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Hearing Impairment in Iraqi Children: A Study of Otitis Media Outcomes and Assessing Risk Factors of the Study.

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Abstract: **Background:** Childhood infection is often caused by otitis media (OM), with around 60% of children experiencing a minimum of a single episode at the age of 4. **Objective:** This study determined and analysed clinical outcomes of otitis media as well as assessed risk factors for children. **Patients and methods:** We recruited 76 children aged between 3-14 years, and their data was collected from Azadi Teaching Hospital in Kirkuk, Iraq, for a period extending from January 7, 2023, until September 15, 2024. This data included both the most common symptoms in children with otitis media and the severity classification. Otitis media, which included acute otitis media, otitis media with effusion, and chronic otitis media.
Moreover, this study recorded clinical data on pediatric patients after taking treatment with amoxicillin in terms of rates of pain, complications, recovery time, quality of life, severity of symptoms, and identification of risk factors affecting pediatric patients after the treatment period. **Results:** This study recorded clinical parameters in terms of diagnosis, treatment, and outcomes, which included females being a risk factor in 48 cases, more than males (28 cases), exposure to passive smoking, which included 50 cases, and family history of ear infections, which included 23 cases. We classified the otitis media severity measures. They are acute (50 cases), effusion (only 3 cases), and chronic (23 cases). Children commonly experience fever in 70 cases, ear pain in 63 cases, decreased appetite in 18 cases, and bacterial infection in 76 cases. All children also received treatment with amoxicillin. For a period of 5 days or more, complications included nausea and vomiting in 3 cases, allergies in 2 cases, and hearing loss in only 2 cases. Quality of life standards were determined for patients, as the criteria included both ear symptoms: 18.95 ± 4.87 before treatment with amoxicillin and 47.72 ± 6.33 after treatment with amoxicillin. Hearing function was 28.21±3.96 before amoxicillin treatment and 51.74±2.68 after amoxicillin treatment. **Conclusion:** Amoxicillin treatment is the best, most preferred, and most effective treatment for treating bacterial infections in patients who have middle ear infections, which causes a lower rate of complications, a lower rate of pain, and a better and faster recovery rate.

Key words: otitis media (om), hearing impairment of children, quality of life, and COMOT-15.

Introduction: Otitis media is one of the most common diseases in childhood. By age 3, more than two-thirds of children have had at least one episode of otitis media, and one-third will have three or more. [1]

Otitis media OM is one of the most common childhood diseases and one of the main causes of medical consultation and the prescription of antibiotic treatment [2]. Between 10 and 19% of children exhibit recurrent OMA, making it a frequent pathology [3]. On average, a child will experience four episodes of OMA during the first six years of life. [4]

This pathology also interrupts the daily activities of those who take care of children and negatively affects the quality of life (QOL) of children, including that of household members [5]. The general policy on health interventions accepts the QOL as a standard for evaluation. In its global and multidimensional concept, the VCD incorporates physical, functional, psychological, social, and economic well-being [2,6,7]. In the context of health care, it is more subjective, and its result reflects the patient's perception of their health status. Parent reports typically serve as a representative measure of their child's quality of life (QOL) because it is impossible to directly assess the feelings of young children. [8,9]

It is rare in the first six months of life and acquires its maximum frequency between 6 and 11 months, probably coinciding with the depletion of maternoplacental transfer immunoglobulins. Breastfeeding also has a protective role. [10]

Among the risk factors for otitis media are family predisposition, atopy, immunodeficiencies, cold climates and seasons, overcrowding, and attendance at daycare centers. [11]

About two-thirds of patients have pathogenic bacteria isolated from their middle ear. The cornerstone of treatment is antibiotic therapy. The selection of the antibiotic should ideally be based on its antimicrobial spectrum of action, its safety, guaranteed by a high efficacy-toxicity index, and also by its enonomic cost. [12,13]

The normality of the analytical parameters means the little or no information they provide for the diagnosis of otitis media [14]. The correspondence between the isolation of a germ in the otic exudate and the blood culture does not appear in the study. Bacteremia is uncommon in the presence of otitis media. Reviewed sources indicate that the finding of germs in the blood culture associated with otitis media occurs in percentages lower than 3%. Leukocytosis with or without left deviation would be more related to secondary bacteremia than to the otic focus itself. [15]

