DIFFERENCE IN HEARING TRESHHOLD BEFORE AND AFTER MEDICAL TREATMENT AT OTITIS MEDIA WITH EFFUSION

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ABSTRACT

This study discusses the differences in hearing threshold before and after medical treatment in patients with effusion otitis media. This research is an experimental study with pre and post test design with 17 ears of respondents. The results showed that respondents with mild hearing loss were 17.6%, moderate hearing loss was 41.2%, and severe impairment was 41.2%. After treatment, there was 5.9% hearing loss, 29.4% mild heraing loss, 41.2% hearing loss and 23.5% severe ones. The average hearing threshold before doing medicamentosa was 55.19 ± 16.25 dB and after 48.44 ± 14.78 with p value = 0.001.

Keywords: *OME, Audiometry, Hearing Threshhold.*

INTRODUCTION

Otitis media with effusion (OME) is a condition of accumulating fluid in the middle ear without symptoms of acute inflammation with intact tympanic membrane as cited from Mawson 1976.1,2,3 Serous or mucoid secretions that persist for three months or more. So that OME is also known as secretory otitis media, serous otitis media and glue ear. 1

OME often occurs in children with a peak age of 2-5 years and is likely to occur in adults. OME is often without symptoms, so it is late to be diagnosed and treated. The cause is multifactorial.1,3 Non-medical factors include age (2 years to 5 years), extended family, short breastfeeding period and passive smoking. Meanwhile, medical factors include a history of acute otitis media, acute tonsillitis, nasal congestion and craniofacial anomalies. Tubal function, allergies, viral infections, otitis media that have not complet resolution and local immune dysfunction due to the presence of persistent pathogenic bacteria.1,2 The conditions mentioned above cause obstruction in the orificium of the tube, disturbed aeration, causing negative pressure in the middle ear. Negative pressure causes an increased in capillary permeability so that fluid transudation occurs and collects in the middle ear.1

Allergies also cause Eustachian tube obstruction due to edema. In addition, it plays a role in increasing secretion activity in the middle ear mucosa. Not only that, the aspiration of nasopharyngeal bacteria contained in allergic secretions enters the middle ear as the cause of OME. 1

Viral infection of the upper respiratory tract can enter the mucosa of the middle ear, causing it to arise increased secretory activity in the middle ear. Inadequate antibiotic therapy

AOM can deactivate the infection but cannot be completely cured. In this case, a low-grade infection can occur which can trigger the mucosa to produce more secretions.1

The results of culture of OME secretions from the middle ear obtained H. influenzae, S.pneumoniae, A. Otodidis, and M. catarrhalis. The existence of these culture results becomes a guideline for the use of antibiotics in OME.5 Isolation of bacteria in pediatric patients are more sensitive to antibiotics than adults.

OME is often asymptomatic. Complaints that eventually made people come for consultations were due to hearing problems which caused difficulty in communicating and disrupted the learning process. Hearing loss due to OME is conductive deafness or mixed deafness.2.3 Hearing loss of more than 50 db can be ascertained that damage has occurred in the inner ear. Hearing loss in OME as cited from Roberts et al 2004, 50% of hearing loss is more than 20 dB, 20% loss is more than 35 dB and 5-10% of hearing loss is more than 50 dB.3

The diagnosis of OME is confirmed using the Cantekin algorithm based on the type B tympanogram and negative pressure tympanogram accompanied by an otoscopic examination for the presence of an effusion.4 Otoscopic finded include fluid in the middle ear, bubble appearance, dull tympanic membrane and central.3

Management of OME can be both non-surgical and surgical. Non-surgical therapy includes medical, outoinflation and hearing aids. Medical administration in the form of antibiotics was requested because of the discovery of bacteria from the isolation of OME patient secretions. Meanwhile, Griffin Fan Flynn 2011 conducted a study on the use of antihistamines and decongestants, either alone or in combination, in OME patients, the results were clinical, although not of high value. Mucolytic administration can reduce the symptoms of OME as in the study conducted by Itu et al. 2015, although the long-term efficacy has not been proven, the literature states that 1-3 months of mucolytic administration can prevent tympanostomy tubing in 20% of children with OME. This mucolytic administration aims to reduce secretion production, facilitate secretion and reduce the risk of adhesion damage.3

