ISSN (P) : 2589-9120 / (O) : 2589-9139
PubMed-National Library of Medicine - ID: 101773527

International Journal of Medical Science and Applied Research (IJMSAR)

Available Online at: https://www.ijmsar.com

Volume – 6, Issue – 3, May – 2023, Page No. : 40 – 53

A Cross Sectional Study of Bacterial Etiology of Chronic Suppurative Otitis Media in A Tertiary Care Hospital

[1]Dr. Bonangi Sri Vani Vijaya Subhashini, [2]Dr. Nunsavathu Lakshmi, [3]Dr. Chamalla Siva kalyani , [4]Dr. Sulakshana Sony Cheemala

[1]Assistant Professor, Dept. of Microbiology, Govt. Medical College, Srikakulam, Andhra Pradesh, India

[2]Associate Professor, Dept. of Microbiology, Govt. Medical College, Vizianagaram, Andhra Pradesh, India

[3]Associate Professor, Dept. of Microbiology, Govt. Medical College, Srikakulam, Andhra Pradesh, India

[4]Assistant Professor, Dept. of Microbiology, Mamata Academy of Medical Sciences, Bachupally, Hyderabad, Telangana, India

Citation of this Article: Dr. Bonangi Sri Vani Vijaya Subhashini, Dr. Nunsavathu Lakshmi, Dr. Chamalla Siva kalyani , Dr. Sulakshana Sony Cheemala, "A Cross Sectional Study of Bacterial Etiology of Chronic Suppurative Otitis Media in A Tertiary Care Hospital,'' IJMSAR – May – 2023, Vol. – 6, Issue - 3, Page No. 40-53.

Copyright: © 2023, Dr. Sulakshana Sony Cheemala, et al. This is an open access journal and article distributed under the terms of the creative common attribution noncommercial License. This allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Corresponding Author: Dr. Sulakshana Sony Cheemala, Assistant Professor, Dept. of Microbiology, Mamata Academy of Medical Sciences, Bachupally, Hyderabad, Telangana, India

Type of Publication: Original Research Article

Conflicts of Interest: Nil

ABSTRACT

Chronic suppurative otitis media (CSOM) is a chronic inflammation of the middle ear, characterized by recurrent ear discharge through a permanent perforation of tympanic membrane. If left untreated, it can lead to serious intracranial as well as extracranial complications. Identifying the etiological agents and their antibiogram is of utmost important in the proper management of the cases. The aim of the study was to identify Bacterial isolates associated with CSOM and their Antibiogram. The study included 200 CSOM patients clinically diagnosed in the ENT out patient department and 50 swabs from dry ears as controls. samples were sent to Microbiology laboratory where processing was done and bacterial agents were isolated and identified as per standard protocols. Antimicrobial susceptibility testing was performed by Kirby- Bauer's disc diffusion method. Out of 200 samples, 188 were culture positive. Males were predominant and commonest age group affected was 1-10yrs. 84.40% bacterial agents and 15.60% fungal

agents were isolated. The study identified predominance of Gram-negative bacteria (55.96%). Pseudomonasaeruginosa (40.22%) topping the list followed by Staphylococcusaureus (20.67%). Incidence of multidrug resistant strains includes, ESBL producers (11.46%), MBL producers (5.04%) and Methicillin resistant strains (12.38%). Maximum sensitivity was observed for Amikacin. Continuous surveillance of etiological agents of CSOM and their antibiogram is necessary to monitor antimicrobial resistance and to guide in empirical treatment.

Keywords

Pseudomonas aeruginosa;Staphylococcus aureus ; ESBL ; MRSA ; MBL; Vancomycin.

INTRODUCTION

Chronic suppurative otitis media is a chronic condition, where there is accumulation of purulent fluid in middle ear in addition to tympanic membrane defect[1]. It is an important cause of preventable hearing loss in many developing countries[2]. The study of organisms commonly associated with chronic suppurative otitis media is necessary to enable the otologist in management and prevention of complications[3].Chronic suppurative otitis media has innumerable complications and Multi-drug resistance[3]. The indiscriminate use of both topical and systemic antibiotics has led to drug resistance and biofilm formation[4].

