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A Retrospective Study of Microbiological Profile and Antibiotic Sensitivity and Resistance Pattern of Chronic Suppurative Otitis Media in 2 Different Years in a Tertiary -Care Hospital.

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ABSTRACT:
The profile of aerobic microorganisms causing Chronic Suppurative Otitis Media (C.S.O.M) has been changing due to various reasons like geographical location , background of patients like their socio-economic status , habits and hygiene levels etc.
Our study conducted in 2 different time periods i.e. January2015-December 2015 and January 2019 - December 2019 has shown that the predominant organisms are gram negative organisms as compared to gram-positive organisms. Pseudomonas aeruginosa , is found to be the predominant organism causing C.S.O.M.in both the years of study , followed by the gram positive,Staphylococcus aureus.
Pseudomonas aeruginosa is found to be sensitive to Ceftazidime and Piperacillin -Tazobactum , Aztreonam ,to which Pseudomonas was found to be resistant (92.30%) ,in the year 2015, has seen a shift towards a decrease in resistance (48.5%) in 2019.Thus study aims to give an update on the change in the aerobic organisms causing C.S.O.M., if any, and also about the shift in antibiotic sensitivity and resistance patterns found, and thus help the treating clinicians in effectively treating patients.

I. INTRODUCTION:

Chronic Suppurative Otitis Media is inflammation of the middle ear and mastoid cavity, which usually presents with persistent or recurrent ear discharge, lasting for more than 2 weeks. [1,2,3]
Aerobic and facultative organisms, mainly Pseudomonas aeruginosa and Staphylococcus aureus were considered to be the commonest pathogens giving rise to C.S.O, M.[4]
Studies on microbiological diagnosis may differ due to geographical location, age, sex and socio-economic status of patients.

Hence, a time-to-time update regarding the microbiological profile and antibiotic sensitivity andresistance will help in the effective treatment of C.S.O.M.
This study aims to study the changes in 2 different years of microorganisms causing C.S.O.M, if any, andalso to find out whether there are any changes in the antibiotic sensitivity and resistance patterns.

II. MATERIALS AND METHODS:

This study was done retrospectively for 2 different years, January2015- December 2015 and January 2019 – December 2019.

A total of 58 samples were received between January 2015- December 2015 from patients with C.S.O.M., visiting our, out-patient Ear, Nose& Throat department, and a total of 40 samples were received in between January 2019-December2019.This study included samples from all ages and both sexes.

All the samples received in both the years were put up for culture study, according to the standard guidelines for the testing methods ,routinely employed [5]

The swabs were inoculated on Mac Conkey's agar and Blood agar media, after a Gram's stain was done for each swab for the preliminary identification of the organisms.

The inoculated media were then incubated at 37°C, overnight.The colonies on the agar media plates, if grown, were duly noted for their colonial characteristics and were recorded. Cultures were reported as sterile, if no growth was observed on the plates. Also hemolytic changes in the colonies on blood agar ,if any were noted. Further Gram's stainwas performed from thesecolonies. Motility tests were also done, wherever necessary.Suitable biochemical tests were put up for further identification of the gram negative organisms.In case of gram -positive organisms, Catalase and Coagulase tests were put up for further identification [5]. Germ -tube test was put up to identify the species in case of yeast.Antibiotic senstivity testing was performed for all the

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organisms with appropriate antibiotic discs ,using the Kirby -Baeur disc -diffusion method , and following proper Quality -Control protocol.

III. RESULTS:

(1) Study between January2015-December 2015:

Out of the 58 samples received , 37 samples (63.79%) showed growth. No growth was found in 21 (36.2%) of these samples. Out of the 37 positive samples, gram-negative organisms (62.16%) were predominant, which has been nearly similar to a study done by V.C. Chander et al [3] ,showing a gram negative predominance (78%).Pseudomonas aeruginosawas found to be the predominant organism causing C.S.O.M, followed by Staphylococcus aureus , which is similar to the various studies done elsewhere [1,27,8,9,10,11]. Out gram -negative organisms13(35.13%) were found to be Pseudo aeruginosa , 3 (8.10%) were to be Proteus spp., and 2(5.40%) each of Acinetobacter spp.,Klebsiella pneumoniae ,Escherichiae coli,similar to a study done by A.V.S.Hanumantharao, B.Vijay Kumar,Nasir Jani Shaikh[11] and 1(2.70%) of Enterobacter spp.. 1(2.70%) was found to be Candida spp.