While surgical therapy is the insertion of a tympanostomy tube or myringotomy. 7 Tympanostomy tube placement is the gold standard for the management of OME with

hearing loss. The tympanostomy tube helps ventilate the middle ear and balance pressure on the side of the tympanic membrane. Research from Hellstrom et al. 2011 showed hearing improvement occurred no later than nine months after insertion of the tympanostomy tube. The complications of tympanostomy can occur otorrhea, persistent tympanic membrane perforation and myringosclerosis. 3

The purpose of study generally determine the effect of medical administration on the hearing threshold of patients with OME. In particular, to determine the average hearing threshold of OME patients, the degree of hearing loss and the difference in hearing threshold before and after medical administration.

METHODE

The research design used experimental study with pre and post test control group to determine the hearing threshold before and after being given medicamentosa, 17 ears were evaluaed.

The research was conducted at Ear, Nose, Throat, Head and Neck Surgery (ENT-KL) Awal Bros Pekanbaru Hospital from July 2019 to November 2020. The study population was OME patients who came to the ENT-KL departement of Awal Bros Hospital Pekanbaru. The sample total is obtained by the formula:

$$N = \left[\frac{(Z\alpha+Z\beta)S}{Xa-Xo}\right]$$

Zα = alfa standar deviation
Zβ = beta standar deviation
S = the standard deviation of the difference in values between groups
Xa-Xo = the minimum difference between the mean which is considered significant

Zα is set at 1.96 and Zβ at 1.28.8 The minimum significant difference (Xa-Xo) is 5. The standard deviation obtained from the literature is 11.3 9, then the total sample is obtained.

$$N = \frac{(Z\alpha+Z\beta)S}{Xa-Xo}$$

$$= \left[\frac{(1,96+1,28)\ 11,3}{5}\right]$$

$$= 7,32 \approx 7$$

So the minimum sample needed is 7 ears. The sample was determined by means of consecutive sampling10, all study respondents who met the acceptance criteria were sampled and received treatment.

The research sample was the result of ear audiograms with OME patients who came to the ENT-KL outpatient clinic of Awal Bros Hospital Pekanbaru with intact tympanic membrane, complaining of hearing problems with the age of 5-50 years. Samples with craniofacial conditions such as palatoscysis, middle ear, nose and throat infections during the study were excluded. Likewise, if the tympanic membrane perforation occurred during the study or did not come to control at the specified time and allergies to any of the medical composation were too.

Anamnesis, examination of the ear, nose and throat, tympanometry and audiometry were carried out in the research respondents. Tympanomentry is an examination to determine the condition of the middle ear and the flexibility of the tympanic membrane. The results of tympanometry were classified by Jegger, namely type A, type B, type C, type As and type Ad. OME is confirmed by tympanometry type B or C. Audiometry is a test to determine the hearing threshold. Hearing loss was defined when the audiometric result was more than 25 dB. The data obtained are recorded. After that, given medicamentosa consisting of antibiotics, antihistamines / decongestants and mucolytics for two weeks. Then performed audiometric examination. Data were processed using the SPSS statistical window 25 with paired t-test. The results of statistical analysis were stated to be significant if the value was $p < 0.05$.

RESULTS AND DISCUSSIONS

This research was conducted on 17 ears. Based on respondents, it can be seen in table 1. Based on gender, males are more than separated (69.2%), the largest age group is 36-45 years (46.2%) and the highest level of education is higher education (47, 1%). On otoscopy examination, 14 ears of opaque tympanic membrane were found and 3 bubble apperance. 14 tympanometry with type B and 3 type C.

Duration of complaints before treatment (table 2) 1 month - 3 months were 2 ears (11.7%), old complaints> 3 months - 6 months were 6 ears (35.3%),> 6 months - 1 year were 7 ears (41.2%) and over 1 year as much as 2 ears (11.8%).