Increasingly resistant isolates are seen in both community and hospitalized patients which render their treatment difficult [5]. Pseudomonas aeruginosa strains which producesmetallo-beta lactamases have been adversely affecting clinical outcomes and adds to treatment cost[5,6,7,8]. Hence, the present work aims to isolate and identify the aerobic bacterial isolates of chronic suppurative otitis media, to determine antibiogram of bacterial isolates, and to detect drug resistance of the bacterial isolates by phenotypic methods.

MATERIALS AND METHODS

The samples were collected from CSOM patients of both sexes and of different ages attending Government Ear, Nose, and Throat Hospital, Out-Patient Department and processed in Department of Microbiology, Andhra Medical College, Visakhapatnam. A prospective study was conducted for a period of 1 year from June 2018 to May 2019 on 200 clinically diagnosed CSOM patients with ear discharge complaint for more than 3 months. 50 ear swabs were collected from patients with healthy ear as controls.

Inclusion Criteria:

a. Patients who were not on any antibiotic treatment for previous 48 hours.
b. Diagnosed Chronic suppurative otitis media cases of all age groups with chronic ear discharge of at least 3 months period.

Exclusion Criteria:

a. Patients currently on treatment with antibiotics and antifungal drugs.
b. Patients with acute ear discharge and discharge with less than 3 months duration.
c. Patients having Otitis externa with Chronic suppurative otitis media.
d. All known HIV or immunosuppression patients.

Collection of Samples

The discharge was collected by sterile swab by gently introducing into the ear under direct visualization and the pus specimen was collected. Two pus samples were collected per ear and placed into the sterile containers which were labelled. The samples were

© 2023 IJMSAR, All Rights Reserved

immediately transported to Laboratory for microbiological isolates.

Processing of Samples

The samples were carried out in the Department of Microbiology, Andhra medical college, Visakhapatnam. 1st swab was used for Gram stain to see the presence of pus cells, morphology of bacilli. 2nd swab was inoculated on Blood agar, MacConkey's agar and Nutrient agar, and incubated at 37°c for 24hrs and observed for growth. After incubation, the colonial and cultural characteristics of isolates were observed, biochemical tests done for identification and documented as perClinical and Laboratory Standards Institute guidelines[9].

The antimicrobial susceptibility testing was done by the Kirby Bauer disc diffusion method[10].The Mueller-Hinton agar plates with growth suspension equivalent to 0.5 McFarland standards were incubated at 37ºC overnight and the zones were measured as per CLSI guidelines[9]. Methicillin resistance in staph aureus was detected using Cefoxitin 30µg disc. Potentiated Disc Diffusion test (PDT) was used for ESBL and MBL detection in Gram- negative bacteria [11]. The resistance patterns were further determined by E-test by interpreting Minimum inhibitory concentration (MIC) values (mcg/ml)[12,11].

RESULTS

Totally 250 ear swabs from CSOM patients were studied including study group (200 cases) and control group (50 cases). Among 200 cases (study group), 118 were males and 82 were females, which show the incidence of CSOM was higher in males compared to females. Out of 200 ear swabs from chronic suppurative otitis media cases, 188 (94%) samples showed growth, and 12 (6%) samples showed no growth (Table 1.). In the control group, out of 50 ear swabs, 28 (56%) showed growth in culture and 22 (44%) were culture negative. Out of 28 culture positive samples, CONS 11(39.28%) was the predominant isolate followed by Micrococci 10 (35.71%), Diphtheroid 6 (21.42%) and C. tropicalis 1 (3.57%) (Table 2.). In the present study, CSOM incidence was highest between 1 – 10 years age group may be due to frequency of Upper respiratory tract infections (Fig. 1.). Further, the figure 2 shows Male preponderance in CSOM cases and left ear (60.5%) was more affected when compared to right ear (34%) and both ears (5.5%). And the study showed predominance of cases in rural population (63%) when compared to urban population (37%) (Fig. 3.). Out of 188 culture positive cases, 158 (84.05%) cases showed monomicrobial growth. 30 (15.95%) cases showed polymicrobial growth (Table 3.). Total number of isolates obtained from monomicrobial and polymicrobial samples was 218. Out of 218 isolates, bacterial species isolated were 184 (84.40%) and fungal species isolated were 34 (15.60%). Out of total 184 bacterial isolates,128 were from in pure growth and 56 were from mixed growth (Table 4.). The predominant bacterial isolate was Pseudomonasaeruginosa 74 (40.22%) followed by Staphylococcusaureus 38 (20.67%), Proteusspecies 24 (13.05%), CONS 20 (10.86%), Klebsiellapneumoniae 14 (7.61%), E. coli6 (3.26%), Acinetobacter baumani 4 (2.17%), Micrococci 2 (1.08%), and Corynebacteriumspecies 2 (1.08%). Out of total 34 fungal isolates, the predominant isolate was Candidaalbicans 12 (35.29%), Aspergillusniger 12 (35.29%) followed by Aspergillusflavus 6 (17.64%) (Table 4.).

