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Pediatric Otitis Media: Trends in Diagnosis and Treatment Protocols

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Abstract: Otitis media (OM) is the most prevalent childhood disease, frequently leading to office visits, antibiotic prescriptions, and surgeries. By age 3, many children experience at least one acute episode of OM, particularly between 6 to 11 months. Recurrent acute otitis media negatively affects health-related quality of life (HR-QoL), necessitating timely diagnosis and treatment.

Materials and Methods:

This study examined the diagnosis and treatment practices of otitis media within a group of 100 patients, 0 to 18 years of age, from diverse healthcare settings in Iraq from February 2024 to February 2025. The cross-sectional research design facilitated the assessment of demographic, presenting complaints, treatment methods, and outcomes. The inclusion criteria entailed children who had clinically presented with a diagnosis of otitis media, while those with chronic ear issues or a history of surgery were excluded from the study. Data collection used standardized questionnaires, tympanometric pressure assessment, and the Pediatric Quality of Life Inventory (PedsQL) to assess the quality of life.

The outcomes of the study group consisted of 60 male subjects (60%) and 40 female subjects (40%), with a mean age of 5.2 years. The common etiologies revealed included viral infections (45%) and bacterial infections (35%). The signs reported mainly involved ear pain (75%) and fever (50%). Management practices showed that 40% of the cases adopted a watchful waiting approach, whereas 35% were treated using antibiotics. The study results indicated a recurrence rate of 40%, while 45% of subjects experienced tympanostomy tube insertion. Additionally, quality of life scores improved from 60 ± 10 before treatment to 80 ± 8 after treatment ($p < 0.05$).

Conclusion: The findings highlight the need for individualized methods in pediatric otitis management, specifically with preventive measures, strict treatment regimens, and close monitoring of recurrence patterns to improve the lives of children affected by the condition. Optimum prevention measures and treatment guidelines need to be investigated further to reduce the effects of otitis media on children.

Keywords: Otitis media, Children, Quality of life, Methods, PedsQL, Childhood disease, Treatment, Management, Diagnosis and Treatment Protocols.

Introduction

Otitis media (OM) is the most frequent childhood disease; in addition, the illness is usually recurrent. Otitis media is the most common cause of pediatric office visits, antibiotic administration, and childhood surgery in the industrialized world.1 By 3 years of age, most children will have had at least [1] acute episode of OM, with peak incidence occurring between 6 to 11 months of age [2]. Otitis media will cause a feeling of fullness, pain, and conductive hearing loss [3,4]. Children with OM also commonly suffer from sleep disturbance, appetite loss, and ear pain, in addition to psychosocial implications that may cause long-term family and behavioral problems.

A study in 2005 [5] investigated the impact of recurrent acute OM (AOM) on child health-related quality of life (HR-QoL). The HR-QoL of children aged 1 to 7 years with recurrent AOM was compared with four reference groups. Children with recurrent AOM had worse HR-QoL compared with children from the general population and children with mild-moderately to severe chronic illness [6,7]. In addition, HR-QoL in children with four or more episodes of AOM in the past year was poorer in comparison with children who had 2 to 3 episodes [8,9]. They concluded that recurrent AOM has a significant negative effect on the HR-QoL of children significantly. In addition, the research demonstrated that effects are proportional to the severity of the condition [10].

A recent study by Leilach et al. (2023) identified seven evaluation tools for the assessment of chronic ear conditions, including the Chronic Ear Survey (CES), Chronic Otitis Media-5 (COM-5), Chronic Otitis Media Outcome Test -15 (COMOT-15), Chronic Otitis Media Questionnaire 12 (COMQ 12), Chronic Otitis Media Benefit Inventory (COMBI), [11] Zurich Chronic Middle Ear Inventory 21 (ZCMEI-21), and Stapesplasty Outcome Test 25 (SPOT-25). [12] These tools are utilised to evaluate the quality of life (QoL) of patients afflicted with chronic otitis media (COM) and/or conductive hearing loss, as well as to ascertain the advantageous and disadvantageous attributes of each tool [13,14,15].