The distinction between acute otitis media understood as the finding of retrotimpanic purulent material, usually symptomatic, and otitis media with effusion, which would encompass any condition of occupation of the middle ear, usually with the absence of acute symptomatology, would therefore be a more clinical than microbiological issue, according to the results of the study, where the purulent collection was only found in three patients (6%), coinciding with the conclusion of Bluestone in his review of the pathogens of the middle ear in the past decade. Therefore, the accidental discovery of an otic effusion in an asymptomatic infant does not justify the omission of antibiotic treatment. [16,17]

Patients and methods

Our research paper conducted a cross-sectional study of pediatric patients suffering from otitis media, which recruited 76 children whose ages ranged between 3-14 years and whose data were collected from Azadi Teaching Hospital in Kirkuk, Iraq for a period that lasted from January 7, 2023 to September 15, 2024, which included clinical and demographic data before undergoing surgery children were referred for treatment, which included age, gender, comorbidities, level of education, level of family economic income, and other factors, which included exposure to passive smoking and family history of ear infections.

Furthermore, this study classified clinical outcomes associated with otitis media severity which included both acute otitis media, otitis media with effusion, and chronic otitis media. Also, we identified the most common symptoms in children with otitis media, which were identified in 7 factors or indicators which were distributed to all patients. We also identified the specific factors due to the infection, which included both bacterial and viral infections.

This study recorded the results and clinical data of patients who took treatment with amoxicillin and determined the extent of its effectiveness in children with otitis media, as it is given orally as a suspension or tablet to treat otitis media instead of taking it directly in the ear canal, where the dose of amoxicillin is given in an amount of 80-90 mg/ kg/day and is taken three times a day during the follow-up period of 5-8 days. In addition, our study evaluated the extent of pain in children before and after treatment with amoxicillin using the Wong-Baker FACES pain rating scale, which was measured during five days of recovery. This scale determines the level of pain through facial expressions and ranges between 0 and 10, where 0 It means there is no pain, and 10 represents the presence of severe pain. As a result, our data identified complications that occurred among children during follow-up after receiving amoxicillin treatment. Also, this study evaluated the quality of life of children during follow-up after receiving treatment with amoxicillin using the COMOT-15 scale, as this scale classifies the quality of life of pediatric patients in terms of recovery and weakness, ranging from 0 to 60, with higher scores indicating good and ideal quality of recovery and 0. It indicates the poor quality of children after treatment, as the criteria included ear symptoms (ES), hearing function (HF), mental health (MH), and overall score (OS). Our data recorded the determinants of symptom severity in children suffering from otitis media before and after treatment with amoxicillin on the AOM-SOS scale, where the scale ranges from 0 to 10, with lower scores representing the least severe symptoms. This study conducted logistic regression to evaluate risk factors affecting patients in the short term after receiving treatment.

Results

Table 1: Demographic or clinical characteristics of pediatric patients suffering from otitis media.

Characteristics	Number of patients [76]	Percentage [%]
Age		
3 – 6	14	18.42%
7 – 10	20	26.32%
11 – 14	42	55.26%
Sex		
Male	28	36.84%
Female	48	63.16%
Comorbidities		
Yes	31	40.79%

No	45	59.21%
Hypertension	9	11.84%
HIV	3	3.95%
Diabetes	6	7.89%
Kidney disease	4	5.26%
Obesity	8	10.53%
Exposure to second-hand smoke		
Yes	50	65.79%
No	26	34.21%
Family history of ear infections		
Yes	23	30.26%
No	53	69.74%
Maternal education		
Less than high school	4	5.26%
High school graduate	9	11.84%
College Graduate	63	82.89%
Income status, $		
≤ 1000	58	76.32%
> 1000	18	23.68%
Our results showed that children who aged (11 – 14) years were at the highest which, include 42 cases, where females were determined as a risk factor which have 48 cases more than males had 28 cases, as well as children, were suffered from some factors which effect on hearing aspect, which are exposure to second-hand smoke which include 50 cases, and family history of ear infections include 23 cases.		