Out of 30 mixed infections, 60 isolates were reported. The most common combination of organisms was

© 2023 IJMSAR, All Rights Reserved

Pseudomonasaeruginosa and Proteusmirabilis was seen in 6 (20%) samples, Pseudomonasaeruginosa and Klebsiellapneumoniae seen in 6 (20%) samples (Table 5.).

Most of Gram-negative isolates are sensitive to Imipenem, Amikacin, Piperacillin+ tazobactam, Ceftazidime + clavulanic acid, Ciprofloxacin and Gentamycin (Table 6.).Most of Gram-positive isolates were sensitive to Linezolid, Vancomycin, Teicoplanin, Azithromycin, Amikacin Levofloxacin and Clindamycin (Table 7.). Moreover, in the present study ESBL production was seen in 25 (20.49%) isolates. Out of total 122Gram- negative isolates, 11 (9.01%) were Carbapenemase producers (Fig. 4 & 5).

Distribution of MRSA strains in Staphylococcus aureus (n= 38)

Out of 38 Staphylococcus aureus isolates, 18 (45%) were Methicillin Resistant Staphylococcus aureus (MRSA) and 20 (55%) were Methicillin Sensitive Staphylococcus aureus (MSSA)(Fig. 6).

Distribution of MDR strains among total isolates (n= 218)

Out of 218 microbial isolates, Multi drug resistant (MDR) strains were 63 (28.89%). Among total Multi drug resistant strains, MRSA isolates were 27 (12.38%), ESBL producers were 25 (11.46%) and Carbapenemase (MBL) producers were 11 (5.04%)(Table. 8).

Therapeutic Response (n= 188)

Out of total 188 cases, 140 recovered with antibiotics, 32 showed no response to treatment and 16 were defaulters (Fig. 7).

DISCUSSION

The study evaluated the aetiological agents (bacterial & fungal) of CSOM and their antimicrobial susceptibility. Males (59%) were more affected than females (41%) in the present study which correlated with Narayana R.S. et. Al[13] (59%), N. Lakshmi (58.9%)[14], Saranya SK. et. al.[15] (61.42%) Raghu Kumar KG et. al.[16] (62.26%) Whereas, Ramakrishna PJ. et. al.[17] (54.7%), Nikakhlagh S.et. al.[18] (54%) and Sharma M.et. al.[19] (52%) reported slightly lower incidence.

CSOM cases were predominantly seen between the age group of 1-10 yrs (42.5%) which correlates with the study of N. Lakshmi (46.1%)[14], Sarathbabu (43.75%)[20] and Bhumbla U.et. al. (38.5%)[5], Vaidya K et. al.[21](28.57%)and Sharma M.et. al.[19](24.8%). Whereas the studies of Kumar H.et. al.[22](35.71%), Prakash et. al.[23](26.47%)and Sagar Kashyap et al.[24](42.16%) reported higher incidencein the age group of 11- 20 years and the study of Raghu Kumar KG et. al.[16](25.42%) reported higher incidence in 21-30 years.Studies of Ramya SN et. al.[13](37.1%) and Loy AH.et. al.[25](23.3%)reported higher incidence in age group of 31- 40 years.

