words: allergic rhinitis, children, IgE, gastrointestinal dysfunction, probiotic, therapy, BIFOLAK ACTIVE.

Introduction

Since the initial days of life (and before than intrauterine) intestine affects formation of immune response. So, developmentofprotectivemechanismsandtheiractivity in the future depend on the stability and balance of micro flora settling on sterile surface of intestinal mucous membrane of a new-born baby [1,3,6].Thus, prerequisites of disorders in the immune system appear in early childhood. Immatureorganismofayoungchildhas to adjust to new, sometimes hostile conditions. After birth protection received from mother (antibodies, or special protein complexes transmitted through placenta and breastmilk) helps to overcome certain risks (infection). However, it is valid only for a few months; after that a baby needs his own immunity, even imperfect one. Gastrointestinal tract is a physiological barrier for antigens, in other words alien substances. Every day it catches hundreds and thousands of pathogens such as viruses, bacteria, allergens, parasites, and food proteins [2,4].

Whenfloraisnormalandmostlyincludes “regular” typesofmicroorganisms (bifidobacteria and lactobacilli) immunity responds only to certain antigens, for example infectious agents, while the mechanism of tolerance or immunity to allergens coming with food operates accurately and in harmony [5,6]. At the same time, allergy as a pathologically keen sensitivity to food antigens, wool, animals’ saliva, cosmetics, household dust and other media can be linked with alteration in the balance of useful and relatively pathogenic flora or dysbacteriosis.

The last group always lives in intestine, but if “regular” microbes dominate, it is not dangerous. However, in certain circumstances there can be sudden rise in the number of colonies of unfavorable micro organisms with no possibility to suppress their growth, and it can affect the

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process of digestion and immune protection. Intestinalallergyhasacuteorchronicprogression, it can cause exhaustion of body and development of anemia (decrease in erythrocyte number and blood hemoglobin) [9,10,11]. Somepatientshaveconstipation or congestion of fecal mass in intestine. Duetoabsenceoftimelyexcretionofballastsubstancesthereisintoxication, i.e. absorption of decay products to blood and poisoning of the organism. That intensifies indigestion, dysbacteriosis, and results in individual intolerance forming vicious circle [7,8].

Theobjective:to study peculiarities in intestinal micro flora in children with allergic rhinitis (AR).

Methods

Forty children, diagnosed with AR at the moment of the first application, were enrolled in the study. Amongthem 51.7% of the patients had combined allergic lesion of nose and gastrointestinal tract.

Twenty-onechildrenappliedwiththeinitialmanifestationsof AR observed at the age of 3-6 years old (average age 5.09 years old) and nineteen children within the period from 6 to 9 years old (average age 7.8years old). Maximal number of primary applications due to clinical symptoms of AR was registered among the children under 3 (38.6 %), less among the children of 3-6years old (36.3 %), and the least from6 to 9 years old (25.1 %). Comparison group included 20 children from 3 to 9 years old with no hereditary atopic pathologies (average age7.9 years old).

Researchmethodsincludeddefinitionofqualitativeandquantitativecompositionofintestinalmicroflora in children, dynamic definition of the number of eosinophiles by means of immersion microscopy of stained smears in compliance with Romanovsky-Gimza's method and definition of total immunoglobulin E (IgE) using enzyme immunoassay according to the recommendations of the manufacturer. Morbidityrateswithsomaticandinfectiousoriginwereassessedwith the help of interviewing parent and analysis of children's medical cards (history of physical development № 112). Statistical processing of the result was performed using STATISTICA for WINDOWS 6.1 software.

