

CLINICAL AND IMMUNOLOGICAL CHARACTERISTICS OF EXUDATIVE OTITIS MEDIA IN CHILDREN UNDERGOING IMMUNOCORRECTIVE THERAPY

Salomov K. M.

Zokirova M. R.

Tashkent Pediatric Medical Institute, Tashkent, Uzbekistan

Abstract

An analysis was conducted on the outcomes of conservative treatment for 30 children with exudative otitis media. Every patient received complete care, which included both mechanotherapy and medication. In accordance with a defined procedure (application No. 2014114122), extra immunocorrection was given to the observation group ($n = 15$) using the intranasal spray Imunofan. There was no immunocorrection administered to the comparison group ($n = 15$). After receiving Imunofan for one month, the clinical outcome—which was expressed in points based on questionnaire results—was 1.5 times better than that of the comparison group, and after three months, it was 2.1 times better. Upon reaching physiological norm levels, neutrophil myeloperoxidase activity under immunocorrection had significantly increased by the end of the first month (2.1 vs. 1.8) and the end of the third month (2.8 vs. 1.4).

Keywords: Exudative otitis media, hearing loss, Imunofan.

Introduction

A problem in pediatric practice is hearing loss. Hearing loss is still a relevant problem in pediatric medicine today, with both medical and socioeconomic implications. Learning difficulties, modifications in intellectual and auditory-speech development, and ultimately social maladaptation can all result from childhood hearing loss [1–4]. Conductive hearing loss is the most prevalent type of hearing loss in children and is primarily caused by eustachian tube dysfunction and exudative otitis media (EOM) [5, 6]. The number of children diagnosed with EOM has increased 2.5 times in the last 20 years [7, 8]. Exudate buildup in the middle ear cavities is a hallmark of exudative otitis media (EOM), a polyetiological, non-purulent inflammatory condition. It manifests clinically as conductive or mixed hearing loss. present challenges in the management of exudative otitis media. Despite advancements in the study of the pathophysiology and etiology of exudative otitis media (EOM), treatment-related issues remain crucial. There is presently debate over the role of prolonged inflammation of the pharyngeal tonsil and reduced local mucosal immunity as initiators of EOM in children [9]. The efficiency of mucosal immunity is greatly influenced by the anatomical configuration and functional capacity of subepithelial





lymphoid tissue, the condition of nonspecific defense elements such as epithelial integrity, and the functional traits of neutrophils and macrophages.

One of the key components of children's nonspecific immune defense, which ensures mucosal protection and an adequate inflammatory response, is known to be neutrophilic granulocytes (NGs). In light of this, myeloperoxidase (MPO), one of the main lysosomal enzymes of neutrophils, was selected as a marker for assessing the degree of innate immunity. MPO catalyzes the hydrogen peroxide-induced oxidation of chloride anion to hypochlorite, a chemical with strong antibacterial properties. The MPO level is a reliable indicator of the body's neutrophil functional capacity and nonspecific immune defense state.

The research objectives are to examine the indicators of the innate immune system and evaluate the effectiveness of immunomodulatory drugs in treating exudative otitis media in children.

Materials and Methods

The study comprised 30 children with exudative otitis media (EOM) aged 2–7 who were treated at the Department of Otorhinolaryngology and Pediatric Otorhinolaryngology at the Tashkent Pediatric Medical Institute (17 males and 13 girls). The control group was composed of 15 children in the same age range, 7 of whom were females and 8 of whom were boys. Each patient underwent a comprehensive assessment that included:

- Questionnaires are used for assessment.
- Otorhinolaryngological examination;
- Instrumental diagnostics (tympanometry and pure-tone audiometry);
- Cytochemical analysis (measurement of myeloperoxidase activity in peripheral blood neutrophils);

Including Standards: The patients were selected based on the following criteria:

- Bilateral or unilateral hearing impairment
- Otoscopic findings: middle ear effusion without significant indications of inflammation
- Tympanometry: tympanogram of type B

Tympanometry: type B tympanogram; audiometric information: conductive hearing loss with an air-bone gap ≥ 20 dB in the speech frequency range; and the child's lawyer's informed consent All of the research participants had a diagnosis of either grade II or III adenoid hypertrophy.

Additionally, every participant went to a preschool.

Groups of Patients and Treatment Procedures: Two groups of patients were randomly selected:

1. The comparison group ($n = 15$) was given just conventional treatment.
2. The observation group ($n = 15$) received immunomodulatory medication in addition to conventional therapy.

Endaural electrophonophoresis with 3% potassium iodide solution, mechanical therapy (Politzer inflation, pneumatic massage of the tympanic membranes), antihistamines (desloratadine), mucolytics (acetylcysteine), and nasal decongestants (phenylephrine hydrochloride) were all part of the standard treatment. Age-appropriate dosages were used for all drugs.

Immunomodulatory Therapy: Patients in the observation group received an extra course of intranasal Imunofan spray in compliance with the following protocol: A single 50 mcg dose should be given twice daily in each nostril on days 1–7, once daily (at night) on days 8–21, and twice daily in each nostril on days 22–28.