In the present study, left ear (60.5%) was more affected when compared to right ear which correlates with study of Sarath babu R. (61.25%)[20], Saranya SK. et. Al[15] (60%) Kamal N et. al.[26](46.7%)and N. Lakshmi (56.6%)[14] Whereas, Ramakrishna PJ et. al.[17](32%) andHirapure PV et. al.[27] (33.8%)reported less incidencein left ear.

Majority of CSOM cases were from rural areas (63%) which correlates with the study of Sarath babu R. (66.25%)[20], Harshika YK. et. al.[28] (60%) and Kaur P.et. al.[29] (59%) Whereas, Sharma M. et. Al[19](72%), Kumar H. et. al.[22](75%), Harrison Phiri. et. al.[30](81%) and Bhumbla U. et. al.[5](81.91%) reported higher incidencedue to low socio-economic status, lack of personal hygiene and poor education.

© 2023 IJMSAR, All Rights Reserved

Analysis of the 200 samples of CSOM revealed that culture positivity was seen in 94% of the cases. This correlates with study of Loy AH et.al.[25]who reported (96.5%), PajorA.et.al.[31](96.5%), Sangeeta Baskaran[32] (93%), Shashidhar V. et.al.[33](88.5%), Bhumbla. U.et.al.[5] (88.5%)and Sharma M. et.al.[19] (91.2%). Monomicrobial growth seen in 84.05%, mixed growth was seen in 15.95% in the present study which coincides with Sarath babu (83.2% & 16.8%)[20], Harrison phiri et al[30] (85.8% & 14.2%) and Pajor et. al.[31] (82.5% & 17.5%).

In the study, 78.40% of bacterial isolateswere reported which coincides with the studies of Fatima G et. al.[34]who reported 80.07%, Bhumbla. U. et. al.[5](79%). Shashidhar V. et. al.[33](74.8%), Saranya SK et. al.[35](69.79%), and Kumar H et.al[22].(69%). Whereas, Narayana R. S. et. al.[13](62.4%) and Attalah MS. et. al.[36](48%)reported relatively lower incidence.A higher incidence was reported by Sharma M. et.al[19] (89.6%),PajorA. et. al.[31](88.6%), Loy AH et. al.[25](87.7%) and Sangeeta Baskaran[32](87%).Most predominant agent was Pseudomonas aeruginosa (40.22%) followed by Staphylococcusaureus (20.67%), which coincides with the study of Attallah MS et al.[36] (51.7%), Wariso BA et. al.[37] (41%), Malkappa SK et. al.[38], (45.2%), and Raghu Kumar KG et. al.[16] (42.2%) Fatima G et. al.[34], Raghu Kumar KG et. Al[16]. and Sagar Kashyap et al[24]. whereas, Vaidya K et. al.[21] (54.5%) and GH. Ettehad et al.[39] (31.15%) reported Staphylococcus aureus as the predominant isolate followed by Pseudomonas aeruginosa in their studies.

Imipenem (90%) followed by Amikacin (85%) and Piperacillin+ tazobactam (89%) showed highest sensitivity for Gram-negative isolates which coincides with study of Saranya SK et al.[15], Harrison Phiri et. al.[30], Fatima G et. al.[34]and Raghu Kumar KG et. Al[30]. Pseudomonas aeruginosa isolates were sensitive to Colistin (88%), Imipenem (82%), Aztreonam (92.4%), Amikacin (91%), Piperacillin+ Tazobactam (92%), Ceftazidime (77%) which coincides with study of Saranya SK et al[15]., Fatima G. et. al.[34] and Soumya S. et. al.[40] Vancomycin (100%) and Amikacin (89%) were highly active against gram positive isolates which correlated with study of Saranya SK et. al.[15], Sagar Kashyap et. al.[24] and Kumar H. et. al.[22]

