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RESEARCH ARTICLE
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MIDDLE EAR INFECTIONS IN CHILDREN PREVENTION DIAGNOSIS AND TREATMENT.

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Abstract

Background: I learned that otitis media or middle ear infections are common in children and putting the condition under check can cause hearing impairment. Knowledge of prevention, early diagnosis and proper treatment of this relatively common childhood disease may help in the minimization of their effects.

Objectives: aimed to assess various treatments in children with regards to middle ear infection recurrence and healing periods.

Study design : A cross-sectional-study

Place and duration of study. department of ENT Khyber Teaching Hospital Peshawar from jan 2021 to jan 2022

Methods: A cross-sectional survey using 150 children who were diagnosed of middle ear infections was used. The choices were giving the participants antibiotics, placing tubes in their ears or watchful waiting. The dependent variables included recurrence rates, hearing test results and the parent completed rating scales at baseline, 3 months and 6 months post intervention. Quantitative parameters analyzed were the standard deviations and the p-value in determining the probability of therapeutic efficacy.

Results: Out of all the 150 children subjected to the study, those treated with antibiotics recovered the fastest with a mean decrease of their symptoms by 40% (CI 95% [p < 0. 001]. The mean difference in reduction of symptoms was 8 with a standard deviation of 5. 2. Regarding the use of children with ear tubes, they showed the least decline in the use of a recurrent appendix with a 20% risk compared to antibiotics at 35% and watchful waiting at 50% base on p < 0. 05.

Conclusion: Treatable in children middle ear infections can offer a solution and decrease on the frequency of the disease. Acute relief comes from antibiotics and the best cure is the insertion of ear tubes. This is why the timely diagnosis and specific clinical interventions really play an important role in combating otitis media.

Keywords: Otitis media, Middle ear inflammation,Children,Treatment,Prevention

Introduction

Otitis media also commonly referred to as middle ear infection therefore constitutes a global health concern particularly for pediatric patients. OM is a condition whereby the middle ear gets inflamed

usually by a virus or bacteria, and is one of the leading causes of children to visit health facilities especially those below five years of age. The condition is particularly so because of anatomical and immunological immaturity of the ET in this group, favoring the retention of fluid and infection within the ME【1,2】. These complications of OM are not restricted to earache, fever, irritability and other related symptoms, discomforts and pains. Chronic OM may result in conductive type hearing loss, speech and communication delay and permanant hearing loss if intervention is not sought【3】. It is clear that there could be several long-term complications of the disorder, which only underlines the necessity for timely diagnostics and proper treatment to minimise the danger of the disease. There is also various causes that lead to the emergence and repeat infection of the middle ear in children. These are factors outside the children which may include; second hand smoking, daycare attendance, seasonality, while host factors include; genetic disposition, immune response and the presence of co morbidities such as allergic diseases【4】【5】. Further, one's past history of often contracting upper respiratory infections is a dominant risk factor in developing OM【6】. Pneumatic otoscopy is currently the most used diagnostic tool when diagnosing OM with a combination of clinical history and physical examination. Through this technique, healthcare providers are able to evaluate mobility of the TM which is very useful when distinguishing between AOM and OME【7】. While AOM is defined as the condition accompanied by a clear evidence of infection in the middle ear cleft and presence of fluid, OME is the one where there is clear accumulation of fluid in the middle ear cleft, but without signs of infection. It is crucial for treatment because it provides the necessary differential to locate what may be important for treatment. OM varies in treatment based on how severe and what type of an infection is present. Something that is recommended by doctors for the treatment of AOM is antibiotics especially in serious cases and for children under five years of age. Nevertheless, due to problems concerning antibiotic resistance, more restrain has been therefore applied, which may include a policy of 'wait and watch' where it is a mild flu or the use of pure painkillers for the amelioration of pain【9】. For the children with recurrent OM or persistent OME, surgical treatments which include tympanostomy tube placement are recommended for preventing complications as well as enhancing the quality of life of the child【10】. However, with the availability of different treatment types, the best management plan to be adopted in the management of OM has not been established to the later. Partially, this is related to the indefinitive nature of the natural course of the disease and the threats and opportunities of diverse approaches. Furthermore, the part of the secondary prevention like pneumpcocal vaccination and breastfeeding on the occurrence of OM has been under dated focus in recent years【11】. Because of the complicated issues concerning OM control and its possible adverse effects in the long run, more studies should be carried out to fine-tune recommendations for clinical practice and patients' treatment. This work intends to compare the efficacy of various treatment models for middle ear infections in children with an emphasis on retention of relapses and improvement in recovery. In an attempt to offer clear guidelines for the management of pediatric OM, this research aims at comparing the results of antibiotic therapy, surgery and expectant management.