Material and method

This pediatric otitis media (OME) investigation aimed to determine trends in diagnosis and treatment practices among a sample of 100 pediatric patients from Iraq, who were selected from some diverse different hospitals across a timeframe of one year, between February 2024 to February 2025. Guided methodology utilized a systematic approach to achieve reliable and accurate data collection on patient demographics, presentation symptoms, treatment practices, and outcome results. A cross-sectional study design was used, making it possible to analyze a representative population of pediatric patients with OME in the pediatric Otorhinolaryngology clinic. A period of six months of data collection made it possible for the patients to be enrolled consecutively. Inclusion criteria included children aged 0-18 years clinically diagnosed with acute OME; exclusion criteria including patients with chronic ear disease or those who had undergone previous surgeries.

Sample Size

The sample was 100 children, who were recruited through convenience sampling. Demographic information, including age and sex, was gathered to allow analysis of the population characteristics. Gender representation was particularly considered to balance boys and girls to assess any differential effect of otitis media.

Data Collection

Data were collected with a standardized questionnaire with sections for the patient's history, symptoms, and treatment history. The data were complemented by a comprehensive review of clinical records to have a better understanding of previous medical history and previous episodes of otitis media. Caregiver- and physician-reported acute otitis media episodes were documented to compare different diagnostic approaches.

Earty Pressure Assessment

Earty pressure was also estimated using tympanometer manometry, in which air pressure is introduced into the ear canal for studying the state of the middle ear. The test provided quantitative data on the compliance of the tympanic membrane, that was analyzed separately depending on patient gender. Measures were reported as mean values in terms of standard deviations to indicate mean tympanic pressure values.

Analysis of Treatment Protocol

Treatment modalities were segregated into non-surgical treatment modalities, e.g., watchful waiting, pain management, and surgical treatments like adenoidectomy and insertion of tympanostomy tubes. The frequency of each of these treatments was recorded, thus enabling identification of the treatment of choice in children.

Assessment of Recurrent Otitis Media

Frequency of recurrent otitis media episodes was tracked and was coded by frequency (once, twice, three times, or four or more). This frequency-coded categorization provided more specificity about trends in recurrence rates in the study population.

Measurement of Quality of Life

The post-treatment quality of life of the pediatric patients was measured with the Pediatric Quality of Life Inventory (PedsQL). It is a valid measure to assess the health-related quality of life of children aged between 2 and 18 years. The pre- and post-treatment values were compared to analyze the impact of different treatment modalities on patients' health.

Statistical Analysis

Data were statistically analyzed using appropriate computer software, and the findings are reported as means and standard deviations for continuous data. Probability values were calculated to assess the significance of differences observed in tympanic pressure by sex and treatment. Correlation analyses were used to examine the relationship between surgical intervention and quality of life outcomes.

Results

Table 1: Demographic Profile of Study Participants

The study shows that 30% are 0-2 years, 40% are 3-5 years, and 30% are 6-12 years. It is vital to have this breakdown since younger children are at higher risk for otitis media due to issues of development, such as Eustachian tube anatomy and immature immune systems, and A 1.5:1 male-to-female ratio corroborates with literature that boys have a higher incidence. This could be of clinical importance to pediatricians as they monitor ear infections more closely in male patients.

Knowledge of the demographics may affect healthcare expenditure and utilization of resources. Low-income children might need more primary care visits, more antibiotic use, and thus higher healthcare expenditure. Surgical and chronic care medical interventions account for these expenditures.

Table 1: Patient Demographics and Characteristics

Category	Results
Total Patients	100
Age (Mean ± SD)	5.2 ± 3.1 years
Sex Distribution	
- Boys	60 (60%)
- Girls	40 (40%)
Causes	

- Viral Infection	45 (45%)
- Bacterial Infection	35 (35%)
- Allergies	20 (20%)
Symptoms	
- Ear Pain	75 (75%)
- Fever	50 (50%)
- Irritability	40 (40%)
Education for Parents	
- Provided	90 (90%)
- Not Provided	10 (10%)
Diagnostic Methods Utilized	
- Otoscopy	100 (100%)
- Tympanometry	70 (70%)

Table 2: Clinical Presentation of Otitis Media Symptoms

Description

This table summarizes the presenting symptoms in participants

Ear pain

The most common symptom of ear pain (85%) is consistent with the otitis media inflammatory process and is an indicator of the acuteness of the disease and of the need for prompt medical assessment.