Among the total CSOM isolates 218, Multi drug resistant strains were 63 (28.89%). Out of them, MRSA isolates were (12.38%) which correlated with study of S. Nanarayan R et. al.[13] (11.79%), Ramakrishna PJ et. al.[41] (13.63%) and Fathy Mohamed ES. Et. Al[43] (10.83%). Bhumbla U. et. Al[5] reported 33.33%. Among 122 Gram- negative isolates, (20.49%) were ESBL producers which is similar to the studies of Prasanth D.P. et. al.[44](22.22%), Ramesh A. et. al.[42] (24.5%). Whereas Sagar Kashyap et.al.[24](62.5%),Rejitha I.M. et. Al[45].(31.57%)andBhumbla U. et. al.[5] (33.33%) reported higher incidence of ESBL producers.Fathy Mohamed E.S. et. al.43[(10)] (3.7%) and Sattar A et. al.[46](6.6%) reported lower incidence of ESBL producers respectively.Metallo beta Lactamases were (9.02%) similar to that of Chakraborthy B. et. al.[6](10.71%), Ramesh A. et. al.[42](6%) and Sagar Kashyap et. al.[24](18.18%). Whereas the studies of Sowmya S. et. al.[40](30%), Neelaveni D.et. al.[47](29.1%) reported higher incidence and Harshika YK. et. al.[48](5.13%) reported relatively lower incidence

CONCLUSIONS

The study showed that Pseudomonasaeruginosa and Staphylococcusaureuswere the predominant bacterial

© 2023 IJMSAR, All Rights Reserved

isolatesin CSOM patients. Antibiotic susceptibility testingidentifiied that most of Gram-negative isolates were sensitive to Imipenem, Amikacin, Piperacillin+ tazobactam, Ceftazidime + clavulanic acid, Ciprofloxacin, and Gentamycin. Most of Gram-positive isolates were sensitive to Linezolid, Vancomycin, Teicoplanin, Azithromycin, Amikacin and Clindamycin. Recently, the multidrug resistant strains are increasing gradually due to injudicious use of drugs, availability of over-the-counter drugs and increase use of steroid drops. Majority of cases responded to antibiotic treatment. No response in few cases could be mainly, due to development of cholesteatoma or mastoiditis which needs surgical treatment.

Thus understanding the etiology and local antibiogram pattern of CSOM isolates is extremely helpful for the clinical in choosing the appropriate empirical antibiotics which further prevent the emergence of resistance strains.

REFERENCES

1. Shenoi PM. Management of chronic suppurative otitis media, 5th Ed. Scott Brown's textbook of Otorhinolaryngology. 1988.
2. Rupa V, Jacob A, Joseph A. CSOM prevalence and practices among rural South Indian children at Vellore. Int. Journal of Pediatrics and Otolaryngology. 1999;25(48): 217-219.
3. Scott Giebnik G. M. D. Book on evidence -based otitis media. Hamitpn; London Panther Publications printed by Colors imprint, Bangalore. 2000.
4. Abdelshafy IA, Haleem AA, Khalil YA, Ghazal AA, Gaballah A. Microbiology of chronic suppurative otitis media, study of the role of bacterial biofilm and fungal infection. J Otolaryngol ENT Res. 2015;3(1):00051.
5. Bhumbla U, Gupta P, Mathur DR, Gyaneshwari. Current trends in microbial profile and resistance pattern in CSOM in a semi-urban hospital of Southern India. J. Evolution Med. Dent. Sci. 2016; 5(34):1917-1921. DOI: 10.14260/ jmeds/ 2016/ 454.
6. Chakraborthy B, Subhadip D, Debashish G. Changing trends of antibiogram profile in patients with community acquired chronic otitis media in a tertiary care hospital. J. Evol. Med. Dent. Sci. 2014;3(45):11000- 5.
7. Deshmukh KA, Manthale D. Prevalence and antibiotic susceptibility of Pseudomonas aeruginosa isolated from chronic suppurative otitis media. Int J Otorhinolaryngol Head Neck Surg. 2017;3(1):56-60.
8. Mansoor T, Musani MA, Khalid G, Kamal M. Pseudomonas aeruginosa in chronic suppurative otitis media: Sensitivity spectrum against various antibiotics in Karachi. J Ayub Med Coll Abbottabad. 2009;21(2):120-123.
9. Wayne PA. Clinical and laboratory standards institute: performance standards for antimicrobial disk susceptibility tests. Approved standard M100–S22, Clinical and laboratory standards institute. 2012; 32(3):70-74.
10. Mackie & McCartney. Practical Medical Microbiology, 14th Ed. Edited by J.G. Colloe, G. Fraser, B.P. Marmion, Anthony Simmons; Churchill Livingstone; Medical division of Person Professional Limited, 2015.
11. EUCAST. Breakpoint tables for interpretation of MICs & Zone diameters, version 7.0 valid from 01.01.2017.

