

# The experience of using a complex of natural terpenes for the prevention and treatment of respiratory tract diseases in preschoolers

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*Abstract.* The authors shared experience of using a complex of natural terpenes to prevent respiratory tract diseases in preschool children in organized groups. A total of 7,129 children aged 3-7 years were examined, which included: a pediatrician examination, anamnestic data analysis, an observation sheet filling, a polymerase chain reaction for the presence of Epstein-Barr virus in nasopharyngeal swabs before and after the examination.

*Keywords:* children, terpenoids, prophylaxis, Epstein-Barr virus, polymerase chain reaction, acute respiratory disease

The modern world experiences an increase in continuously recurrent diseases of the upper respiratory tract and at the same time there is a tendency towards low effectiveness of the symptomatic and antibacterial treatment. The key causes of chronic disease include systemic and local immune disorders. According to the literature data, failures of immune regulation mechanisms are among immunopathological processes due to the influence of various factors, in particular, infectious agents. Currently, the role of virus-induced immunopathology in developing disease outcomes attracts many researchers [1].

Among inflammatory diseases of the upper respiratory tract, more than 70% are viral infections,

including herpetic ones. It is worth noting that ENT-organ diseases that result from the reactivation of the Epstein-Barr virus (EBV) come in top places in infectology [2]. This fact can be explained by various EBV transmission routes and the widespread presence of EBV, as well as a huge range of diseases activated by it that often lead to a chronic process. This is facilitated by its high mutability and the ability to suppress cellular immunity. Nonetheless, a variety of clinical manifestations and immunopathological reactions of chronic Epstein-Barr viral infections (EBVI) are still debatable in pediatric practice [3, 4].

Features of EBVI replication and the need for continuous completion of the dominant chain determine the

variety of immune disorders and often cause probable errors, heterogeneity and variability of the virus. EBV has many genes enabling to "escape" from the human immune system. Since it is a genetic "parasite," the basis of its relationship with the body is a pathological process at the cellular level that is implemented through the interaction of cellular and viral genes. EBV survives at the stage of integration of infected lymphocytes with the genome and provides the conditions for triggering autoimmune changes and activation of free radicals and pro-inflammatory cytokines with subsequent development of function complications of various organs and systems [1].

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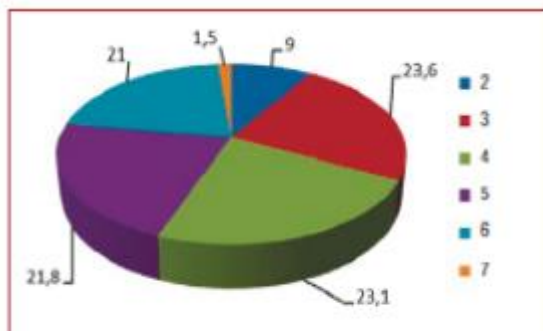


Fig. 1. Age of examined children - girls

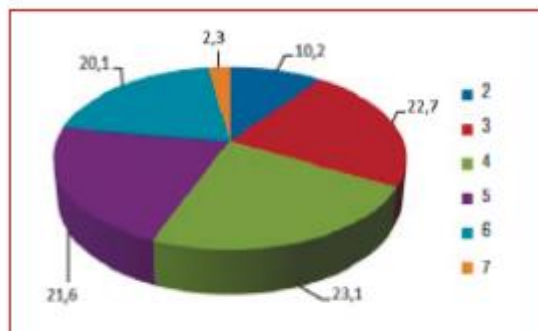


Fig. 2. Age of examined children - boys

EBV is known to cause the development of infectious mononucleosis (IM). Despite the fact that a lot of scientific work has been devoted to IM, the issue is still relevant. This fact is primarily associated with the persistent high incidence of IM, especially among the child population. So, in the Russian Federation, the prevalence of IM is 7.5 cases per 100 thousand people and 34.0 cases per 100 thousand children [5]. The variety of clinical manifestations in pediatric practice leads to difficulties in the correct and timely diagnosis as well as differential diagnosis of IM with mononucleosis-like diseases [6]. Moreover, the error rate varies between 40-90% in infants at the prehospital stage. The developed modern diagnostic methods provide an opportunity for more detailed study of clinical manifestations of cytomegalovirus and herpesvirus IM, as well as combinations of these infections [1, 7].

