

Otitis externa in a localized area at the South of Jordan

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ABSTRACT

Objective: To investigate the clinical findings and to identify the microorganisms in the pathogenesis of otitis externa.

Methods: The symptoms and signs, as well as the bacterial flora, from the auditory canals of 70 Jordanian patients (94 ears) suffering from otitis externa were studied during the period from February 1999 to February 2000.

Results: Pain was the most common symptom (82%). The most common sign was erythema (65%), while oedema was the least common (42%). *Pseudomonas*

aeruginosa was found in 39%, *Aspergillus* in 27%, *Candida albicans* in 18%, *Staphylococcus aureus* in 18% and no growth in 8.5%. Ninety three percent of healthy ears revealed normal skin flora.

Conclusion: Gram-negative microorganisms (*Pseudomonas aeruginosa*) were the most frequently isolated pathogenic microorganisms.

Keywords: Otitis externa, microorganisms.

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Acute otitis externa is a common otological disease encountered by General Practitioners and Otolaryngologists. It has been found that up to 10% of the population is affected at some time in their life, a physician can expect to see 16 new cases per year.¹ This disease can be classified into 2 broad categories: localized and diffuse otitis externa. Recognizable etiologies include trauma to the external auditory canal, irritant effect of certain chemicals and allergic reaction to specific topical medications. Otitis externa is also associated with aquatic activities. The aquatic environment adds the variable of moisture to the ear canal. Bacteria may be introduced with the moisture, and in the warm environment of the canal, multiply, generate debris, invade the canal lining and cause the symptoms of acute otitis externa.² Occasionally otitis externa may be a part of a generalized skin condition such as psoriasis, seborrhoeic, allergic or atopic dermatitis.

In many cases, however, no obvious reason can be found despite careful history and examination. The normal commensal flora of the external auditory canal includes *Staphylococcus epidermidis* and *Corynebacterium* sp. (*Diphtheroides*). *Staphylococcus aureus* and *Streptococcus viridens* may be present without causing any ill effects.³ However, in the acute stage of otitis externa, *Pseudomonas aeruginosa* is the most frequent organism to be cultured, particularly when associated with swimming.⁴ *Staphylococcus aureus* tends to be associated with furunculosis. Fungal infection may supervene in chronic or inadequately treated cases. Primary infection of the external canal has also been considered important.⁵ The present study was undertaken to investigate the clinical findings and to identify the bacterial organisms involved in the pathogenesis of otitis externa.

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Methods. Seventy children (34 males and 36 females) presented with otitis externa (46 unilateral and 24 bilateral) to the Ear, Nose and Throat (ENT) clinic in Prince Ali Hospital at the South of Jordan, during a one year period from February 1999 to February 2000. Twenty-eight patients (28 ears) attending with unrelated complaints were used as controls. Age of both groups ranged from 10 to 16 years. Previously treated patients were excluded from this study. The diagnosis of otitis externa was made in the presence of complaints of discharge, itching or pain on manipulation of the auricle; and objective findings at otoscopy of erythema, edema, desquamation of the external auditory meatus with purulent discharge. Particular attention was given to the eardrum, as an intact tympanic membrane is an indispensable request for the diagnosis of primary external otitis. Swabs obtained from the auditory canal were immediately placed in Stuarts transport medium. Each swab was inoculated into agar plates of chocolate, blood, MacConkey, Sabouraud's and neomycin blood media within 24 hours. The blood agar and MacConkey agar plates were incubated aerobically overnight at 37°C while, the chocolate agar plates were incubated in a candle jar at 37°C. The neomycin blood agar plates which contained 70 mg/l of neomycin sulphate were incubated anaerobically at 37°C for at least 3 days, using the Gas Pak anaerobic culture system. Antibiotic discs of gentamicin 10 ug and metronidazole 5 ug were also put on the inocula on the neomycin blood agar plates before incubation. The Sabouraud's agar plates were incubated at 37°C overnight and subsequently at room temperature for up to 3 weeks. All aerobic cultures were identified according to standard methods described by Cowan⁶ while anaerobic bacteria were identified on the basis of colony morphology and Gram staining, sensitivity to metronidazole, resistance to gentamicin, and a characteristic sensitivity pattern using oxid anaerobic identification discs.⁷ Fungal isolates were identified according to methods previously described.⁸

Results. Table 1 summarizes the symptoms and signs in 70 patients with 94 ears manifesting otitis externa. Table 2 presents a list of the microorganisms isolated and identified in the affected ears and 28 controls. In the affected auditory canals, there was a distinct predominance of non-pathogenic Gram-positive microorganisms (91%) included especially *Staphylococcus albus* (51%) and *Diphtheroids* (13%). Gram-negative microorganisms were next in order of frequency (67%), out of which *Pseudomonas aeruginosa* was isolated in 39%. Anaerobic bacilli were found on 7%, while fungi in 53%. Single cultures, usually *Pseudomonas aeruginosa* were obtained in 37 ears.

