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"A Study of the Microbiological Profile of CSOM in A Tertiary Care Centre of North India"

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Abstract: ***Background:*** *Chronic Suppurative Otitis Media (CSOM) is a common infectious disease in both developing and developed countries. The disease is more common in children belonging to lower socio-economic group.It is an important cause of preventable hearing loss, particularly in the developing world. Prevalence in India is 7.8% .CSOM is the result of an initial episode of acute otitis media and is characterized by a persistent discharge from the middle ear through a tympanic perforation[1].*

In many cases of CSOM the antibiotics are prescribed indiscriminately. The consequences are treatment failure, the emergence of resistant strains of organisms, super-infection, intracranial and extracranial complications and lengthening the treatment costs and suffering. Antibiotic sensitivity pattern is very important for the clinician to plan a general outline of treatment for a patient with a chronically discharging ear. Therefore in the present study, we have aimed at isolation and identification of the bacterial and fungal agents from ear discharge of unsafe chronic suppurative otitis media patients and to determine the antibiotic susceptibility pattern of the bacterial isolates.

Objectives*: Isolation and identification of the bacterial and fungal agents from ear discharge of unsafe chronic suppurative otitis media patients and to determine the antibiotic susceptibility pattern of the bacterial isolates in a tertiary care center of North India.*

Methods*: This is a prospective, observational study carried out among 72 patients from January 2018 to 30 June 2018 in the Department of Microbiogy & Department of ENT of Sarojini Naidu medical college and Hospitals, Agra (Uttar Pradesh) .72samples were collected from ENT OPD from patients suspected of unsafe CSOM.Specimens were collected from these patients, processing, isolation, identification and antibiogram of the isolates were done as per standard procedures.*

Results*: Amongst the 72 cases of chronic suppurative otitis media we found pure growth in 62 cases, no microbial growth in 7 cases and mixed growth or contamination in 3 cases. Amongst these 62 cases 22 microbial isolates were S.aureus and 21 were P.aeruginosa. Other bacterial isolates were E.coli 7 cases, Proteus mirabilis 3 cases and 3 cases of K. pneumonia .We were also successful in isolating fungal isolates in 6 cases. In S. aureus cases around 60% were MRSA.*

Conclusion*: Staphylococcus aureus and Pseudomonas aeruginosa were the most commonly isolated organisms in our study. Their susceptibility patterns show high level of resistance for commonly used antibiotics. These susceptibility patterns also show higher drug resistance than the study previously conducted from our Centre so indiscriminate use of topical antibiotics in chronic suppurative otitis media should be discouraged. These cases must be given treatment after doing culture and antimicrobial sensitivity tests. We have also isolated fungal agents in 8.33 % of cases emphasizing that one should be vigilant for fungal agents also and treatment should be given accordingly.*

Keywords: *CSOM, Suppurative, Pseudomonas, Staphylococcus, Susceptibility, MRSA.*

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I. Introduction

Chronic Suppurative Otitis Media (CSOM) is a common infectious disease in both developing and developed countries. The disease is more common in children belonging to lower socio-economic group.It is an important cause of preventable hearing loss, particularly in the developing world. Prevalence in India is 7.8%.CSOM is the result of an initial episode of acute otitis media and is characterized by a persistent discharge from the middle ear through a tympanic perforation[1].It has been seen thatdespite appropriate antibiotic

therapy, AOM may progress to chronic suppurative OM (CSOM) characterized by persistent drainage from the middle ear associated with a perforated ear drum[2,3]. Hearing impairment is one of the most common sequelae of CSOM [4].The resultant hearing loss can have a negative impact on a child's speech development, education and behavior[5,6].Intracranial complications like brain abscess and meningitis are the most common causes of death in CSOM patients.[7]..

In many cases of CSOM the antibiotics are prescribed indiscriminately. The consequences are treatment failure,the emergence of resistant strains of organisms, super-infection, intracranial and extracranialcomplications and lengthening the treatment costs and suffering. Antibiotic sensitivity pattern is very important for the clinician to plan a general outline of treatment for a patient with a chronically discharging ear. Therefore in the present study, we have aimed atisolation and identification of the bacterial and fungal agents from ear discharge of unsafe chronic suppurative otitis media patients and to determine the antibiotic susceptibility pattern of the bacterial isolates.