Taking into account all of the above, the authors emphasize the age-related features of the clinical picture and the course of EBV-caused IM. Gelatosplenomegaly is a constant symptom of IM in the eruptive phase, since the pathogen has high liver and spleen tissue affinity and also leads to the development of necrosis and degeneration of their cells against the background of increased activity of regeneration processes [8]. In the acute period, there are no evident signs in infants, with the exception of the clinical manifestations

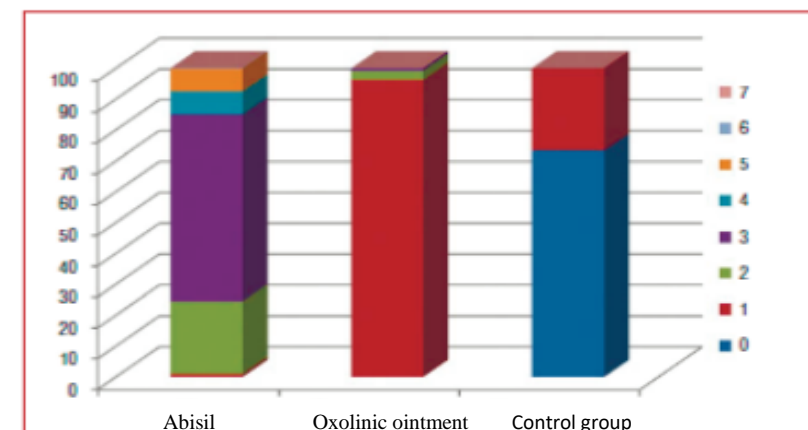


Fig. 3. Number of months of drug administration Symposium

of acute respiratory disease, accompanied by lymphadenitis. In contrast, this infection is characterized by more severe symptoms in older children [8].

Thus, EBV supports the inflammatory process in the upper respiratory tract, reduces local immunity, and adversely affects the functioning of the liver and spleen.

The purpose of the study was to evaluate the use of a complex of natural terpenes in the prevention and treatment of acute respiratory tract diseases in preschool children.

### Material and study methods

Prior to the study, the permission was obtained from the Local Ethics Committee of FSBEI HE KSMU of the Russian MoH - extract from protocol No. 9 dated November 22, 2016. A study of the dynamics of polymerase chain reaction indicators (the presence and subsequent elimination of the Epstein-Barr virus from the upper respiratory tract) in

preschoolers at risk of frequent development of acute respiratory infections due to the topical use of preventive drugs was carried out in the period from 2016 to 2017 within the premises of the department of prophylactics of childhood diseases and intermediate level pediatrics with a course of childhood diseases of the medical faculty of FSBEI HE KSMU of the Russian MoH. An outpatient examination of 7,129 preschool children aged 3-7 years old attending preschool institutions in the city of Almet'yevsk was conducted. Before the start of the study, after obtaining oral and written information, the parents of the children filled out informed consents. Abisil, a complex of terpenoids, and Oxolinic ointment with the active substance of dioxotetrahydroxytetrahydronaphthalene were used as drugs. As previously stated, Abisil is a safe and effective drug for preschool patients [9].

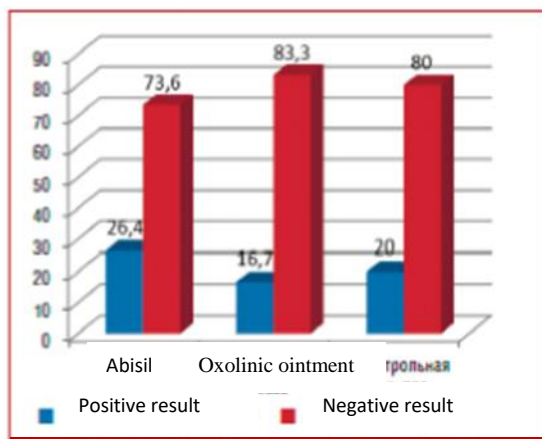


Fig. 4. Number of children with positive and negative results of EBV before taking the study drugs