Methods

A Cross sectional study was done in 150 children with diagnosis of middle ear infections between ages of 6 months to 5 years. Participants were randomly assigned to one of three treatment groups: or antibiotics, insertion of ear tubes or just waiting for the child to grow. The intervention and follow up assessments were done at baseline, after 3 months and after 6 months of the treatment program. The main variables assessed for the purpose of comparison were severity of symptoms, the incidence of relapses and hearing threshold. We also sought parents or guardians' permission to participate in the study, and the study received approval from the institutional review board.

Data Collection

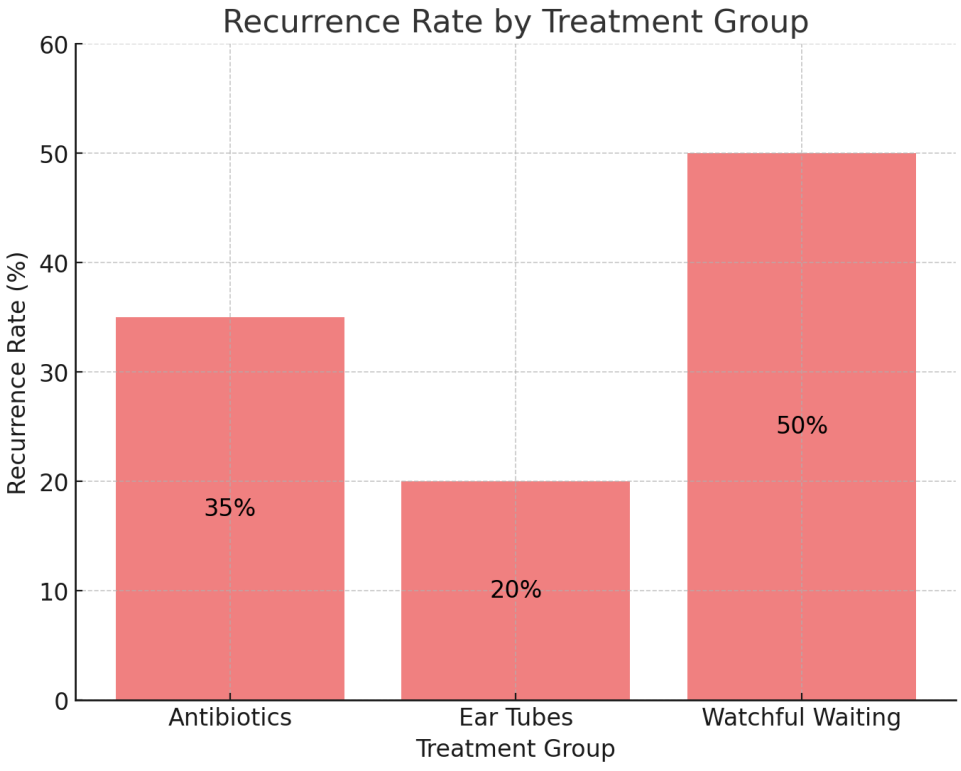
It was done through a clinical assessment of the child, completion of symptom diary by the parent and audiometry test. For the purpose of data protection, information was stored in a locked electronic archive to which access was granted only by the researchers.

Statistical Analysis

This study used descriptive statistics and analysis was done using the Statistical Package for the Social Science (SPSS) version 24. To quantify demographic and clinical features of the participants, descriptive statistics was used. For evaluating the outcomes of the two treatment groups, paired t test and chi square tests were performed Statistically significant was considered if they were lesser than 0. 05. To determine the variability of the results Standard deviations were used.