Table 2: Classification of severity of otitis media.		
Variables	Number of patients [76]	Percentage [%]
Acute otitis media	50	65.79%
Otitis media with effusion	3	3.95%
Chronic otitis media	23	30.26%

Our findings classified for children according to the severity of otitis media, which are acute otitis media included 50; otitis media with effusion had 3 cases only, and chronic otitis media included 23 cases.

Table 3: Identifying the most common symptoms in this study.

Symptoms	Number of patients [76]	Percentage [%]
Ear pain	63	82.89%
Fluid drainage from the ear	4	5.26%
Difficulty hearing	11	14.47%
Fever	70	92.11%
Irritability	8	10.53%%
Loss of balance	5	6.58%
A decrease in appetite	18	23.68%
We determined that the most common symptoms related to children with otitis media, which are fever, had 70 cases, ear pain included 63 cases, and a decrease in appetite included 18 cases.		

Table 4: Enroll clinical outcomes of amoxicillin treatment and their effectiveness of children with Otitis Media.

Variables	Number of patients [76]	Percentage [%]
Cause of the infection		
Bacterial	76	100%
Viral	0	0%
Management of amoxicillin treatment		
Amoxicillin use		
Yes	76	100%
No	0	0%
Amoxicillin dose	80-90 mg/kg/day	
Administering the medication	Three times daily	

Amoxicillin Added	Orally administered as a suspension or tablet for the treatment of Otitis Media, as opposed to direct administration into the ear canal.
Follow–up time	5 – 8 days
Length of Recovery, days	Eight days
Clinical outcomes were identified amoxicillin treatment and their effectiveness of children with Otitis Media, where contain Cause of the infection by Bacterial was 76 cases, as well as all children had taken amoxicillin treatment for five days or more.	

Table 5: Evaluation of the extent of pain in children before and after amoxicillin treatment by Wong-Baker FACES Pain Rating Scale.

Follow–up time, [Days]	Before amoxicillin treatment	After amoxicillin treatment
1 Day	8.02 ± 0.57	4.78 ± 1.04
2 Day	8.46 ± 0.06	3.11 ± 0.002
3 Day	9.1 ± 0.0005	2.13 ± 0.58
4 Day	8.78 ± 0.01	1.24 ± 0.64
5 Day	8.92 ± 0.031	1.01 ± 0.02

Table 6: Distribution of identified complications in children during follow-up after receiving amoxicillin treatment.

Post-treatment complications	Number of patients [76]	Percentage [%]
Nausea and Vomiting	3	3.95%
Allergies	2	2.63%
Tympanic membrane abnormalities	0	0%
Mastoiditis	1	1.32%
Hearing loss	2	2.63%
Cholesteatoma	1	1.32%
Our results defined the rate of complications who children suffered of, which are nausea and vomiting, which include 3 cases, aallergies had 2 cases, and hearing loss got 2 cases only.		

Table 7: Evaluation of children's quality of life during follow-up after receiving amoxicillin treatment by COMOT-15 scale.

Items	Before amoxicillin treatment	After amoxicillin treatment
Ear Symptoms (ES)	18.95 ± 4.87	47.72 ± 6.33
Hearing Function (HF)	28.21 ± 3.96	51.74 ± 2.68
Mental Health (MH)	26.51 ± 9.91	41.02 ± 6.43
Overall Score (OS)	19.72 ± 5.66	53.74 ± 3.86

Our study was conducted an evaluation of quality–of life before and after receiving amoxicillin treatment by COMOT-15 scale, where the most perfect items were ear symptoms was 18.95 ± 4.87 before amoxicillin treatment, and 47.72 ± 6.33 after amoxicillin treatment, hearing function was 28.21 ± 3.96 before amoxicillin treatment and 51.74 ± 2.68 after amoxicillin treatment.

Table 8: Determining the severity of symptoms in children suffering from otitis media before and after amoxicillin treatment by AOM-SOS scale.