Pseudomonas aeruginosa were found to be most sensitive to Ciprofloxacin(76. 93%), similar to a study done by M.Ravi Kumar Raju, V.S.A.Ramana Rao[6],and found equally sensitive (69.3%) to Ceftazidime, Piperacillin-Tazobactum, Amikacin and Tobramycin ,which is similar to study done by Deepak Juyal et al[12]and to another study done in Abbottabad by Tahira Mansoor , Mohd.Ayub and all[7] . Pseudomonas was found to be highly resistant (92.30%) to Aztreonam.

Gram -negative organisms ,other than Pseudomonas, were found to be 100% sensitive to Imipenam,Amikacin and Piperacillin-Tazobactum and showed resistance to Cotrimoxazole and Gentamicin .Out of the 13 gram positive organisms isolated , 9 were Staphylococcus aureus(69.23%), out of which 8 were (88.88%) Methicillin -sensitive Staphylococcus aureus(M.S.S.A)and 1 (11.11%) was found to be Methicillin Resistant Staphylococcus aureus (M.R.S.A).The other gram-positive cocci were Enterococcus (5.40%) and Streptococcus pyogenes and Streptococcus pneumoniae (2.70%).

2) **Study between January 2019- December 2019**

Out of the 40 samples received, 34 samples (84%) showed growth.Again, gram-negative organisms were the predominant organisms causing C.S.O.M.(85.24%).
Out of the 29 gram-negative organisms isolated,27 (93.10%) were found to be Pseudomonas aeruginosa and one each (3.44%) of Proteus spp. and Acinetobacter spp. were also reported similar to a study by Nitin Deosthale al[14]

Among the gram-positive organisms isolated, all isolates were found to be Staphylococcus aureus (100%), out of which (60%) were found to be Methicillin Resistant Staphylococcus Aureus (M.R.S.A.) and only 40% were found to be Methicillin Sensitive Staphylococcus aureus.

Pseudomonas aureus was found to be most sensitive to Ceftazidime (59.25%) ,and sensitive equally to Piperacillin -Tazobactum andAztreonam(51.85%). Pseudomonas aeruginosa was found to be most resistant to Ceftriaxone (96.30%), and mostsensitive to Ciprofloxacin was found to be 85.19%,similar to a study done by Tahira Mansoor ,Mohammed Ayub M, Gulnaz K and Mustafa K[7]and sensitivity to Amikacin and Tobramycin was found to be equal(66.67%).Imipenam was found to show a resistance in 55.5% of the Pseudomonas.

Gram-negative organisms, other than Pseudomonas aeruginosa, were found to be 100% sensitive to Ciprofloxacin and only 50% sensitive to Ceftazidime, Piperacillin-Tazobactum,Imipenam, Gentamicin ,Amikacin ,Co-trimoxazole .

