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Original Article

Microbiology of Cerumen Bacterial Flora of Acute Otitis Externa Patients

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Abstract

Background:To compare the microbiology of Cerumen bacterial flora in acute otitis externa patients and healthy individuals.

Methods: In this comparative study a total of 120 participants were included, consisting of 50 patients of acute otitis externa patients and 70 healthy participants. Healthy cases without any medical problems but with cerumen in the ear canal were enrolled ascontrol group. Clinical examination of the ear was performed and the patients' medical history was fully reviewed. Cerumen samples were obtained from both groups by suction, curettage or the use of a loop. Samples were then cultured on chocolate agar, blood agar and eosin methyl blue (EMB) media. The chocolate agar and EMB agar were incubated for 18-24 hrs at 37^{o}C while the blood agar was incubated for 18-24 hrs at 37^{o}C under Co2 condition. Colonies characteristics were then examined by direct microscopic examination (gram staining) and also special diagnostic tests. A p-value equal to or less than 0.05 was considered as significant.

Results: Proportion of pathogenic bacteria was significantly (p-value = 0.000) higher in cases of otitis acute externa patients (44% vs. 8.57%) as compared to normal healthy patients. There were significantly (p-value < 0.05) higher gram negative bacteria in cases of otitis externa as compared to healthy control group. Most common microorganisms found in the patient group were Staphylococcus aureus (24.6%), Bacillus (21.2%) and Pseudomonas(9.0%). Staphylococcus epidermidis (41.5%), Diphtheroid (24.7%) and Streptococcus (19.5%) were the commonly found microorganisms in the control group. There was significant (p-value < 0.05) association between colony count and actue otitis externa status.

Conclusion: Isolated bacteria from cerumen of healthy subjects were different in comparison to those of acute otitis externa patients.

Key Words: Cerumen bacterial flora, Actue otitis Externa, Staphylococcus aureus, Staphylococcus epidermidis

Introduction

The inflammation of external ear canal which might involve the pinna or tympanic membrane is termed as acute otitis externa. Its important signs are soreness of tragus, pinna or both, having same or intense position as expected on the basis of visual examination. Acute otitis externa is cellulitis of skin in ear canal and subdermis with inflammation and varying edema. [1,2]

Customarily otitis externa is caused by bacterial infection, sometime fungal infection can also case otitis externa. But it can be a result of different non-infectious or local dermatologic progressions. Discomfort of external auditory canal is a main symptom of otitis externa and its common signs include erythema and swelling of the canal with discharge. Trauma and intense amount of moisture can affect the natural defensive system of the canal and can cause the otitis externa. [3]

The external canal of the auditory system has a perfect design for self-purgative purpose. Unnecessary cleaning or instrumentation of the ear canal have a major risk for acquiring infections. These infections can cause ear itching, aches, discharge and feeling of fullness. [4]

Some micro-organisms can survive in outer auditory canal. Coagulase negative Staphylococcus, Staphylococcus aureus and Streptococcus pneu-moniae are the most well-known microbes segregated from the outside ear trenches of healthy individuals. Corynebacterium species like Turicellaotitidis and Corynebacterium auris, have additionally been confined in different studies. The third most frequently found microbes are Streptococci and Enterococci species.[5]

Human wax is a blend of desquamated keratinocytes discharged in external third of the mass of outside auditory canal, and sebaceous organ discharges, alongside apocrine sweat glands. This structures a dark chestnut to grayish-dark shaded thick substance, which gets kept over and along the mass of shallow and profound outer sound-related channel. Glandular emissions from the hair in the canal additionally blend and structures sticky substance known as cerumen. [6,7]Cerumen or ear wax is discharged by ceruminous

and sebaceous organs. Two sorts of human cerumen, wet and dry, are controlled by two autosomal alleles.[8]
The cerumen function in protecting the ear against microorganisms has been an issue of discussion for a long time. It is said that cerumen may have antibacterial activities. Nevertheless, there is little evidence to support this concept in either way. [9]According to the literature diverse forms of organisms were found in cerumen of patients of otitis externa and controls. In a study it was found that in the study group, Staphylococcus aureus (20.8%), Bacillus (18.9%) and Pseudomonas (11.3%) and in the control group Staphylococcus epidermidis (38.7%) and Diphtheroid (22.4%) were the most commonly recognized microorganisms.[10]

Patients and Methods

In this comparative study a total of 120 participants, visiting in ENT department of Ahmad Medical Complex, were included, which consisted of 50 patients of acute otitis externa patients and 70 healthy participants. Healthy cases without any medical problems but with cerumen in the ear canal were enrolled in the control group. Clinical examination of the ear was performed and the patient's medical history was fully reviewed. Cerumen samples were obtained from all cases in both groups by suction, curettage or the use of a loop. These samples were then sent to the microbiology department, where the samples were incubated on chocolate agar, blood agar and eosin methyl blue (EMB) media. Colonies characteristics were then examined by direct microscopic examination (gram staining) and also special diagnostic tests. A p-value equal to or less than 0.05 was considered as significant.