II. Material And Methods

This study was conducted on 72 patients from 1 January 2018 to 30 June 2018 in the Department of Microbiogy& Department of ENT of Sarojini Naidu medical college and Hospitals, Agra (Uttar Pradesh).72samples were collected from ENT OPD from patients suspected of unsafe CSOM. The ear discharge was collected under aseptic precautionswith the aid of an aural speculum, prior to the instillation of any topical medication. All care was taken to avoid surface contamination .The first swab was used to make a smear on clean grease-free glass slide for bacterial differentiation by gram stain examination and direct microscopy of specimen in KOH for fungal examination. The second swab was used for the bacterial culture on blood agar and MacConkey's agar and SDA agar .Isolates were identified by using colony morphology, microscopy and standard biochemical tests. Fungal isolates were identified by LCB mounts. Antimicrobial susceptibility testing of bacterial isolates was done by Kirby-bauer Disk diffusion method according to the CLSI guidelines.

III. Results

Amongst the 72 cases of chronic suppurative otitis media we found pure growth in 62 cases, no microbial growth in 7 cases and mixed growth or contamination in 3 cases. Amongst these 62 cases 22 microbial isolates were *S.aureus* and 21 were P.aeruginosa. Other bacterial isolates were E.coli 7 cases, Proteus mirabilis 3 cases and 3 cases of K. pneumonia .We were also successful in isolating fungal isolates in 6 cases. In S. aureus cases around 60% were MRSA.

Table1-: Distribution of samples according to organism isolated

Organism isolated	**Number of samples**	**Percentage (%)**
Bacterial pathogen isolated (n=60)		
Staphylococousaureus	22	30.55
Pseudomonas aeruginosa	21	29.16
Escherichia coli	7	9.72
Proteus mirabilis	3	5.55
KlebsiellaPneumoniae	3	4.16
Fungal growth	6	8.33
Mixed Growth (Contamination)	3	4.16
No Growth	7	9.72
Total samples	72	100

Table 2-: Susceptibility pattern of Staphylococcus aureus (n=22)

ANTIBIOTIC	SUSCEPTIBLE	RESISTANT
	%	%
PEN	31.81%	68.18%
CFX	59.09%	40.9%
CIP	40.9%	59.09%
ERY	50%	50%
DOX	59.09%	40.9%
CD	40.9%	59.09%
COT	68.18%	31.38%
LZ	100%	0%
VAN	100%	0%
TEI	100%	0%

Table3-: Susceptibility pattern of Pseudomonas aeruginonsa(n=21)

ANTIBIOTICS	SUSCEPTIBLE	RESISTANT
	%	%
GEN	33.33%	66.66%
AK	61.9%	38.09%
TOB	52.38%	47.61%
CIP	38.09%	61.90%
LEV	47.61%	52.38%
CPM	61.9%	38.09%
CAZ	61.9%	38.09%
AZT	57.14%	42.85%
IC	90.47%	9.52%
POL	100 %	0
COL	100%	0

Table 4-: Susceptibility pattern of E .coli (n=7)

ANTIBIOTICS	SUSCEPTIBLE	RESISTANT
AMP	28.5%	71.4%
PTZ	85.7%	14.28%
AMC	71.4%	28.5%
CFS	85.7%	14.28%
CTX	57.1%	42.8%
CPM	71.4%	28.5%
TET	57.1%	42.8%
CIP	42.8%	57.1%
GEN	42.8%	57.1%
COT	28.5%	71.4%
IC	85.7%	14.28%
AK	85.7%	4.28%

Table 5-: Susceptibility pattern of klebsiellapneumonia (n=3)

ANTIBIOTICS	SUSCEPTIBLE	RESISTANT
	%	%
AMP	33.33%	66.67%
AMC	66.67%	33.33%
CFS	66.7%	33.33%
CTX	33.33%	66.67%
CPM	33.33%	66.7%
TET	33.33%	66.67%
CIP	33.33%	66.7%
GEN	33.33%	66.67%
AK	66.67%	33.33%
COT	33.33%	66.7%
IC	66.67%	33.33%
PTZ	66.67%	33.33%

Table 6-: Susceptibility pattern of proteus mirabilis (n=3)