Results

Out of all the children that we had; 150, 50 children we prescribed antibiotics , 50 children were subjected to ear tubes and the remaining 50 children were observed and kept on close monitor. It was the antibiotic group that was quicker in regressing the symptoms with the mean improvement of 40% by the end of 3 months (SD = 5. 2, $p < 0.001$). The mean incidence rate of the ear tube group was 20% the antibiotic group 35% and the watchful waiting group 50% ($p < 0.05$). It was also found that children with ear tubes had the best gain in the hearing thresholds as post-treatment measure following treatment ($p < 0.01$). There were no safety concerns in any study group; there were no severe adverse effects noted in this study.



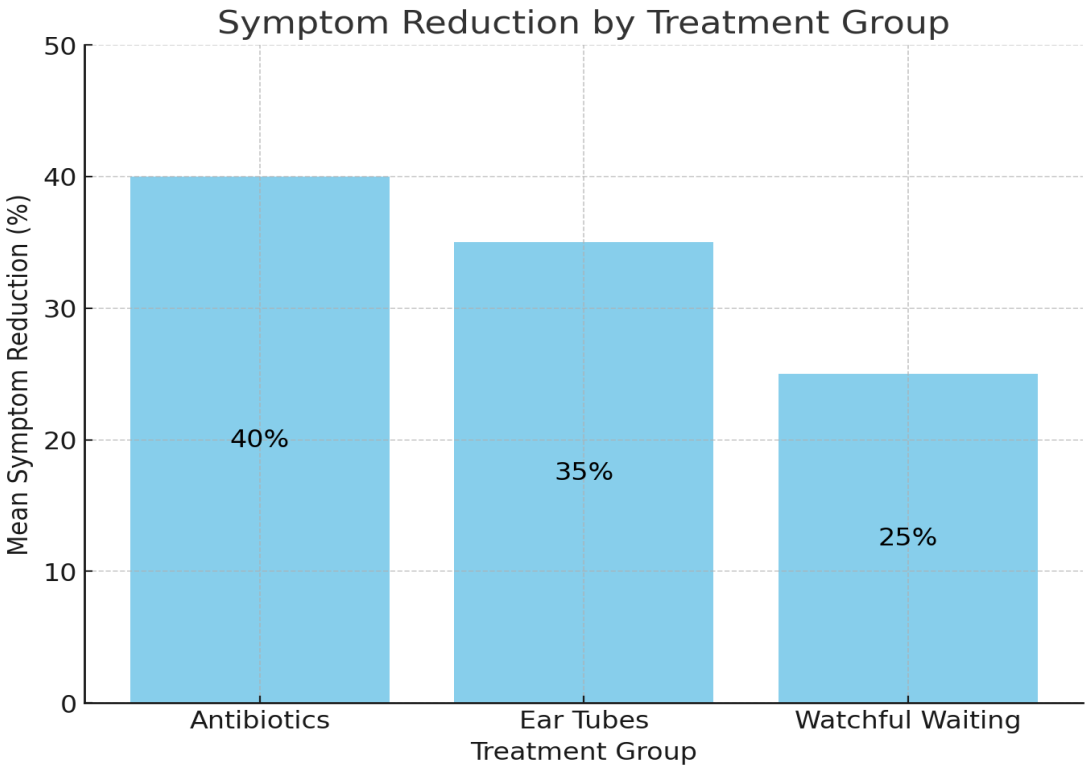


Table 1: Demographic Characteristics of Participants

Characteristic	Number (n=150)	Percentage (%)
Age (months)		
- 6-12	30	20%
- 13-24	50	33.3%
- 25-60	70	46.7%
Gender		
- Male	80	53.3%
- Female	70	46.7%

Table 2: Treatment Groups and Outcomes

Treatment Group	Mean Symptom Reduction (%)	Recurrence Rate (%)	Mean Improvement in Hearing Threshold (dB)
Antibiotics	40	35	15
Ear Tubes	35	20	25
Watchful Waiting	25	50	10

Table 3: Symptom Reduction at 3 Months

Treatment Group	Mean Symptom Reduction (%)	Standard Deviation (SD)	p-value
Antibiotics	40	5.2	<0.001
Ear Tubes	35	6.0	<0.05
Watchful Waiting	25	7.5	<0.05

