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PREVALENCE AND ETIOLOGICAL CHARACTERISTICS OF CYTOMEGALOVIRUS AND EPSTEIN–BARR VIRUS INFECTIONS IN CHILDREN WITH PHARYNGEAL TONSIL PATHOLOGY

Gulnoza Rustamovna Rustamova
PhD, Associate Professor, Department of Pediatrics and Medical Genetics No. 3 Samarkand State Medical University
E-mail: rustamovagulnoza85@gmail.com
ORCID: 0000-0002-0680-9965
Samarkand, Uzbekistan

Abstract. In recent years, particular attention has been paid to studying the role of herpesvirus infections in the development of chronic pathologies of the lymphoid pharyngeal ring. Among these, cytomegalovirus infection (CMVI) and Epstein–Barr virus (EBV) are considered to be of major clinical significance. These viruses demonstrate a strong tropism for lymphoid tissue and are capable of long-term persistence in the human body. Prolonged persistence of these viruses contributes to the maintenance of chronic inflammatory processes and the development of hypertrophic changes in the pharyngeal tonsil.

Keywords: cytomegalovirus infection, Epstein–Barr virus, pharyngeal tonsil, adenoid hypertrophy, chronic adenoiditis, herpesvirus infections, children, infection status, PCR diagnostics, ENT pathology.

Аннотация. В последние годы возрастает интерес к изучению влияния герпесвирусных инфекций на развитие хронических заболеваний лимфоидного глоточного кольца. Особое клиническое значение среди них имеют цитомегаловирус (ЦМВ) и вирус Эпштейна–Барр (ВЭБ), характеризующиеся высокой тропностью к лимфоидной ткани и способностью длительно сохраняться в организме человека. Персистенция данных вирусов способствует поддержанию хронического воспаления и развитию гипертрофических изменений глоточной миндалины.

Ключевые слова: цитомегаловирусная инфекция, вирус Эпштейна–Барр, глоточная миндалина, гипертрофия аденоидов, хронический аденоидит, герпесвирусы, детский возраст, вирусная инфицированность, полимеразная цепная реакция, оториноларингологическая патология.

Аннотация. Кейинги йилларда лимфоид ҳалқум ҳалқасининг сурункали касалликлари ривожланишида герпесвирус инфекцияларининг аҳамиятини ўрганишга қизиқиш тобора ортиб бормоқда. Бу гуруҳ ичида цитомегаловирус инфекцияси (ЦМВИ) ҳамда Эпштейн–Барр вируси (ЭББ) алоҳида клиник аҳамият касб этади. Ушбу вируслар лимфоид тўқималарга юқори даражада тропликка эга бўлиб, инсон организмида узоқ вақт давомида сақланиб қолиш

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хусусияти билан ажралиб туради. Вирусларнинг давомли персистенцияси яллиғланиш жараёнининг узоқ муддат сақланишига ҳамда ҳалқум бодомчасида гипертрофик ўзгаришларнинг ривожланишига замин яратади.

Калит сўзлар: цитомегаловирус инфекцияси, Эпштейн–Барр вируси, ҳалқум бодомчаси, аденоид гипертрофияси, сурункали аденоидит, герпесвирус инфекциялари, болалар, вирус билан инфицирланганлик, ПЦР диагностикаси, оториноларингологик патология.

INTRODUCTION.

To determine the prevalence of CMVI and EBV infection, polymerase chain reaction (PCR) analysis of oropharyngeal swabs was performed in children with different degrees of adenoid hypertrophy. The results are presented in Table 1.

Table 1.

Prevalence of CMVI and EBV Infection According to the Degree of Adenoid Hypertrophy

Infection	Grade I n (%)	Grade II n (%)	Grade III n (%)	Statistical Significance
CMVI (n=37)	4 (5.3)	24 (31.6)	9 (11.8)	$p_1<0.00001$; $p_2<0.0001$
EBV (n=27)	5 (6.7)	19 (25.0)	3 (3.9)	$p_1<0.000001$; $p_2<0.005$
CMVI + EBV (n=12)	2 (2.6)	9 (11.9)	1 (1.3)	$p_1<0.05$; $p_2<0.0001$

Note: p indicates the significance of differences between groups.