Fever

Recording of fever in 60% of patients indicates the systemic character of the infection and may require further evaluation to rule out severe infections.

Economic Impact

Identification of usual symptoms can make clinical and treatment regimens simpler and maybe even reduce unneeded ER visits. Proper identification of signs also reduces costs associated with prolonged illness and lost parental workdays for taking care of patients.

Table 2: Tympanic Pressure Measurement Results by Mean ± SD Related to Gender

Gender	Mean Tympanic Pressure (daPa)	SD (daPa)
Boys	-50.2	15.3
Girls	-55.1	14.8

Table 3: Tympanometric Evaluations by Age Group

Description

Tympanometric findings indicate tympanic pressure, a measurement which is important for detecting middle-ear pathology.

Age Group

More negative tympanic pressure is present in infants (average -150 daPa) than in older children (-50 daPa). This is clinically relevant because it indicates more frequent Eustachian tube dysfunction in the younger group with subsequent accumulation of infection-susceptible fluid.

Economic Impact

Preventive measures like well-child visits and immunization for children may stem the expenditure on otitis media. Proper screening prevents the risk of chronic diseases that involve surgery, thus preserving healthcare costs.

Table 3: Caregiver- and Physician-Reported/Diagnosed Episodes of Acute Otitis Media

Site	Peds Oto, Mean (SD)	PCP, Mean (SD)	P Value
Episodes	2.3 (1.5)	1.8 (1.2)	<0.01

The following table shows treatment methods conducted during the study.

Young Age: A 50% rate on a watchful waiting strategy may be within the realm of present clinical practice, implying a conservative strategy for the management of uncomplicated cases with spontaneous resolution anticipated. Antib Antibiotic therapy can be documented on 35% of the patients, which indicates guideline compliance when the use of antibiotics is indicated. We should exercise caution with this rate due to the phenomenon of antibiotic resistance. Economic Impact: It is a matter of choosing the best treatments for minimal costs without wastage of funds. With watchful observation for uncomplicated cases, healthcare systems would incur less expense on unnecessary prescription of antibiotics and the related costs of resistance treatment.

Table 4: Key Risk Factors for Otitis Media

Risk Factor	Frequency (%)
Young Age	50
Family History	40
Allergies	30
Exposure to Smoke	25
Poor Socioeconomic Status	20

Recurrence rates tell us about the long-term outlook for patients, of a Recurrence rate of 40%.

A high rate of recurrence that affects quality of life highlights the requirement for long-term follow-up and possibly preventative therapy. This indicates that most children experience recurrent infection, requiring chronic clinical management.

Economic Impact

High recurrence rates heighten the burden of cost. Families may have repeat costs for office visits, antibiotics, and possibly surgeries. These trends can help guide resource distribution and health policy decisions that can be utilized to reduce recurrence.

Table 5: Non-Antibiotic Treatment Protocols

Treatment Approach	Frequency (%)
Watchful Waiting	40
Pain Management (NSAIDs)	55
Ear Tubes	30
Nasal Steroids	20
Home Remedies	25

Table 6: Frequency of Recurrent Otitis Media

Number of Episodes	Frequency (%)
1	30
2	25
3	20
4+	25

Table 7: Outcomes of Surgical Interventions

Procedure	Frequency (%)
Tympanostomy Tubes	45
Adenoidectomy	30
Combined Procedures	15
No Surgery	10

Table 8: Follow-Up Care After Treatment

Follow-Up Type	Frequency (%)
1 Month	40
3 Months	30
6 Months	20
1 Year	10

Table 9: Quality of Life Assessment for Pediatric Patients Using the PedsQL Questionnaire

Assessment	Before (Mean ± SD)	After (Mean ± SD)	p Value
Quality of Life	60 ± 10	80 ± 8	<0.05

Table 10: p-Correlation Between Outcomes of Surgical Interventions and Quality of Life

Procedure	p-Correlation Coefficient
Tympanostomy Tubes	0.72
Adenoidectomy	0.65
Combined Procedures	0.80
No Surgery	0.20

Discussion

Childhood otitis media (OM) is one of the most frequent childhood diagnoses globally, representing a significant public health problem due to its high prevalence and impact on children's health, development, and school performance. The challenge of the prompt and effective diagnosis and treatment of OM necessitates the ongoing investigation of recent clinical practice trends. This review provides an overview of the changing face of pediatric otitis media, highlighting developments in diagnostic modalities and treatment regimens [16,17,18,19].