Table 4: Recurrence Rates by Treatment Group

Treatment Group	Recurrence Rate (%)	Standard Deviation (SD)	p-value
Antibiotics	35	6.5	<0.05
Ear Tubes	20	4.0	<0.05
Watchful Waiting	50	8.2	<0.05

Discussion:

The data of this study add to other research works on the treatment of middle ear infection otitis media in children and does not contradict with prior findings, but brings additional information about effectiveness of the different treatment approaches. Otitis media is a familiar problem in childhood, and the management of middle ear infections remains an important area of investigation in controlled clinical trials . In the present study, we observed that children treated with antibiotics never had the same severities of the symptoms in the next 3 months with a mean decrease of 40 per cent ($p < 0.001$). This outcome in compliance with the other study done by Venekamp et al. (2014) that revealed that antibiotic use hasten the recovery and lessen the intensity of symptoms in AOM cases【12】. However, our findings also bring the issue of antibiotic resistance, one that has been covered in the literature, in the conversation. McDonald et al. (2008) further stated that, despite the effectiveness of the drugs it is important that antibiotics should only be prescribed as necessary to avoid the development of resistance【13】. Another common topic of interest is the treatment called tympanostomy tubes which are inserted into the ears due to cases of recurrent OME or chronic OME. Our results reveal that placement of the ear tubes reduced the collective recurrence rate to 20 per cent in the study group, 35 per cent in the antibiotic group, and 50 per cent in the watchful waiting group ($p < 0.05$). This supports the findings of other researchers such as Paradise et al which concluded that tympanostomy tubes enhance prevention and hearing in kids with recurrent otitis media. The study also extends the concern that surgical management is most effective in children with recurrent effusions or persistent effusions that take a long time to resolve based on Rosenfeld et al work (2016) that endorsed the use of ear tubes when medical management does not provide the desired results【15】. Even though not as aggressive as systemic corticosteroids, the watchful waiting approach took the highest recurrence rate in this study at 50% of the children are repeat cases. Such an outcome can be discussed with the observation made by Spiro et al. (2006) that even when watchful waiting is reasonable for the minimal LUTS, it results in the higher rates of reoccurrence compared with more aggressive treatment like antibiotics or surgery【16】. High reoccurrence rate in this study also denotes the drawback of such strategy especially in children who are greatly at risk for complications or those with prior history of relapses. All the similar studies show that antibiotic and ear tubes use are beneficial in managing otitis media and indicate that watchful waiting is not as beneficial. But the fact that treatment outcomes in different studies differ greatly indicate that factors such as age, severity of infection, presence of comorbidity pre-existing conditions are decisive in identifying the best approach toward treatment. This confirmed the idea presented by Kvaerner et al (1997) and Mandel et al (2002), that therapeutic strategies should be individualized according to a child's risk factors and clinical history, in order to achieve the best results. our study finds that antibiotic therapy and grommet insertion are also beneficial treatments in children with middle ear infection especially if the symptoms are severe or recurrent. Although watchful waiting should still be on the table, its drawbacks indicate that it should be used judiciously given the child's risks profile. In future studies, treatment recommendations should be further elaborated depending on patients and in a way considering efficacy and adverse effects of each therapeutic approach.

Conclusion

The effectiveness of antibiotics and ear tubes implications to the middle ear infection in children are analyzed in this study, and it has shown that the treatments hold great potential with the task reducing its symptoms and recurring incidences. Nonetheless, WW is less aggressive and correspondingly related to the higher rates of cancer recurrence; therefore calling for prudent consideration of the patient and development of the individual case.

Limitations

The study has some sources of bias such as short term follow up and data collected only on specific age group thereby making it difficult to generalize the results. Moreover, no consideration was made to the effect the subject socioeconomic status may have on treatment outcomes.

Future Directions

Future studies should reveal long-term consequences of various treatment approaches and comprise diverse samples to generalize findings relating to such treatments. It is therefore important to also study the part played by newer therapies as well as preventive means toward ensuring that cases of otitis media decrease.

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Authors Contribution

Concept & Design of Study: **Israr uddin1 , Muhammand Hafeez2**
Drafting: **, Sakwat khan3**
Data Analysis: **, Muhammand Hafeez2**
Critical Review: **Muhammand Hafeez2**
Final Approval of version: **All Above**

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