Items	Before amoxicillin treatment	After amoxicillin treatment	P -value
Ear pain	8.63 ± 1.05	2.31 ± 0.01	< 0.001
Fluid drainage from the ear	6.68 ± 0.71	1.82 ± 0.003	0.0003
Difficulty hearing	6.02 ± 2.45	3.73 ± 0.26	0.0024
Fever	8.35 ± 0.84	4.35 ± 0.61	0.0373
Irritability	5.83 ± 0.24	1.92 ± 0.20	0.0382
Loss of balance	4.45 ± 1.85	2.62 ± 0.0068	0.0413
A decrease in appetite	4.03 ± 2.21	1.10 ± 0.063	0.0458

Our results measured the severity of symptoms where determine the most parameters who get access, which are fever was 8.35 ± 0.84 before amoxicillin treatment and 4.35 ± 0.61 after amoxicillin treatment, ear pain was 8.63 ± 1.05 before amoxicillin treatment and 2.31 ± 0.01 after amoxicillin treatment, and difficulty hearing was 6.02 ± 2.45 before amoxicillin treatment, while 3.73 ± 0.26 after amoxicillin treatment.

Table 9: Logistic regression evaluation of risk factors affecting patients in the short term after receiving treatment.		
Risk factors	Or	CI 95 %
Age [11 – 14]	2.84	0.3 – 6.85
Sex [females]	1.95	0.02 – 6.40
Bacterial	4.73	1.12 – 8.61
Exposure to secondhand smoke	3.66	2.05 – 5.73
Family history	2.95	0.86 – 7.65
Allergies	2.81	0.78 – 7.93
Nausea and Vomiting	4.45	1.02 – 6.65
Hearing loss	5.34	1.2 – 10.23
Ear pain	6.54	2.34 – 18.74
Fever	4.63	1.08 – 6.66
A decrease in appetite	7.96	2.48 – 24.93
Obesity	6.58	3.38 – 9.24

Discussion

Recent studies have revealed that weight stagnation, even in the absence of fever, is a common presentation of infant otitis media, a finding so significant that it prompts the hospital to admit the patient for further study. Also, there is an important correlation between otitis media and upper respiratory tract infection, according to the findings of other authors. More than 50% of patients exhibit symptoms suggesting an upper respiratory tract infection, such as rhinorhea and nasal obstruction. [18]

An American study showed that a fever is a very common symptom in infant otitis media, which is usually unable to express its otalgia and only, in some cases, manifests a nonspecific irritability [19]. On the contrary, the series comprising higher age groups coincide in presenting otalgia as the most frequent symptom, followed by fever. However, the exact role of respiratory viruses in the etiopathogenesis of otitis media is unknown. [20]

In the only sample with positivity for the adenovirus, S. pneumoniae grew concomitantly. Otitis media in infants with positive RSV bronchiolitis in nasal mucus was, in 66% of the cases, of bacterial etiology. In no case could the respiratory syncytial virus be isolated in the otic exudate [21]. Although several viruses have already been isolated and viral antigens have been detected in the fluid of the middle ear, there is no definitive evidence indicating that viral replication takes place in the same tympanic cavity. [22]

Some study suggested that a viral pathogen is unlikely to be the sole cause of this disease, implying that antibiotic therapy would always play a secondary role [23]. Only one of the patients was affected by an immunodeficiency [24]. Another study agreed that despite the extensive clinical experience in the treatment of otitis media, there is no consensus regarding the optimal follow-up strategy after treatment. [25]

Conclusion

in conclusion, the research on hearing loss in children from Iraq, specifically examining the consequences of otitis media and evaluating factors that contribute to its occurrence, provides valuable insights into the substantial influence of ear infections on this particular group. The results emphasize the significance of timely identification and intervention to avert persistent auditory impairments. By identifying crucial risk variables linked to otitis media, such as environmental factors and healthcare access, it is possible to devise ways to enhance preventative and management protocols.

Healthcare practitioners and politicians must prioritize ear health efforts and increase knowledge of the consequences of untreated otitis media on childhood development and overall well-being. Additional study and collaborative endeavors are essential for addressing the difficulties encountered by Iraqi children with hearing impairment and striving for appropriate solutions to promote the well-being of future generations.

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