Results and discussion

All the children with AR had hereditary predisposition to allergy, most often inherited from mothers (67.6%). Among the relatives of the children in both groups we registered high prevalence rates of intestinal pathologies (27.5%) and helminth-protozoa infections (8.9%).Allergicandsomaticdiseasesinthemajorityofthemothersconditioned the high rates of morbidity within pregnancy. Mother of children with AR had chronic tonsillitis more often, than those from the comparison group (29.2 % versus7.5 %, p=0.011), and four of them (6.7 %) had exacerbation during pregnancy.Pregnancy with chronic pyelonephritis was registered in18women out of 40 from the basic group (45 %) and 6 out of 20 in the comparison group (30.0 %), exacerbation was registered only among the women of the basic group (n=12, p=0.017). the women of the basic group statistically more often had ARVD (69.7 % versus 22% in comparison group, p=0.001). Every second woman in the basic group was diagnosed with giardiasis (30 % versus 10 % in comparison group, p=0.005), which was not treated during the pregnancy. Womenfromthebasicgroupsignificantlymoreoftenhadariskofmiscarriage (40 % versus15 %, p=0.001) and statistically significant number of diagnoses of CMV (25 % in the basic group versus10 % in the comparison group, p = 0.001). Isolation of Candida albicans in cervix observed only in 10 women from the basic group (p = 0.001) was due to administration of antibacterial agents for the therapy of chronic diseases.Fifty percent of the women from the basic group had

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preterm birth and 30% had abdominal delivery. In the comparison group these values were equal to40.0% and25%, respectively.

Health status of all children at birth was considered to be satisfactory. We revealed no statistically significant differences in mean anthropometric parameters. The work with the mothers of the children with AR started from the maximal preservation of lactation. The leading line in the interaction with the parents was teaching the bases of rational nutrition taking into account atopy. Symptomsofallergicrhinitisin 78.3% of the children under 5 were observed during the whole year.

Withininitialthreeyears 45% of the children had exacerbations of nasal syndrome with running nose due to violation of diet or administration of pharmaceutical agents for the treatment of ARVD. During the next two years exacerbations were registered in25.0% of the children with stuffy nose due to violation of diet. Exacerbations were stopped by means of prescription of histamine receptorH_1blockers and topical application of glucocorticosteroids for not more than 7 days. Further follow up in catamnesis till 6 years old did not reveal any exacerbations of AR.

Primary complaints of mothers together with running or stuffy nose were intestinal dysfunctions manifested in colic, pathological inclusions such as green, blood, foam or constipation for several days. Bacterial tests of feces showed no statistically significant differences in the isolation of relatively pathogenic micro flora (RPF) in children of the basic and comparison groups, though Staphylococcus aureusandKlebsiellapneumonieaetiters were higher in the basic group (10^6-10^{12}), while in the comparison group these did not exceed 10^4. Clinical manifestations of debut and therapy of the allergic process dependent on the type of RPF had significant differences. Presence of Staphylococcus aureusin the first month of life was displayed by intestinal dysfunction accompanied by intestinal colic, mucous and green feces. Presence of Klebsiellapneumonieae conditioned manifestations of various stages of hem colitis (from single blood streaks to excessive amount).

Total immunoglobulin E was tested at the primary application and by the end of the second year of follow-up. FirsttestofIgEshowedaverage465.50 ± 121.71IU, while the next showed 99.14±23.6 IU (p=0.001), which testifies decrease in the allergic process intensity (p = 0.001).Numberofeosinophilesinthechildrenofthebasicgroupreached4.9±0.21 %, andinthecomparisongroup 1.4±0.2% (p=0.001). Statisticallysignificantprevalenceofeosinophilesinchildrenofthebasicgroupwaspreserveduntil 6 months. Latertherewasnonotabledifference, whilethelevelofeosinophileswashigherinthecomparisongroupduetogreaterprevalenceofworminfestation.

Useful properties ofBIFOLAK ACTIVEare conditioned by alive sublimated probiotic bacteria possessing antagonist activity against a wide range of pathogenic and relatively pathogenic micro organisms. Great quantity of bifidobacteria and lactobacilli promotes fast recovery of physiological balance of intestinal micro flora and activate protective mechanisms in body improving activity of gastrointestinal tract, exchange processes and parietal digestion. BIFOLAK ACTIVEdiminishes the risk of allergens manifestation due to good digestion of the consumed food; bacteria synthesize proteolytic enzymes splitting protein (and other toxins and allergens) and decrease development of allergy. Probiotic bacteria synthesize proteolytic enzymes, which split proteins (and allergens). Probiotic bacteria also stimulate production of protease enzymes, which intensify splitting of proteins (and allergens) in cells of intestine.Micro

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crystal cellulose (MCC) adsorbs toxins, allergens and other slags in intestine and cleans the body. Inallcasesitisrecommendedtoconsultadoctor. Early diagnosis of intestinal allergy in AR the most important direction in the work of practicing doctor is to eliminate significant causing allergens from the diet and to choose therapy [5,11].