Results

Mean age of the cases was 37.43±8.06 and the mean age of healthy group was 34.76±7.44 years. There were 16 (32%) males and 34 (68%) female in cases group. In control group there were 20 (28.57%) male and 50 (71.42%) female participantds. Klebsiella pneumonia, Staphylococcus aureus, Haemophilus influenza, Streptococcus pneumonia and Pseudomonas were considered as pathogenic bacteria of the external ear, and other bacteria were categorized as normal flora. The proportion of pathogenic bacteria was significantly (p-value = 0.000) higher in cases of otitis acute externa patients (44% vs. 8.57%) as compared to normal healthy patients (Table 1).There were significantly (p-value < 0.05) higher gram negative bacteria in cases of otitis externa as compared to healthy control group. Most common microorganisms found in the patient group were Staphylococcus aureus (24.6%), Bacillus (21.2%) and Pseudomonas (9.0%). While Staphylococcus epidermidis (41.5%), Diphtheroid (24.7%) and Streptococcus (19.5%) were the commonly found microorganisms in the control group.

Table 1: Comparison of different Cerumen bacterial flora characteristics between actue otitis externa patients and healthy controls

Characteristics of Cerumen samples	Cases Group (n=50)		Controls Group (n=70)		p-value
	No	Percentage	No	Percentage	
Pathogen and normal flora bacteria in the case and control group					
Bacterial Flora	28	56.00%	64	91.43%	0.000
Pathogen	22	44.00%	6	8.57%	
Distribution of Gram positive and negative bacteria					
Gram Positive	37	74.00%	67	95.71%	0.000
Gram Negative	13	26.00%	3	4.29%	
Comparison of Bacterial Status in cases and control groups					
Monobacterial	29	58.00%	41	58.57%	0.689
Polybacteria	18	36.00%	27	38.57%	
Non bacterial	3	6.00%	2	2.86%	
Comparison of Colony Count in cases and controls					
< 10 CFU	11	22.00%	22	31.43%	0.000
10 - 100 CFU	37	74.00%	14	20.00%	
Numerous	2	4.00%	34	48.57%	

In the study group, 22% cases had < 10 CFU (74% cases had 10 – 100 CFU and 4% cases had numerous cell colony formation. The colony formation in healthy control group showed that Staphylococcus aureus, Bacillus, and Pseudomonas were the most widely recognized microbes. Twenty two (31.43%) had < 10 CFU, 37 (74%) had 10-1000 CFU and 34 (48.57%) had numerous bacteria. There was significant (p-value < 0.05) association between colony count and actue otitis externa status(Table 1).
In cases of otitis externa 58.00% patients had monobacterial isolates, 36.00% had polybacterial, and 6.00% patients had non bacterial isolates. In control group the distribution of isolates was almost same, that is 58.57% participants had Monobacterial isolates, 38.57% polybacterial and 2.86% had non bacterial isolates (Table 1).

Discussion

Intense otitis externa is a condition instigating inflammation of the ear canal. Bacterial contamination is a basic cause for it. Pathogens like Pseudomonas aeruginosa and Staphylococcus aureus are reasons for infection. It presents with ear trench irritation,

bringing about otalgia, tingling, channel edema, waterway erythema, and otorrhea, and frequently happens taking after swimming or minor injury from unseemly cleaning.[11]

In this present study cerumen bacterial flora was taken from otitis externa patients and from healthy persons was compared to see the difference of micro-organisms found in cerumen of both the groups. In cases of otitis externa 58.00% patients had monobacterial isolates, 36.00% had polybacterial, and 6.00% had non bacterial isolates. In control group the distribution of isolates was almost same. These results are in very much agreement with previous studies.[10-14] Deficiency of cerumen flora is considered as basis for development of diverse microorganisms. The role of cerumen flora in making a physical hindrance between outside and inside environment has been admitted. The removal of human cerumen flora due to any reason, can damage this hindrance, and this will help in bacterial development, prompting contaminations or infections.[15, 16] In the present study, the most common microorganisms found in the patient group were Staphylococcus aureus (24.6%), Bacillus (21.2%) and Pseudomonas (9.0%). While Staphylococcus epidermidis (41.5%), Diphtheroid (24.7%) and Streptococcus (19.5%) were the commonly found microorganisms in the control group. These results are supported by other studies .[17,]According to the present study study group, 22% cases had < 10 CFU, 74%had 10 – 100 CFU and 4% cases had numerous cell colony formation. In healthy control group it was seen that31.43% had < 10 CFU,74% had 10-1000 CFU and 48.57% had numerous bacteria. Similar results have been reported in some other studies as well.[18]This indicates that majority of the isolates from otitis patients cerumen had a high colony count. The comparison showed that the number of colonies was in wider range in control healthy group as compared to otitis externa patients, in majority of the cases it was less than 10 CFU, 10-100 CFU or numerous colonies from one type of bacteria, which shows a normal floral state.

Conclusion

Isolated bacteria from cerumen of healthy subjects were different in comparison to those of acute otitis externa patients.The most common microorganisms found in the otitis patient group were Staphylococcus aureus (24.6%), Bacillus (21.2%) and Pseudomonas (9.0%). While Staphylococcus epidermidis (41.5%), Diphtheroid (24.7%) and Streptococcus (19.5%) were the commonly found microorganisms in cerumen flora of healthy individuals.

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