© 2023 IJMSAR, All Rights Reserved

12. P. Bailey & Scott's diagnostic microbiology-E-Book. Elsevier Health Sciences; 2015 Dec 28.
13. Narayana RS, Rao MJ. Chronic suppurative otitis media-aetiology and their antibiogram. J.Evol. Med. Dent. Sci. 2018 Mar 19;7(12):1480-1484.
14. N. Lakshmi – Dissertation. Bacteriological study of chronic suppurative otitis media. Andhra Medical College, Visakhapatnam. 2002.
15. Saranya S, Vazhavandal G, Ganesh B, Ismail M, Uma A, Subramaniam P. Bacteriological and Mycological profile of chronic suppurative otitis media in a Tertiary care hospital Trichy, Tamilnadu. Int. J. Pharm. Sci. Invent. 2015;4(1):13-19.
16. Raghu Kumar K.G, Navya S, Basavarajappa K.G. A study of bacterial profile and antibiotic susceptibility pattern of chronic suppurative otitis media among patients attending a Tertiary care center, Devangere. Sch. J. App. Med. Sci. 2014;2(5B):1606-1612.
17. Jakribettu RP, Fysal N, Sushanth PS, Ahmed SM, Shamseer AP. Microbiological study of acute otitis media in children aged 2 months to 18 years. J. Evol. Med. Dent. Sci. 2014; 13;3(2):393-399.
18. Nikakhlagh S, Khosravi AD, Fazlipour A, Safarzadeh M, Rashidi N. Microbiologic findings in patients with chronic suppurative otitis media. J. Med. Sci. 2008;8(5):503-506.
19. Sharma M, Ray B, Sahu RK, Raman S, Bagga RV. A study of prescription pattern in the drug therapy of CSOM at a tertiary care hospital in eastern part of India. Int. J. Otorhinolaryngol Head Neck Surg. 2017;3:188-191.
20. Sarathbabu R.-Dissertation. Bacteriological study of chronic suppurative otitis media. Andhra Medical College, Visakhapatnam.2008.
21. Vaidya K, Madhup SK, Shrestha BL, Gautam A, Tuladha NR. Bacteriological and mycological profile of chronic suppurative otitis media among patients visiting Dhulikhel Hospital. ACCLM. 2015;1(1):37-41.
22. Harivinder Kumar, Sonia Seth. Bacterial and Fungal study of 100 cases of chronic suppurative otitis media. J. Clin. Diagn. Reas. 2011;5(6)1224-1227.
23. Prakash M, Lakshmi K, Anuradha S, Swati GN. Bacteriological profile and their antibiotic susceptibility pattern of cases of chronic suppurative otitis media. Asian. J. Pharm. Clin. Res. 2013;6(3):210-212.
24. Kashyap S, Pandey A, Thakuria B, Saxena AK, Asthana AK, Madan M. Resistant microorganisms isolated from cases of chronic suppurative otitis media: a therapeutic concern. Nat. Lab. Med. 2017;6(2):M001-6.
25. Loy AH, Tan AL, Lu PK. Microbiology of chronic suppurative otitis media in Singapore. Singapore Med. J. 2002 Jun 1;43(6):296-299.
26. Kamal N, Joarder AH, Chowdhury AA, Khan AW. Prevalence of chronic suppurative otitis media among the children living in two selected slums of Dhaka City. Bangladesh Med. Res. Counc. Bull. 2004 Dec 1;30(3):95-104.
27. Hirapure PV, Pote MK. Microbiological profile and antibiogram of active patients of chronic suppurative otitis media in Latur, Maharashtra, India. Int Res J Medical Sci. 2014;2(5):6-9.
28. Harshika YK, Sangeetha S, Prakash R. Microbiological profile of CSOM and their antibiotic sensitivity pattern in a tertiary care hospital. Int. J. Curr. Microbiol. App. Sci. 2015;4(12):735-43.