Table 1. Responden characteristics (n=17)

Charecteristic of Responden	f	%
Gender		
Male	13	69,2
Female	4	38,8
Age group		
5-15	3	23,1
16-35	3	23,1
36-45	6	46,2
46-50	5	7,7
Education		
Preschool	0	0
Elementary school	3	17,6
Junior High School	0	0
High School	6	35,3
Academy/PT	8	47,1

Table 2. Onset of symptom before treatment (n=17)

Onset of symptom	f	%
1 month - 3 month	2	11,7
>3 month - 6 month	6	35,3
>6 month - 1 year	7	41,2
>1 year	2	11,8

The degree of hearing loss can be seen in table 3. The degree of severity has decreased after medical treatment from 41.2% to 17.6%. The moderate and mild degrees increased respectively from 41.2% to 47.1% and 17.6% to 29.4%. One ear reaches the normal hearing threshold of 15 dB. Based on table 4, it is found improvment of audiogram in the range 1-10

dB as much as 64.7%, there is no improvement at 11.8%, an increase of 11-20 dB as much as 17.6% and an increase of more than 20 dB as much as 5.9%

The difference in hearing threshold before and after medicamentosa can be seen in table 5. The hearing threshold before treatment was 55.19 dB and after 48.44 dB. The difference in hearing threshold before and after medical administration was obtained p value = 0.001. This difference was statistically significant

Table 3. Degree of hearing loss distribution before and after treatment

Degree of hearing loss	Before treatment		After treatment	
	F	%	F	%
< 26 (normal)	0	0	1	5,9
26 – 40 dB (mild)	3	17,6	5	29,4
41- 60 dB (moderate)	7	41,2	8	47,1
61- 90 dB (severe)	7	41,2	3	17,6
>90 dB (very severe)	0	0	0	0

Table 4. Increased hearing threshold after treatment

Increased hearing threshold (dB)	F	%
No improvment	2	11,8
1 - 10	11	64,7
11-20	3	17,6
>20	1	5,9

Table 5. Comparison of mean hearing threshold before and after treatment

	Before treatment (dB)	After treatment (dB)	p
Average hearing threshold	55,19 ± 16,25	48,44 ± 14,78	0,001

Discussion

In this study, based on the characteristics of the respondents, gender male more than female (69.2%). According to what Abdullah11 found 72% male and 28% female. Several studies have also shown that men are higher than women.12 Male is a risk factor otitis media with effusion (OME).13 Based on the age group, there are 3 respondents (23.1%) aged 5-15 years, age 16-35 years were 3 respondents (23.1%), age 36-45 years were 6 respondents (46.2%) and age group 46-50 years were 5 respondents (7.7%). Based on education there are elementary school 17.6%, High School 35.3% and academy 47.1%.

The occurrence of effusions in OME can be acute with a small period of three weeks, subacute for three weeks to 3 months and chronic for more than three months.11 In this study, 7 respondents (41.2%) found that the most complaints duration was between six months and one year. OME can be persistent for more than 1 year by 5-10% .14 In this study 2 (11.8%) respondents had complaints for more than 1 year and in this case there was no hearing improvement. Type B and C tympanograms were the diagnostic criteria for OME in previous studies.14 In this study the most tympanograms were type B.

Effusion otitis media is a middle ear disorder without pain and without acute inflammation, so hearing loss is the most common complaint for people to consult. This resulted in communication disorders, learning disruption and speech delay in children.9,13 The most degree of hearing loss in this study was moderate hearing loss 41.2%, followed by mild 17.6% and finally severe 4.2%. Abdullah9 (research on children aged 3-12 years) found 48% moderate hearing loss, 32% mild hearing loss and 8% less severe degree. Meanwhile, Najeeb12 had mild to moderate hearing loss, with an average hearing loss of 30 dB.

OME found secretions in the middle ear with intact tympanic membrane. In some cases this secretion is very thick like "glue". Not only that, this middle ear effusion was also found to contain bacteria.10 Many treatments that have been tried for OME include antibiotics, antihistamines, decongestants, steroids, combined mucolytics or single antibiotics.9,10 Medical therapy is required before any surgical decision is made. This patient complaint is hearing loss, the mean hearing threshold before treatment was 55.19 dB and after 48.44 dB. This difference was statistically significant with a value of $p = 0.001$.

CONCLUSION

There was a significant improvement in hearing threshold before and after treatment. Two weeks of medical therapy can be an option before surgery. Further research is needed with a larger sample.

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