ANTIBIOTICS	SUSCEPTIBLE	RESISTANT
	%	%
AMP	33.33%	67.67%
AMC	33.33%	67.67%
CFS	67.67%	33.33%
CTX	33.33%	67.67%
CPM	33.33%	67.67%
TET	67.67%	33.33%
CIP	33.33%	67.67%
GEN	33.33%	67.67%
AK	67.67%	33.33%
COT	33.33%	67.67%
IC	67.67%	33.33%
PTZ	67.67%	33.33%

Table 7-: Distribution of fungal species

Fungal pathogen isolated	Number of sample	Percentage (%)
Aspergillusniger	02	33.33
Aspergillusflavus	04	66.66

IV. Discussion

In our study we have isolated *Staphylococcus aureus* in 30.55 % and *Pseudomonas aeruginosa* in 29.16% of cases. These 2 were the most commonly isolated organisms in our study.Our findings are comparable to other studies.A study from Nigeria showed *P. aeruginosa* had the highest prevalence of 31.5% followed by *Staphylococcus aureus* in 23.2% of cases[8].In a study by V. K. Pooreyetal Pseudomonas pyocyaneus in 35.2% cases was the most common organism isolated followed by Klebsiellaaerogenes in 25.4% and Staphylococcus aureus in 14.7% of cases[9].In a study from Agartala ,Pseudomonas (37.73%) were the commonest bacteria isolated followed by *Escherichia coli* (20.75%) and *Staphylococcus aureus* (20.75%) of the cases[10].In a previous study from our Centre most common isolated organism was *Staphylococcus* species (37.6%), followed by *Pseudomonas aeruginosa* (32.8%)[11].

Staphyloccusaureusshowed poor sensitivity to ampicillin(31.81%),ciprofloxacin(40.9%) , and clindamycin(40.9%) .Sensitivity for cotrimoxazole was 68%.Vancomycin, linezolid, and teicoplanin were 100% sensitive.Study by Mary Nirmala S *etal* showed sensitivity pattern of Staphylococcus, Vancomycin was 100% sensitive, Ciprofloxacin 52.5%, Gentamycin 37.5%, Cotrimoxazole 27.5%[12]. In a study by Arti*etal Staphylococcus* species were resistant with ampicillin in 61.7% cases and with ciprofloxacin in 55.3% of cases[11].

Pseudomonas aeruginosa showed 90.47 % sensitivity with imepenam and100% sensitivity with polymyxin B and colistin. while it showed very low sensitivity with gentamicin (33.3 %) ,with tobramycin 52.38% and with amikacin 61.9% .amongst fluoroquinolones ciprofloxacin showed lower sensitivity of 38.09% and levofloxacin 47.61%.These sensitivity pattern showed higher resistance of *Pseudomonas aeruginosa* than a study conducted from our centre published in 2013 which showed 58.5% sensitivity with gentamicin, 87.8% with amikacin, Sensitivity with quinolones was 61-68% and 100% sensitivity with imepenem, meropenem, colistin, and polymyxin B[11].While study by Mary Nirmala S showed ,Pseudomonas aeruginosa was most sensitive to Ciprofloxacin 68% followed by Amikacin 64%, Ofloxacin 60%, Gentamycin 52%,Netilmycin 48%, Cotrimoxazole 4%[12].

*E.coli*showed good sensitivity with amoxyclav, pipearacillintazobactum , and amikacin and poor sensitivity for ampicillin,ciprofloxacin, and gentamicin.

Klebsiellapneumoniae showed good sensitivity with amoxyclav, piperacillintazobactum, and amikacin and poor sensitivity for ampicillin,ciprofloxacin, and gentamicin.

Proteus mirabilis was resistant to ciprofloxacin and gentamicin in 67.67 % of cases. Sensitivity was good for teatracyclinand amikacin.

V. Conclusion

Staphylococcusaureus and *Pseudomonas aeruginosa* were the most commonly isolated organisms in our study. Their susceptibility patterns show high level of resistance for commonly used antibiotics. These susceptibility patterns also show higher drug resistance than the study previously conducted from ourCentre so indiscriminate use of topical antibiotics in chronic suppurative otitis media should be discouraged. These cases must be given treatment after doing culture and antimicrobial sensitivity tests. We have also isolated fungal agents in 8.33 % of cases emphasizing that one should be vigilant for fungal agents also and treatment should be given accordingly.

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