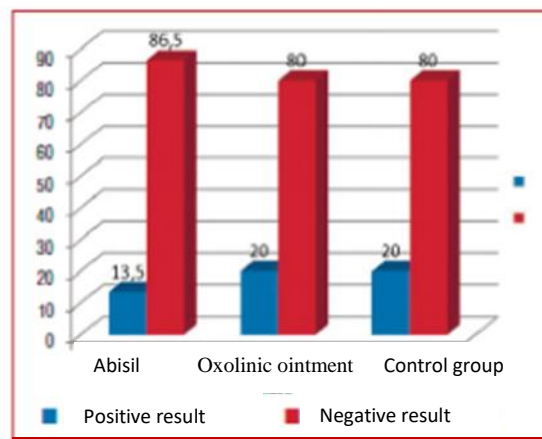


Fig. 5. Number of children with positive and negative results of EBV at the end of the study

The examination complex included an observation sheet completion (by the nurse of the preschool), a pediatrician examination, medical history analysis, and a polymerase chain reaction before and after the study. The nurse performed sampling in the treatment room of the Biomed laboratory. According to storage conditions, Abisil was stored in the preschool institutions.

The examined children were divided into three groups. The main (first) group included preschoolers who used the Abisil complex of natural terpenoids with a course of 1-3 months for prophylactic and therapeutic purposes. Nurses of the preschool institution applied the drug to the mucous membrane of the nasal cavity with cotton buds in the form of applications twice a day in the morning and evening for five days a week (1-2 courses). At the end of the course of therapy, children were followed up. After a routine examination, children from the comparison group (second group) underwent preventive and therapeutic measures with oxolinic ointment. In the control group (third group), children did not get prevention and treatment.

The presence of EBV in the upper respiratory tract was verified by the polymerase chain reaction: EBV DNA was detected in swabs.

When conducting a statistical analysis, the program Statistics 6.0 was used. Quantitative data (relative (%) and absolute (n, N)), mean values

(M), and standard deviation (SD) were calculated. Statistical data and hypotheses were verified upon the study results at a significance level of  $p < 0.05$ .

### Study results and discussion

The analysis of the examined children did not reveal age and gender differences in the study groups - the age of 3-5 years old turned out to be approximately equal for girls and boys (Fig. 1, 2).

The children from the first group used the complex of natural terpenes to prevent acute respiratory diseases during the autumn-winter period in most cases for three months, and the children from the second group (comparison group) used Oxolinic ointment for a month. Analysis by the time of taking the drugs (in months) showed a more detailed picture (Fig. 3).

It can be seen that the children of the main group overwhelmingly used the complex of natural terpenes for 1.5, 2, and 3 months. Children from the comparison group used the drug for 1-1.5 months. It should be noted that during the study, children from the first and second groups generally did not miss the intake of the drugs or missed for no more than 5 days in total.

When ranking the diseases in the examined children who were treated with Abisil, the following ones were observed: frequent acute respiratory diseases, adenoiditis, allergic diseases, rhinitis, tracheitis, bronchitis;

in children who used Oxolinic ointment, various forms of acute respiratory diseases were reported. Allergic diseases, rhinitis and acute respiratory diseases were noted in the control group.

The study was conducted to investigate the presence and subsequent elimination of EBV from the upper respiratory tract in preschoolers at risk of frequent development of acute respiratory disease against the background of topical use of preventive drugs. So, the authors analyzed the results of swabs with the polymerase chain reaction before and after the use of the drugs, as well as in the control group and compared them. It turned out that the main group showed a decrease in the frequency of detection of EBV in swabs of children by half ( $r = -0.44$ ;  $p < 0.01$ ), while this indicator increased in the comparison group and did not change in the control group (Fig. 4, 5).

A more detailed analysis is demonstrated for each group separately (Fig. 6-8). The purpose was to define the average number of days required to eliminate the Epstein-Barr virus with Abisil. So, the positive result of the detection of the Epstein-Barr virus was maintained while taking Abisil on average for  $47.89 \pm 1.79$  days, while its complete elimination was achieved when taking the drug on average for  $65.51 \pm 2, 98$  days. Thus, the analysis of data on

inflammatory effect of terpenoids, which is expressed in a positive effect on the elimination of the Epstein-Barr virus from the upper respiratory tract.

