

## Bacteriology of inadequately treated active chronic otitis media in paediatric age group

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### Abstract

Haphazardly treated active otitis media was investigated bacteriologically in 214 children. Analysis showed that *Pseudomonas aeruginosa* was more prevalent than other micro-organisms. *Candida* was also found in appreciable quantity. The author contends that this was due to inadequate self treatment before these children reported in his hospital. He advocates that decision regarding the chemotherapeutic agent to be used should be based on culture and *in vitro* sensitivity.

### Introduction

Environmental and socio-economic consequences of health care delivery affect the paediatric group more than the adult population.

The implications of self help treatment in Otorhinolaryngology have not been properly investigated. Failure to eradicate pathogenic organisms whether it be from inappropriate antibiotic choice or from insufficient antibiotic penetration will result in recurrence or protracted disease (Birrel, 1986).

Effective medical treatment of otitis media depends on the knowledge of infecting organisms. A study on the bacteriology of discharging ears in 214 children, in whom haphazard and inappropriate treatment was initiated before they reported for treatment in our hospital, is presented.

### Materials and method

Two hundred and fourteen patients with history of discharging ears that have been (self) treated by their parents most with antibiotic ear drops and with inappropriate systemic antibiotics were admitted to the study. In approximately 90% of the patients only antibiotic ear

drops had been applied. In the remaining patients, the drugists/chemists advised their patients to add any current antibiotic they could afford. Almost all the patients are urban dwellers from the lower socio-economic group.

There were 111 boys, and 103 girls (age range 3 months to 15 years; mean of 5.8 years). Since our facility could not guarantee 'special transport medium for anaerobes' it was decided to restrict this study to aerobes. A specimen from one discharging ear of each patient was taken under acceptable sterile condition at the first visit and the microbes were processed and identified by conventional methods. The susceptibility of the isolated organisms to antimicrobial agents was tested by the Kirby-Bauer method.

The positive disc contains penicillin, ampicillin, chloramphenicol, cloxacillin, erythromycin, gentamicin, streptomycin, tetracycline, cotrimaxazole, and the negative disc ampicillin, colomycin, gentamicin, nalidixic acid, nitrofurantoin, cotrimaxazole, streptomycin and tetracycline; a cephalixin disc was incorporated in a quarter of the cases.

TABLE I  
 CULTURE RESULTS

	No. of cultures	%
<i>Pseudomonas aeruginosa</i>	65	27.0
<i>Proteus</i> sp.	64	26.0
<i>Streptococcus</i> sp.	36	15.0
<i>Staphylococcus</i> sp.	29	12.0
Specimen with growth	26	11.0
<i>Candida</i> sp.	15	6.0
<i>Coliform bacillus</i> sp.	6	2.0
<i>Haemophilus influenzae</i>	1	0.4
Total	242	

Distribution according to the two paediatric otological age groups (i.e. Below 5, 5 to 15 years) were 49.1 per cent and 50.9 per cent respectively.

TABLE II  
 MIXED GROWTH (28)

<i>Pseudomonas aeruginosa</i>	+ <i>Proteus</i> sp.	5
<i>Pseudomonas aeruginosa</i>	+ <i>Streptococcus</i> sp.	5
<i>Proteus</i>	+ <i>Streptococcus</i>	3
<i>Proteus</i>	+ <i>Candida</i>	3
<i>Streptococcus</i> sp.	+ <i>Staphylococcus</i> sp.	3
<i>Pseudomonas</i>	+ <i>Staphylococcus</i>	2
<i>Staphylococcus</i> sp.	+ <i>Candida</i>	2
<i>Pseudomonas aeruginosa</i>	+ <i>Candida</i>	1
<i>Pseudomonas aeruginosa</i>	+ <i>Coliform</i> bac.	1
<i>Proteus</i>	+ <i>Staphylococcus</i> sp.	1
<i>Proteus</i>	+ <i>Coliform</i> bac.	1
<i>Candida</i>	+ <i>Coliform</i> bac.	1

Of the 160 pure growths, 50 were *pseudomonas*. The sensitivity of each antibiotic was from 1+ to 6+. Taking a cut-off at greater than 2+, the relative sensitivity of the following antibiotics for *pseudomonas* was as follows:

TABLE III

Gentamicin	28%
Streptomycin	16%
Chloramphenicol	16%
Erythromycin	14%
Colomycin	12%
Ampicillin	12%
Tetracycline	8%
Cloxacillin	6%
Nitrofurantoin	4%
Nalidixic acid	4%
Cephalexin (used only in 25%)	40%

### Results

Culture and sensitivity results were available in all the 214 patients. Twenty-six specimens with no growth were included in the evaluation; 28 specimens had a mixed growth of two microorganisms each. One hundred and sixty specimens produced a pure growth.

### Discussion

The pyogenic bacterial pathogens, *Haemophilus influenzae*, pneumococci, and beta haemolytic streptococci, are the bacterial species most frequently recovered in acute otitis media (Shambaugh and Quie, 1973).

*Haemophilus influenzae* tends to be the most frequent pathogen recovered from children under five years of age (Proctol 1973). Proteus and *Pseudomonas aeruginosa* which are secondary invaders via the external auditory meatus, abide in the moist disintegrating keratin and are not properly controlled by antibiotic treatment even though they may be sensitive *in vitro*.

*Staphylococcus aureus* is a notorious secondary and tertiary invader and may contaminate the middle ear by direct invasion from the external auditory meatus after the tympanic membrane has perforated.

The most prevalent bacteria in this study, *Pseudomonas aeruginosa* and *Proteus* and *Staphylococcus* have therefore displaced the usual pathogen found in acute otitis media. Friedmann (1957) evaluated 1700 (untreated) patients with chronic otitis media bacteriologically. A comparison of his and this study is shown in Table IV.

Table IV highlights two major differences: (a) the high percentage of *Pseudomonas aeruginosa* in this study. (b) The presence of *Candida* which is entirely absent in Friedmann's. These cannot be explained only from the fact that this study was conducted under humid tropical environment since all bacteria will quantitatively increase under such a condition. It is contended here that the increase in *Pseudomonas* and the appearance of *Candida* as must have resulted from the inappropriate (self) treatment of the patients in this study before the specimen were taken.

Palva and Hallström (1965) found that *Pseudomonas*

TABLE IV

	Friedmann %	Amadasun %	
<i>Staphylococcus aureus</i>	31.7)		
<i>Staphylococcus aureus</i> Penicillin resistant	) 44.6 12.9)	11.98	
<i>Bacillus proteus</i>		25.4	26.45
<i>Pseudomonas aeruginosa</i>		12.8	26.86
Mixed	8.4		13.08
<i>Escherichia coli</i> (Coliform bacteria)		8.1	2.48
<i>Streptococcus viridans/pneumoniae</i>		4.6	14.88
No growth		10.6	10.74
<i>Candida albicans</i>		-	6.20
<i>Haemophilus influenzae</i>		-	0.41

*aeruginosa* is commonly cultured from infected mastoid cavity and chronic otitis media.

Chandler (1968) emphasizes, that it can be a difficult organism to eradicate, and it often causes osteitis with exuberant granulation tissue reaction.

This study emphasizes that haphazard treatment encourages the growth of *Pseudomonas* and *Candida* more than they would otherwise have been expected without such treatment; this finding is supported by those of Papastavros *et al.* (1989).

From Table III, it can be seen that the more favourable antibiotics are either known to have serious side effects, must be injected or are unaffordable by the majority in third world countries.

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