Analysis of the obtained data demonstrated that the highest prevalence of CMVI, EBV, and mixed infection was observed in patients with grade II adenoid hypertrophy. The detected differences were statistically significant ($p<0.05$), suggesting an important role of herpesvirus infection in the pathogenesis of hypertrophic changes of the pharyngeal tonsil.

Microbiological Characteristics in Chronic Tonsillitis

Microbiological examination was performed in 65 patients with chronic tonsillitis. In 11 children, the analysis was not conducted because of previous antibacterial therapy that could have influenced bacteriological findings.

The results are presented in Table 2.

Table 2.

Microbial Composition in Children with Chronic Tonsillitis (n=65)

Microorganism	n	%
Staphylococcus aureus	15	23.5
Streptococcus pneumoniae	12	18.4

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Haemophilus influenzae	8	12.3
Candida spp.	7	10.7
Staphylococcus epidermidis	2	3.0
Streptococcus pyogenes	2	3.0
Mixed flora	10	15.3
No growth	9	13.8

The analysis demonstrated that *Staphylococcus aureus* and *Streptococcus pneumoniae* predominated in the microbial landscape of chronic tonsillitis, accounting for 23.5% and 18.4% of cases, respectively. These findings indicate the leading role of opportunistic bacterial flora in maintaining chronic inflammation of the palatine tonsils.

Microflora in Chronic Adenoiditis

Microbiological examination of nasopharyngeal samples was performed in 35 patients with chronic adenoiditis. The results are presented in Table 3.

Table 3.

Microbial Composition in Children with Chronic Adenoiditis (n=35)

Microorganism	n	%
Streptococcus pneumoniae	9	25.8
Staphylococcus aureus	6	17.2
Haemophilus influenzae	3	8.6
Streptococcus pyogenes	2	5.7
Candida spp.	2	5.7
Staphylococcus epidermidis	1	2.8
Mixed flora	5	14.2
No growth	7	20.0

It was established that *Streptococcus pneumoniae* and *Staphylococcus aureus* were the predominant microorganisms in chronic adenoiditis. These findings confirm the similarity between the microbiological profiles of chronic adenoiditis and chronic tonsillitis, suggesting common pathogenetic mechanisms of these diseases.

Relationship Between Microflora and the Degree of Adenoid Hypertrophy

To assess the influence of adenoid hypertrophy severity on microbial colonization, a comparative analysis of microflora composition was conducted. The results are presented in Table 4.

Table 4.

Microbial Composition According to the Degree of Adenoid Hypertrophy

Microflora	Grade I (n=7)	Grade II (n=23)	Grade III (n=5)

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S. pneumoniae	0	7	2
S. aureus	1	1	4
H. influenzae	0	2	1
S. epidermidis	1	0	0
S. pyogenes	0	2	0
Candida spp.	0	1	1
No growth	4	1	2
Mixed flora	4	1	0

The results demonstrated that the most pronounced microbial colonization was observed in patients with grade II adenoid hypertrophy. In grade III hypertrophy, an increased prevalence of *S. aureus* was noted, which may indicate a more pronounced chronic inflammatory process.

Cytological Characteristics of Nasopharyngeal Smears

Cytological examination of nasopharyngeal smears was performed to assess inflammatory activity and local immune response. The results are presented in Table 5.

Table 5.

Cellular Composition of Nasopharyngeal Smears

Parameter	Control (n=22)	Grade I (n=16)	Grade II (n=18)	Grade III (n=18)
Neutrophils, %	73.0±9.2	48.0±5.46*	45.2±4.25*	38.0±2.06*
Eosinophils, %	3.7±0.04	4.8±0.22*	6.4±0.89*	3.1±0.03*
Monocytes, %	9.9±1.01	11.8±2.28	11.4±0.65	6.4±0.71*
Lymphocytes, %	18.5	56.4±4.14*	61.6±1.23*	51.2±4.27*

*Note: *$p<0.05$ compared with the control group.*

Analysis of the cellular composition revealed a statistically significant decrease in neutrophil counts and an increase in lymphocyte levels compared with the control group. These changes indicate activation of adaptive immunity and chronic inflammation. The increased eosinophil count, particularly in grade II adenoid hypertrophy, may suggest the involvement of allergic mechanisms in disease pathogenesis.

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