Table 1.

Dynamics of gastrointestinal symptoms in the follow-up of the children before the therapy

Symptoms	Basic group		Control group	
	n=17	%	n=24	%
	First examination			
Stomachache	17	100	11	46.0
Discomfort in abdomen	17	100	21	87.5
Nausea	14	82.3	7	29.1
Vomiting	10	58.9	4	16.7
Heartburn	6	35.2	3	12.5
Diarrhea	8	47.0	5	21.0
Constipation	4	23.5	4	16.7
Flatulence	12	70.5	14	58.3
Rumbling	13	76.4	17	71.0

Childrenwereexaminedagainattheendofthefirsthospitalizationandatthenexthospitalizationin 7-9 months.The basic group included 17 children with AR and the control group included 24 children. Performed therapy caused decrease in the expression of gastrointestinal complaints (Table 1). In the basic group we observed a positive dynamics in all studied symptoms of digestion.

The most explicit positive dynamics was observed in stomachache. Inthemajorityofthechildren symptoms disappeared within initial weeks of the therapy, but in some part of them, insignificant one, the symptoms were revealed in several months. It was mostly relevant to heartburn and rumbling in stomach. Reappearance of heartburn in some children with AR allows us to think that ¼ of the patients had gastro esophageal reflux requiring additional tests and therapy. Reappearance of a symptom such as rumbling in stomach seemingly indicates the necessity of a longer therapy with probiotics (Table 2).

Table 2.

Dynamic of gastrointestinal symptoms before and after the therapy

Symptoms	Basic groupn=17		Control group n=24	
	before (%)	after (%)	before (%)	after (%)
Stomachache	17(100)	1 (5.8)	11(46.0)	5 (20.8)
Discomfort in abdomen	17 (100)	2 (11.7)	21 (87.5)	7 (29.1)
Nausea	14 (82.3)	4 (23.5)	7 (29.1)	2 (8.3)

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Vomiting	10 (58.9)	-	4 (16.7)	-
Heartburn	6 (35.2)	-	3 (12.5)	1(4.1)
Diarrhea	8 (47.0)	-	5 (21.0)	1 (4.1)
Constipation	4 (23.5)	-	4 (16.7)	1 (4.1)
Flatulence	12 (70.5)	1 (5.8)	14 (58.3)	5 (20.8)
Rumbling	13 (76.4)	2 (11.7)	17 (71.0)	8 (33.3)

Atthesametimedynamicsofflatulencewasclearly positive. Inthecontrolgroupatthetimeoftherapyinmostofthechildren stomachache, discomfort in stomach, nausea, vomiting, heartburn, diarrhea, flatulence disappeared with complete absence of any changes in constipation. However, at the next hospitalization in fact many symptoms (stomachache, discomfort in abdomen, vomiting) were observed again, while the prevalence of heartburn even increased. There were few children with nausea, flatulence and rumbling in stomach. Theobtaineddatatestifythat, thoughthetherapyofthebasicdiseasehasapositiveeffectonGIT, inlong-termfollow-updisordersindigestivesystemare preserved and require specialized testing and therapy.

Treatment in clinic led to a significant improvement of coprogram parameters and results of ultrasound imaging of digestive organs. Inclusion of BIFOLAK ACTIVEprobiotic into the therapy mostly effects intestinal micro flora recovering its misbalance in patients with AR.

Conclusion

1. Thus, recentlyintestinalmicrobiota isconsideredtobealeadingetiological factor in the development of allergic immune pathological states, including AR in children. Data indicate the necessity of further study of both the whole microbe community and its separate representatives.
2.The basic marker controlling allergic process in children with hereditary predisposition within initial months of life is the level of eosinophiles and total IgE.
3.Inclusion of BIFOLAKACTIVE probiotic into the therapy mostly effects intestinal micro flora recovering its misbalance in patients with AR.

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