Table 1. Characteristics of the patients investigated.

Options	Main group (n = 30)	Control group (n = 15)
Gender		
- Boys	17	8
- Girls	13	7
Age (years)	2–7	2–7
Diagnosis	Exudative otitis media (EOM)	Practically healthy children
Adenoid hypertrophy	II or III degree —	—

Table 2. Patient groups and treatment methods.

Patient group	Quantity (n)	Treatment
ST group	15	Standard therapy
ST+IM group	15	Standard therapy + immunomodulatory treatment

Assessment for hearing impairment. Parents were given a questionnaire to complete in order to evaluate hearing loss.

Ten questions total, split into two sections, made up the questionnaire:

1. Nasal and nasopharyngeal symptoms were evaluated as possible otitis media causes in the first five questions.
2. The child's speech development abnormalities and hearing impairment symptoms were the subject of the final five questions. Five graded response alternatives (1–5) were provided for each question, enabling a quantitative evaluation of the severity of the symptoms. Convergent validation was performed on the questionnaire prior to its implementation.

Assessment for hearing loss. To assess hearing loss, a questionnaire for parents was created. Ten questions total, split into two sections, made up the questionnaire:

1. Nasal and nasopharyngeal symptoms were evaluated as possible otitis media causes in the first five questions.
2. The child's speech development abnormalities and hearing impairment symptoms were the subject of the final five questions.

Five graded response alternatives (1–5) were provided for each question, enabling a quantitative evaluation of the severity of the symptoms. Convergent validation was performed on the questionnaire prior to its implementation.

Results and Discussion

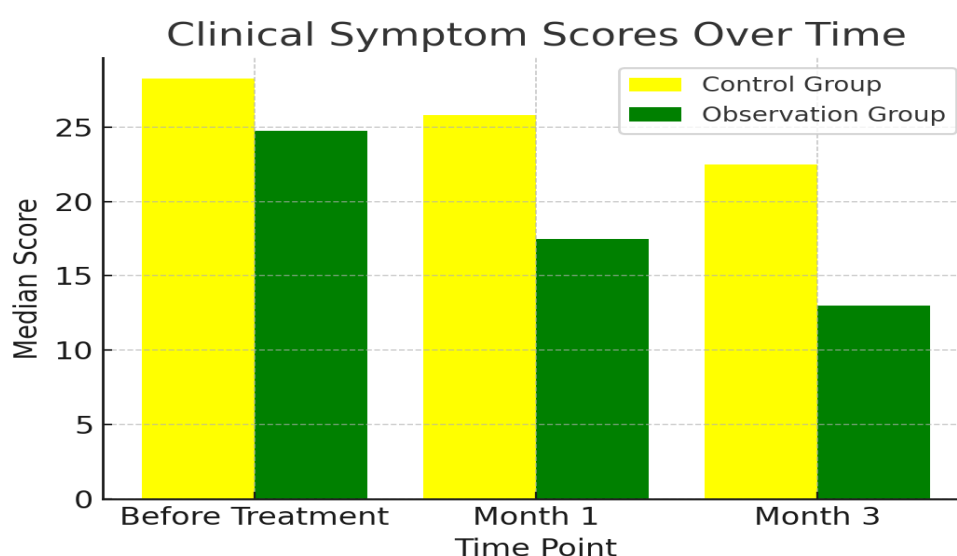
All of the patients had nasal congestion, ear fullness, and unilateral or bilateral hearing loss. Tympanic membrane retraction or bulging, light reflex shortening or absence, and membrane coloring (pink, yellowish, or cyanotic) were all observed during otoscopic examination. According to tympanometry data, there were no recordable acoustic reflexes and the tympanogram was type B. Pure-tone threshold and play audiometry were used to confirm conductive hearing loss, with an average air-bone gap of 34 ± 14 dB in the speech frequency range. The effectiveness of the



treatment was assessed one and three months after the initiation of therapy. The results of parental questionnaires were used to evaluate the clinical dynamics in both groups.

Before treatment, the high questionnaire scores corresponded with the severity of clinical symptoms: Control group (without immunocorrection): Me = 28,25 [24,5–32] and observation group (with immunomodulation): Me = 24,75 [21,5–28]

As treatment progressed, there was a significant reduction in scores, indicating symptom regression. By the first month, children receiving the immunomodulatory drug showed faster symptom improvement, with a median score of 17,5 [15–20], compared to 25,8 [21,5–30] in the control group ($p < 0.05$). By the third month, the median score in the observation group was 13 [11–15], while in the control group, it was 22,5 [19–26] ($p < 0.05$).