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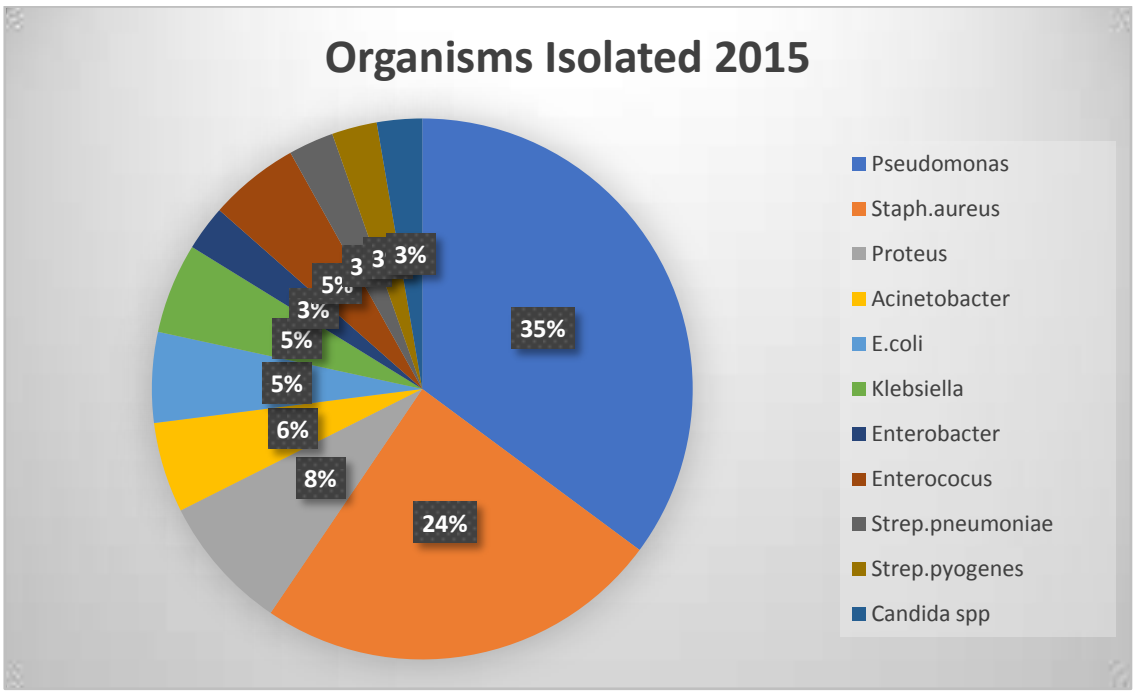