Table 1 - Symptoms and signs in 94 ears manifesting otitis externa (70 patients).

Symptoms	Number of ears	%
Pain	77	82
Discharge	60	64
Itching	58	62
Signs		
Erythema	61	65
Edema	42	45
Desquamation	57	61
Secretion	58	62

The remainder were all mixed growth. In 28 controls, 26 had evidence of normal skin flora growth; 16 had *Staphylococcus albus* alone, 10 had mixed growth (*Staphylococcus albus* and *Diphtheroides*) while in the last 2, no microorganisms were cultured.

Discussion. Otitis externa is a common condition in the tropics and subtropics. The diagnosis of otitis externa poses no particular problem, except on occasions when it is necessary to exclude the presence of middle ear disease. The clinical findings in our study were found to be in keeping with reports from developed countries except for edema which was less often recorded.⁹ Studies in the bacteriology

Table 2 - Microorganisms isolated from 94 auditory canals manifesting otitis externa (70 patients) and from 28 controls.

Microorganisms		Patients ears No. (%)	Controls ears No. (%)
G - ve	P.aeruginosa	37 (39.0)	
	K.aerogenes	10 (11.0)	
	Proteus sp.	9 (10.0)	
	Other coliforms	7 (7.5)	
G +ve	S.albus	48 (51.0)	26 (93.0)
	Diphtheroides	13 (13.0)	10 (36.0)
	S.aureus	17 (18.0)	
	B-hemolytic streptococci	5 (5.0)	
	Bacillus sp.	3 (3.0)	
Anaerobic	Anaerobic cocci	4 (4.0)	
	Bacteroides sp.	3 (3.0)	
Fungi	Aspergillus sp.	25 (27.0)	
	Candida albicans	17 (18.0)	
	Unidentified yeasts	8 (8.5)	
		7 (7.5)	2 (7.0)

G-ve - gram negative; G+ve - gram positive; P. - pseudomonas; K. - klebsiella; sp - species, S. - staphylococcus

of the auditory canal from these countries have shown that it is sterile in 30% of normal individuals, but in 50 - 60% *Staphylococcus albus* alone, or combined with other non-pathogenic organisms is obtained on culture.¹⁰

Our results indicate that only 7.5% of patients had negative swab cultures and this may be related to poor hygiene and late presentation of the patients to a physician, on the other hand it could be related to secondary bacterial overgrowth of normal flora of the external auditory canal. There is a direct relationship between the incidence of otitis externa and the amount of exposure to the water - the incidence of otitis externa in swimmers is 5 times more frequent than in non-swimmers giving rise to the common term 'swimmer's ear'.¹¹ In otitis externa, the bacteriological flora is often mixed with *Staphylococcus aureus* and Gram-negative organisms such as *Pseudomonas aeruginosa*, *Proteus vulgaris* and *Escherichia coli*. Some variations of the proportions of these microorganisms occur with differing geographical areas and *Pseudomonas aeruginosa* infections have been observed to be the most common in tropical and subtropical regions.^{9,12} In temperate zones, *Pseudomonas aeruginosa* is the most commonly encountered contaminant in mixed cultures.¹³ Similar to findings mentioned above, the present study shows the predominance of Gram-negative microorganisms from the auditory canals with otitis externa. The pathogenicity of *Aspergillus* and *Candida albicans* was the subject of debate,¹⁴ but nowadays is thought to be related to chronic or inadequately treated cases.¹⁵ In our study 45% revealed positive swab culture for *Aspergillus* and *Candida albicans*.

Anaerobic microorganisms have now been recognized as the cause of failed response to treatment for an increasing number of clinical conditions,¹⁶ in this study anaerobic microorganisms were isolated in 7.5% of affected ears.

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