© 2023 IJMSAR, All Rights Reserved

29. Kaur P, Sood A. S., Sharma S, Awal G. Microbiological profile and antimicrobial susceptibility pattern of chronic suppurative otitis media in a tertiary care center. Trop J Path Micro. 2018;4(1): 03-13. Doi: 10.17511/ jopm. 2018. i1.02.
30. Harrison Phiri, Ayugi John, Omutsani Mary, Froeschl Uta, Mwaba John. Microbiological Isolates of Chronic suppurative otitis media"; at the University Teaching Hospital and Beit Cure Hospital in Lusaka, Zambia. Int. J. Clin. Exp. Med. 2016;94-100. Doi: 10.11648/j.ijcerms.20160205.14.
31. Pajor A, Durko M, Jankowski A, BartoszkoTyczkowska, Stanczy KR. Bacteriological study of chronic suppurative otitis media. 2006;60:30-40.
32. Sangeetha Baskaran, - Dissertation. Evaluation of bacterial and fungal agents in the etiology of Chronic suppurative otitis media with special reference to antimicrobial resistance pattern of Pseudomonas species. 2016.
33. Vishwanath S, Mukhopadhyay C, Prakash R, Pillai S, Pujary K, Pujary P. Chronic suppurative otitis media: Optimizing initial antibiotic therapy in a tertiary care setup. Indian J Otolaryngol Head Neck Surg. 2012;64(3):285-9.
34. Fatima G, Shoaib M, Raza MZ, Bilal S. Antimicrobial susceptibility pattern of bacterial and fungal isolates from patients with chronic suppurative otitis media in perspective of emerging resistance. Pak J Otolaryngo. 2013;29:49-53.
35. Saranya S, Vazhavandal G, Ganesh B, Ismail M, Uma A, Subramaniam P. Bacteriological and Mycological profile of chronic suppurative otitis media in a Tertiary care hospital Trichy, Tamilnadu. Int. J. Pharm. Sci. Invent. 2015;4(1):13-19.
36. Attallah MS. Microbiology of chronic suppurative otitis media with cholesteatoma. Saudi Med. J. 2000;21(10):924-7.
37. Wariso BA, Ibe SN. Bacteriology of chronic discharging ears in Port Harcourt, Nigeria. West Afr. J. Med. 2006;25(3):219-22.
38. Malkappa S, Saileela K, Rajendra B, Chakraverti T. Study of aerobic bacterial isolates and their antibiotic susceptibility pattern in chronic suppurative otitis media. Indian J Otol. 2012;18:136-9.
39. Ettehad GH, Refahi S, Nemmati A, Pirzadeh A, Daryani A. Microbial and Antimicrobial susceptibility patterns from patients with Chronic suppurative otitis media in Ardebil. Int. J. Trop. Med. 2006;1(2):62-65.
40. Soumya S, Vagrali M, Nagmoti JM, Hogade S. Prevalence and antibiogram of Pseudomonas aeruginosa in chronic suppurative otitis media (CSOM). J. Med. Sci. Clin. Res. 2016;6(2):999-1005.
41. Jakribettu RP, Fysal N, Sushanth PS, Ahmed SM, Shamseer AP. Microbiological study of acute otitis media in children aged 2 months to 18 years. J. Evol. Med. Dent. Sci. 2014;3(2):393-399.
42. Agarwal R, Pradhan R, Khatri P.K, Shah H, Marothi Y. Mycological profile of chronic suppurative otitis media in a tertiary care center in Rajasthan. Int. J. Med. Micr. Trop. Dis. 2016:2(4):142-144.
43. Fathy Mohamed E. Serry, Ashraf Ahmed KadryYosusef, Fatma Ahmed N. M. H. Elmeselhy. Study on bacterial and mycotic

© 2023 IJMSAR, All Rights Reserved

infection of the middle ear. Int. J. Adv. Res. 2017;5(10):1416-1425.