FIGURE 1:Percentage of pathogens isolated in year 2015 from C.S.O.M. cases

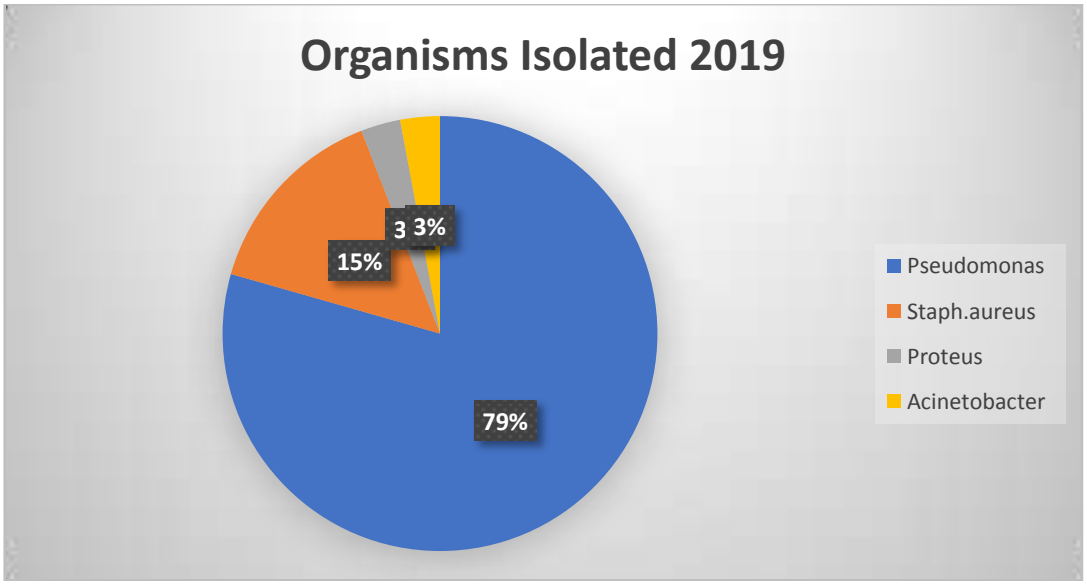

FIGURE 2: Percentage of pathogens isolated in year 2019 from C.S.O.M. cases

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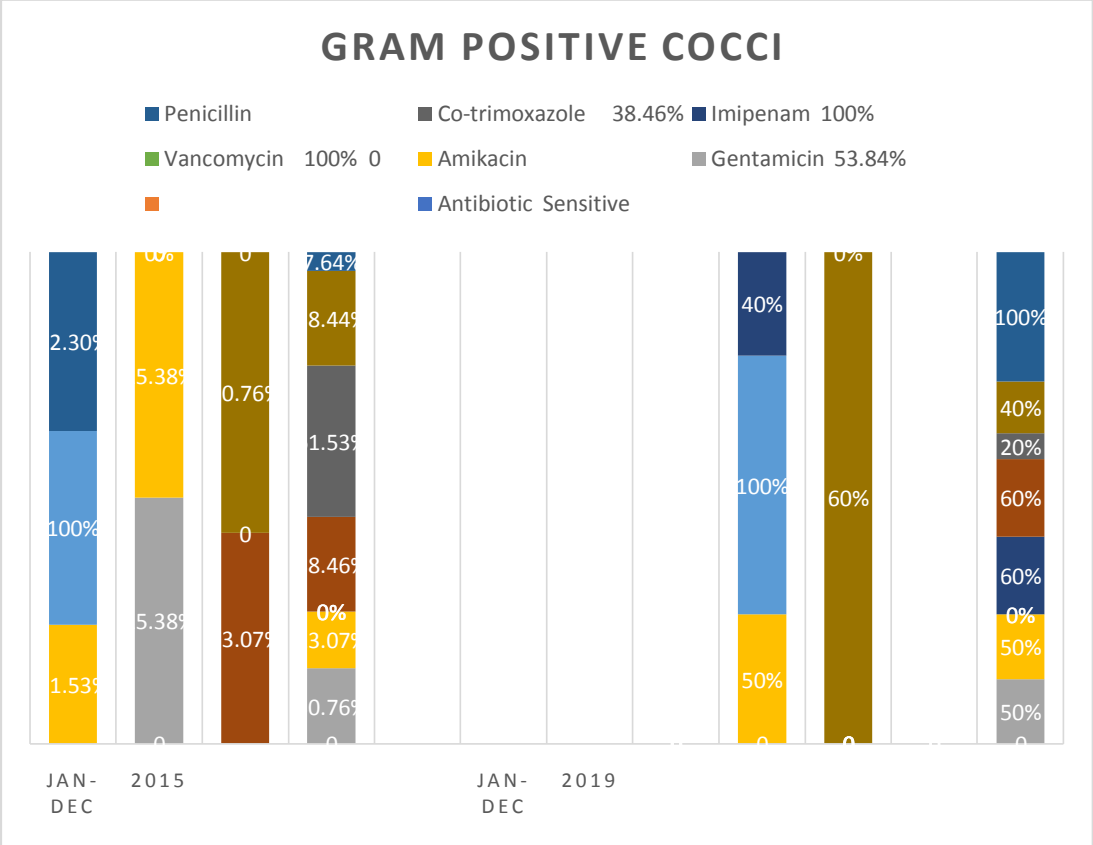
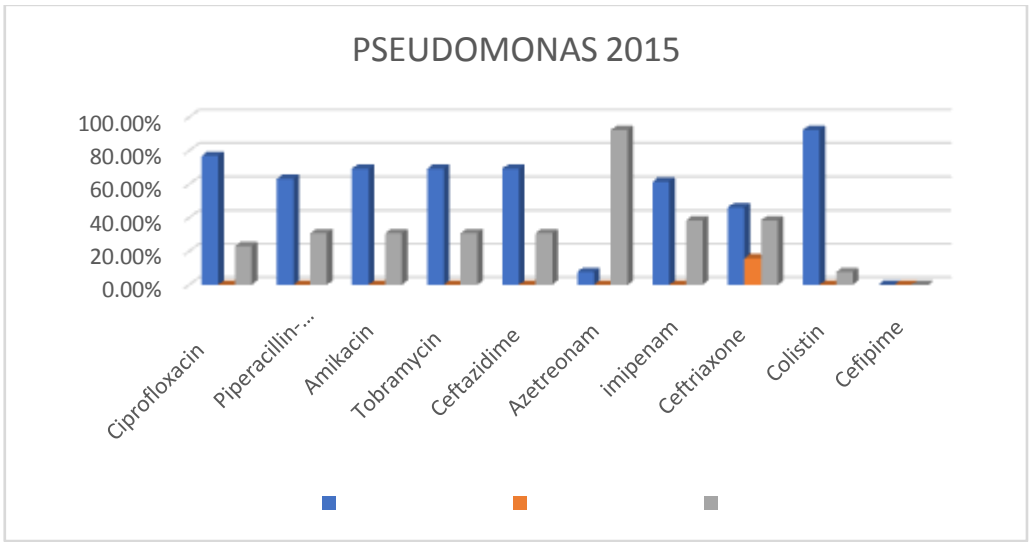