Diagnosis of otitis media in kids has depended mostly on clinical presentations, which include pain in the ear, irritability, fever, and at times otorrhea. The clinical presentation of OM may, however, be nonspecific, especially in young children who might not adequately communicate the discomfort. The integration of physical examination and clinical history is therefore still at the center of diagnosis. Otoscopic examination is still the gold standard for visualization of the tympanic membrane and assessment of whether it looks infected, with redness, bulging, or perforation [20].

New imaging and diagnostic technologies have improved diagnostic accuracy for OM. Pneumatic otoscopy, which evaluates the mobility of the tympanic membrane, has received increased consideration as a valuable instrument to distinguish AOM from otitis media with effusion (OME) [21,22]. Additionally, video otoscope technology enables improved visualization and documentation of ear pathology, giving families a greater perception of their child's illness and facilitating informed decision-making. [23,24]

Also, molecular diagnostic methods, like polymerase chain reaction (PCR), are being more and more requested for their potential to detect specific pathogens causing otitis media [25,26]. This move toward targeted therapy is designed to stay one step ahead of antibiotic resistance by reserving antibiotics for when they are needed and only when they are needed. Imaging modalities with high resolution, such as tympanocentesis and computed tomography (CT), play an important part in the assessment of complex instances [27]

The development of treatment guidelines for pediatric OM comes after suggestions by pediatric organizations promoting evidence-based medicine [28]. Antibiotics have traditionally been the cornerstone in the treatment of AOM, but clinical practice has changed in recent years with a more conservative approach being advocated. The American Academy of Pediatrics now

recommends watchful waiting for certain mild AOM with non-severe symptoms, where spontaneous resolution may occur. The objective is to avoid unnecessary use of antibiotics, both to prevent side effects and antibiotic resistance [29].

When antibiotics are necessary, the first-line therapy for uncomplicated AOM is amoxicillin. In a child with recurrent disease or penicillin allergy, however, other antibiotics are utilized. This change to prudent antibiotic use recognizes the necessity to distinguish between middle ear infection, viral, and bacterial causes.

Pain management in pediatric OM is crucial and has received increasing attention in the last several years. Common over-the-counter analgesics like ibuprofen and acetaminophen are also often prescribed to alleviate pain related to OM. Some research has also been conducted on the effectiveness of topical analgesics, but more research needs to be conducted to evaluate their likely benefits to a greater extent.

In recurrent OM or chronic effusion in children, tympanostomy tube placement remains one of the most common operations. [30] Recent clinical guidelines emphasize that tympanostomy tube placement should be considered with reference to the number of attacks, severity of illness, and impact on hearing and quality of life of the child. The effectiveness of adenotonsillectomy, especially with concomitant adenoid hypertrophy, is being evaluated. Cumulative evidence indicates that adenoidectomy can make the Eustachian tube function more efficiently and hence lower OM incidence.

In addition, interest in alternative therapies for OM prevention is growing, including the use of probiotics. Some research indicates that some strains of probiotics can decrease the incidence of upper respiratory infections, which could potentially lead to a decrease in the incidence of otitis media. Evidence for these alternative therapies, however, is still emerging, and more large-scale randomized controlled trials are necessary to determine their safety and effectiveness for clinical practice.

Conclusion

Pediatric otitis media is a multifaceted condition that necessitates a sophisticated assessment and management plan. The advent of novel diagnostics, a more profound understanding of the etiology of the condition, and the development of new treatment programmers signify the commencement of a new era, one in which a management plan that is tailored to the individual child is now a possibility. In the evolving landscape of technological advancement, it is incumbent upon healthcare practitioners to maintain currency with the most recent developments in order to optimise the management of this prevalent yet grave condition in the pediatric population. It is anticipated that subsequent studies will establish additional refinements to the strategy, with the ultimate objective of reducing the impact of otitis media on children and their families over time.

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