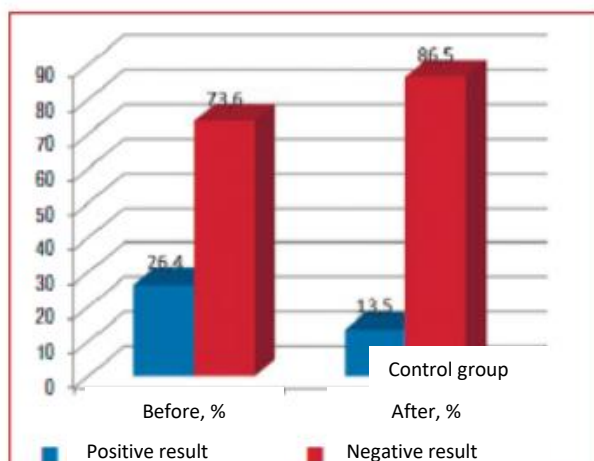


Fig. 6. Number of children with positive and negative results of EBV detection before and at the end of the study with Abisil

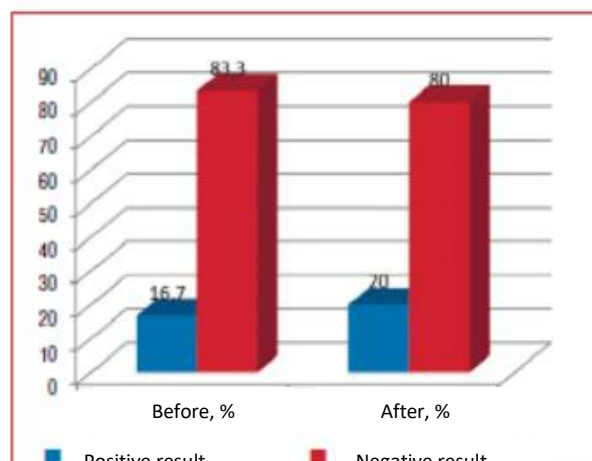


Fig. 7. Number of children with positive and negative results of EBV detection before and at the end of the study with oxolinic ointment

### Conclusions

1. Upon the study results, it is advisable to use the complex of natural terpenes for prophylactic and therapeutic purposes by its endonasal applications with cotton buds on the mucous membrane of the nasal cavity twice a day for 1-3 months.
2. During the study, Abisil did not show adverse reactions. Moreover, a positive effect was noted on local immunity of the upper respiratory tract, manifested in the complete elimination of the Epstein-Barr virus with the drug administration for  $65.51 \pm 2.98$  days.
3. To optimize the etiological diagnosis, a comprehensive examination of patients is necessary with methods that allow detecting EBV

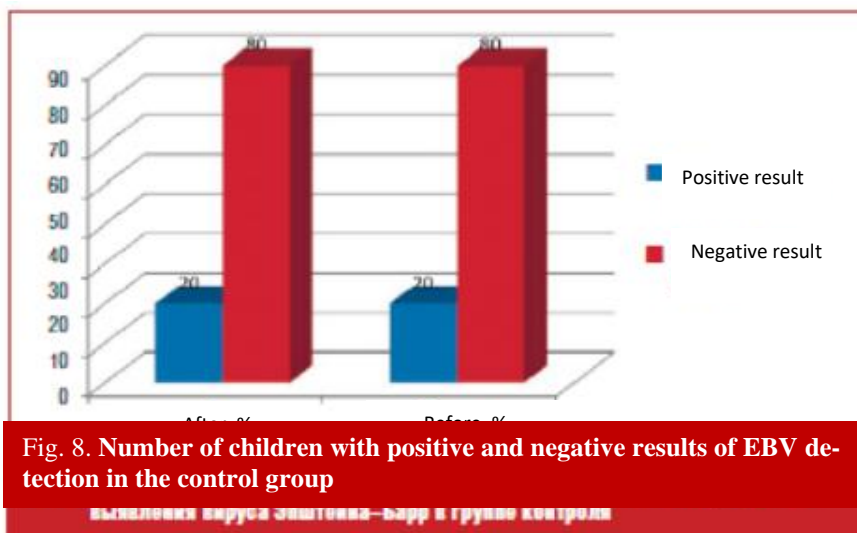


Fig. 8. Number of children with positive and negative results of EBV detection in the control group

antibodies in biological media, especially those that are sampled non-invasively, e.g. nasopharyngeal swabs. To evaluate the activity of chronic Epstein-Barr virus infection, the polymerase chain reaction of nasopharyngeal swabs is of great diagnostic value.

4. The presence and persistence of the Epstein-Barr virus in the tissue of the tonsils is manifested by the features of a humoral response to viruses.
5. The study determines the reasonability of using the complex of natural terpenes in preschool children attending organized groups.

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