FIGURE 3 : Bar diagram showing



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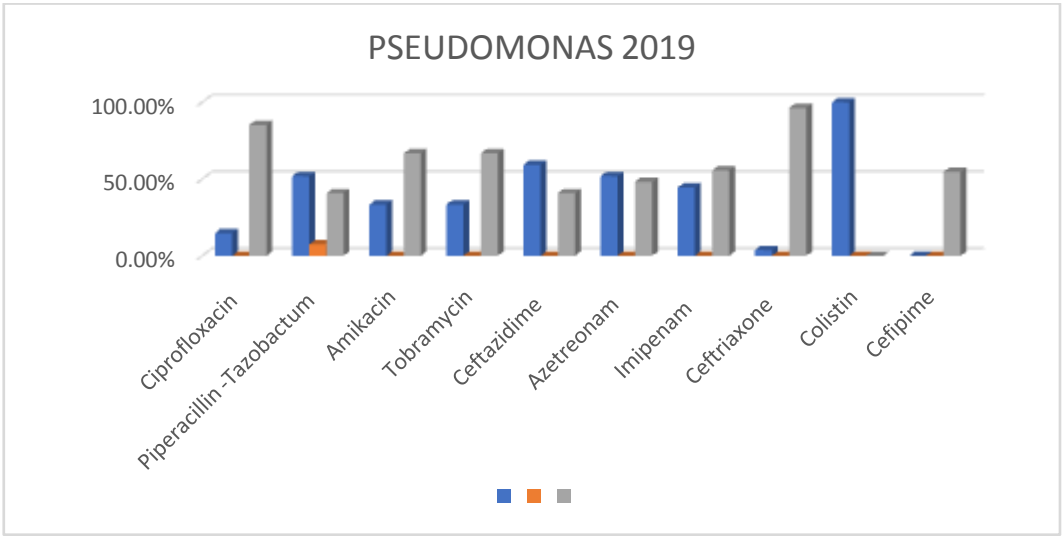