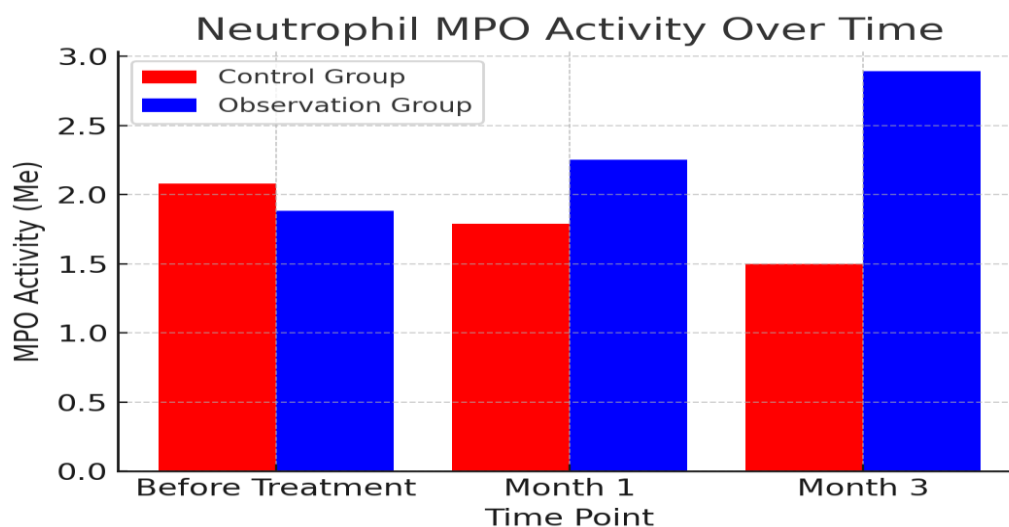


Pic. 1. Dynamics of Clinical Symptoms

Neutrophils' cytochemical analysis revealed that both clinical groups' myeloperoxidase (MPO) activity had decreased prior to treatment: Me = 1.88 [1.55–2.00] for the observation group and 2.08 [1.85–2.72] for the control group. Compared to children in excellent condition, these values were significantly lower ($p < 0.05$).

By the first month, the observation group showed a marked increase in MPO activity (Me = 2.25 [2.07–2.65], $p < 0.05$), while the control group exhibited no substantial improvement (Me = 1.79 [1.50–2.10]).

By the third month, MPO activity in the observation group fully recovered to levels typical of healthy children (Me = 2.89 [2.78–2.98] in 100% of cases). However, in the control group, MPO activity remained low (Me = 1.50 [1.25–1.70], $p < 0.05$ compared to both the observation and healthy groups).



Pic. 2. Changes in Myeloperoxidase Activity

Conclusions.

1. Screening questionnaires provide an objective evaluation of the efficacy of treatment and aid in the early diagnosis of exudative otitis media (EOM) in children.
2. Children with adenoid hypertrophy have functionally limited neutrophils, which may be a pathogenetic basis for the development of EOM, according to the study's findings.
3. The use of Immunofan for local immunomodulation effectively restores neutrophil myeloperoxidase (MPO) activity to healthy levels.
4. The enhanced efficacy of EOM treatment with Imunofan is demonstrated by objective clinical improvements and a faster reduction in nasopharyngeal and auditory symptoms.

References

1. Ageeva, S. N. Prevalence of ENT Diseases Among the Urban Population at the Present Stage / S. N. Ageeva // Russian Otorhinolaryngology. – 2006. – No. 3 (22). – P. 33–37.
2. Loginov, S. N. Screening Acoustic Impedance Audiometry in the Examination of Preschool Children / S. N. Loginov, G. I. Bisharova // Russian Otorhinolaryngology. – 2003. – No. 2 (5). – P. 97–101.
3. Salomov Q.M., Djabbarova D.R., Disfoniya xiqildoq kasalliklarining belgisi . Педиатрия. 2023, №1 (1), 164–167.
4. Mileshina, N. A. Management Algorithm for Patients with Exudative Otitis Media / N. A. Mileshina, N. S. Dmitriev, V. V. Volod'kina // Russian Otorhinolaryngology. – 2007. – Supplement. – P. 164–167.
5. Preobrazhensky, N. A. Exudative Otitis Media / N. A. Preobrazhensky, I. I. Goldman. – M.: Medicina, 1987. – 192 p.
6. Virological Aspects of Exudative Otitis Media Development in Children / N. V. Shcherbik [et al.] // Proceedings of the XVIII Congress of Otorhinolaryngologists of Russia. – St. Petersburg, 2011. – Vol. 1. – P. 430–432.



7. Kovalenko, S. L. Hearing Assessment in Preschool Children at the Present Stage // Russian Otorhinolaryngology. – 2009. – No. 4 (41). – P. 69–74.
8. Palchun, V. T. Otorhinolaryngology: National Guide / V. T. Palchun. – M.: GEOTAR-Media, 2008. – 960 p.
9. Exudative Otitis Media / I. V. Savenko [et al.]. – St. Petersburg, 2010. – 80 p.
10. The Role of Mucosal Immune Defense Disorders in the Development of Exudative Otitis Media Against the Background of Chronic Adenoiditis in Children / N. V. Shcherbik [et al.] // Russian Otorhinolaryngology. – 2013. – No. 3. – P. 173–178.–178.