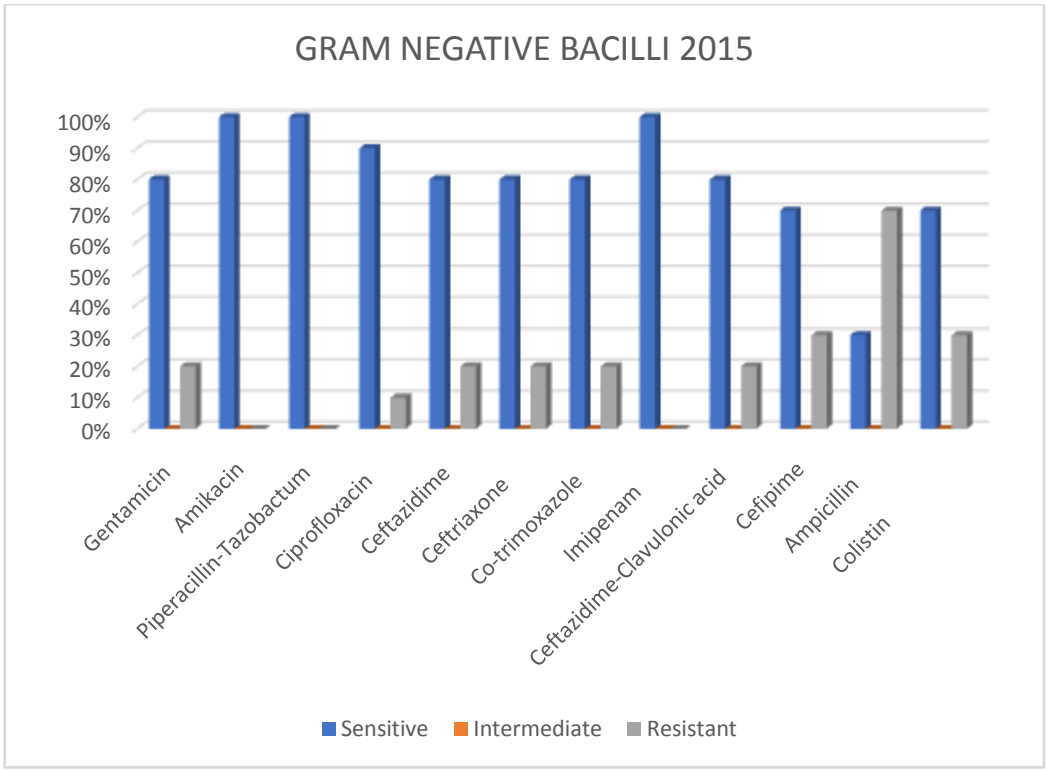

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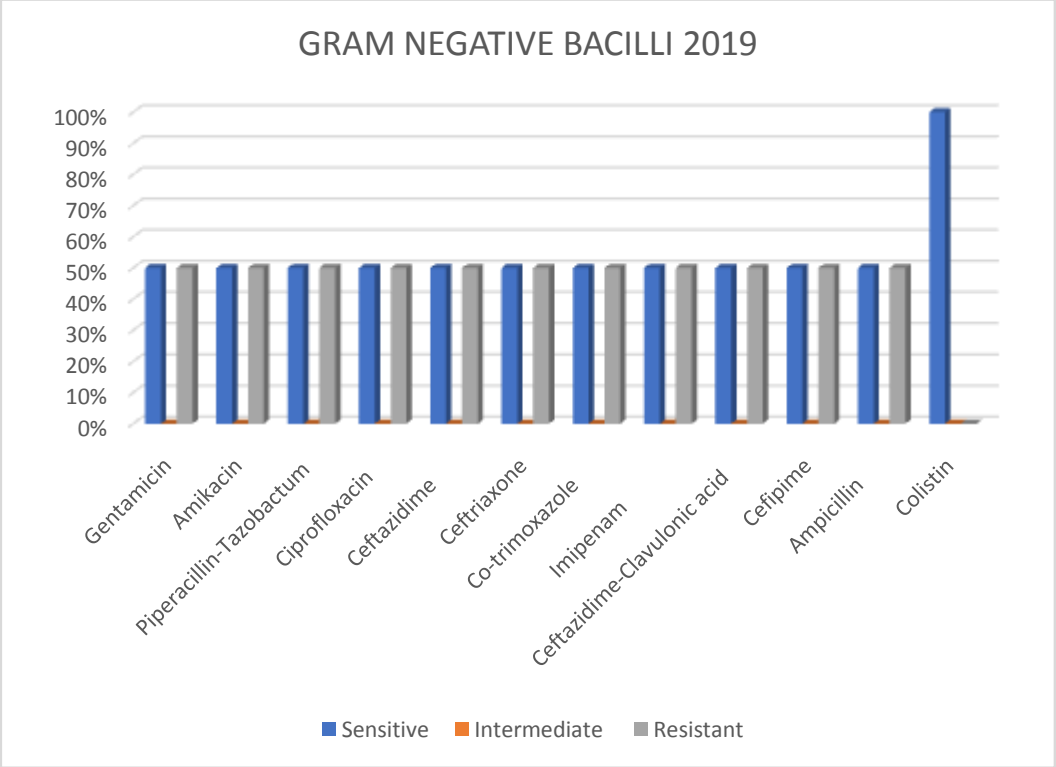

IV. DISCUSSION:

Chronic suppurative otitis media is a long-standing infection of a part or whole of the middle-ear. We have done a comparative study of the microbiological profile and antibiotic sensitivity of Chronic suppurative otitis media between 2 years i.e., January2015-December2015 and January 2019-December2019 in a tertiary care hospital , in Navi-Mumbai , Maharashtra, India.

We have found that Gram-Negative organisms are still the most common organisms causing C.S.O.M.in both the years under our study,similar to a study done by M. Ravikumar Raju et al[6] In our study, Pseudomonas aeruginosa has been found to be the most common organism causingC.S.O.M. followed by Staphylococcus aureus, which has been found to be similar to various studies donein India as well as other countries.study[1,2,3,6,8,9,10,11,16,17,18,19,20]Contrary to this finding, Staphylococcus aureus was found to be the most common causative agent , followed by Pseudomonas in some studies [4,6,7,9,10,14] and in another study Proteus was found to be the most common causative agent, followed by Pseudomonas. [15]

This pattern of the causative organisms has been observed in both the years under study, in our hospital. We have noticed that the various gram negative organisms like E.coli, Klebsiella spp,and Enterobacter, which were isolated from about 2% of the cases of C.S.O.M. in the year 2015, were not isolated in the cases of C.S.O.M in the year 2019.The isolation of Proteus spp. and Acinetobacter spp.was slightly lower (about 3.5%) of the total gram negative causes of C.S.O.M in 2019 as compared to the percentage of their isolation ,which was 5.4% in 2015.

The number of gram positive organisms ,other than S.aureus , like Streptococus pyogenes, Streptococcus pneumoniae and Enterococcus were isolated in the year 2015 as the causative agents , but in comparison, we found that Staphylococcus aureus was the only gram positive causative agent of C.S.O.M isolated .As most of these isolates were from the out patient E,N,T, we have found a significant rise in the cases of M.R.S.A. as compared to the year 2015,which is similar to another study done by Moo Kyun , Park MP et al [26,] We could not correlate with any study regarding the absence of other bacteria in 2019, which were hitherto found to be , as causative organisms in year 2015 as we could not find a study which was done as a comparison in 2 non-consecutive years on C.S.O.M. This change in the microbial profile causing C.S.O.M. in the 2 different years in our setting may be due to a change in the population scenario visiting our out- patient department.

Pseudomonas aeruginosa has been found to be sensitive to Ceftazidime, Piperacillin andTazobactum which was similar to a study

doneby Deepak Juyal , Munesh Sharma and [19]and a study done by Kiran Deshmukhand Deepak Manthale[21.] There has been a significant change in the response of P.aeruginosa to Aztreonam. In the year 2015, we have found P.aeruginosa to have had a high resistance to Aztreonam (92.30%) , whereas the resistance of the organism was reduced to 48.15% in 2019. There has been a change in the sensitivity of Pseudomonas to Ciprofloxacin in between the 2 years of our study. The organism was more sensitive to Ciprofloxacin (76.93%) in 2015 as compared to 2019, where in, its sensitivity to Ciprofloxacin has considerably decreased to 14.8%which is comparable to a study done by DeepakJuyal and all[19]. This shift in the sensitivity /resistance pattern of the organisms could be due to the prescription of older generation antibiotics , in view of emerging antibiotic resistance .

Also , we found that Staphylococcus aureus was sensitive to both Linezolid and Vancomycin (100%) in both the years of our study.The percentage of MRSA has been found to be increased (60%)in 2019, as compared to 2015, which was only 11.11%. In The gram positive organisms we have seen an increase in resistance to Imipenam in 2019 (60%) as compared to 2015 (40%) .

Comparison of the different studies suggest that the microbial profile and antibiotic sensitivity and resistance pattern has been changing over a period of time. This could be due to the difference in patient population , socio-economic status and personal hygiene.

Indiscriminate , haphazard and irrational use of antibiotics, poor patient compliance, incomplete therapy and negligence could be the various factors responsible for the emergence of sensitivity and resistance towards certain antibiotics.

V. CONCLUSION :

This study of microbial profile and their antibiotic sensitivity determines the change in the microbial agents causing C.S.O.M and their changing antibiotic sensitivity pattern in both the years of study. The commonest gram negative organism is Pseudomonas aeruginosa, followed by Staphylococcus aureus (grampositive) in both 2015 and 2019 , in our tertiary care hospital. There has been a significant decrease in resistance to Aztreonam of Pseudomonas in the year 2019 as compared to 2015 and an increasein its resistance to Ciprofloxacin in 2019 to which it was moderately sensitive in 2015 seen in our tertiary care hospital in Navi Mumbai, Maharashtra. A periodic review of the change in microbial profile in CSOM and the antibiotic sensitivity pattern is imperative for the appropriate treatment of C.S.O.M. and thus guide the clinicians with the effective management andthus prevent emergence of resistant strains.

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