44. Prasanth DP, Basavaraj VP. "ESBL and MBL mediated resistance in Pseudomonas aeruginosa: An emerging threat to clinical Therapeutics". J. Clin. Diagn. Res. 2011;5(8): 1552-1554.
45. Rejitha IM, Sucilathangam G, Kanagapriya M. Microbiologic profile of chronic suppurative otitis media in a tertiary care hospital. Microbiology. Int. J. Sci. Res. 2014;3(2).
46. Sattar A, Alamgir A, Hussain Z, Sarfraz S, Nasir J, Badar-e-Alam. Bacterial spectrum and their sensitivity pattern in patients of chronic suppurative otitis media. J. Coll. Physicians Surg. Pak. 2012; 22(2):128- 9. Doi: 02.2012/ JCPSP.128129.
47. Neelaveni D, Sankar P. Detection of Genomic characterization of Carbapenemase producing Pseudomonas aeruginosa isolates in Chronic suppurative otitis media. Glob. J. Res. Anal. 2016;5(9):45-47.
48. Harshika YK, Sangeetha S, Prakash R. Microbiological profile of CSOM and their Antibiotic Sensitivity Pattern in a Tertiary Care Hospital. Int. J. Curr. Micr. App. Sci. 2015;4(12):735- 743.

Table 1: Culture positivity among Total Samples (n= 200)

Samples	Number of cases	Percentage
Culture positive samples	188	94%
Culture negative samples	12	6%
Total samples	**200**	**100%**

Table 2: Organisms Isolated in Control Group (n= 28)

S. No	Isolate	No	%
1.	Coagulase negative Staphylococci	11	39.28%
2.	Micrococci	10	35.71%
3.	Corynebacterium species (diphtheroid)	6	21.42%
4.	Candida tropicalis	1	3.57%
	TOTAL	**28**	**100%**

Table 3: Prevalence of Pure and Mixed Infections (n= 188)

Culture positivity	Number	Percentage
Monomicrobial (Pure)	158	84.05%
Polymicrobial (Mixed)	30	15.95%
Total	**188**	**100%**

© 2023 IJMSAR, All Rights Reserved

Table 4: Distribution of Bacterial Isolates in Pure and Mixed cultures (n=184)

Organism	Total		Pure		Mixed	
	No.	%	No.	%	No.	%
Pseudomonas aeruginosa	74	40.22%	56	30.43%	18	9.78%
Staphylococcus aureus	38	20.67%	26	14.13%	12	6.52%
Proteus species Proteus mirabilis Proteus vulgaris	24 (16) (8)	13.05%	10 (6) (4)	5.43%	14 (10) (4)	7.60%
Coagulase negative Staphylococci	20	10.86%	16	8.69%	4	2.17%
Klebsiella pneumoniae	14	7.61%	8	4.34%	6	3.26%
Escherichia coli	6	3.26%	6	3.26%	-	-
Acinetobacter baumanii	4	2.17%	2	1.08%	2	1.08%
Micrococci	2	1.08%	2	1.08%	-	-
Corynebacterium species	2	1.08%	2	1.08%	-	-
TOTAL	**184**	**100%**	**128**	**69.56%**	**56**	**30.43%**

Table 5: Combination of Organisms in Mixed cultures (n=30)

Bacteria & Fungi or more than one Bacteria	No. of samples	No. of isolates
Pseudomonas aeruginosa + Proteus mirabilis	6	12
Pseudomonas aeruginosa + Klebsiella pneumoniae	6	12
Pseudomonas aeruginosa + Staphylococcus aureus	4	8
Proteus vulgaris + Staphylococcus aureus	4	8
Proteus mirabilis+Coagulase negative Staphylococci	4	8
Acinetobacter baumanii + Staphylococcus aureus	2	4
Pseudomonas aeruginosa + Aspergillus niger	2	4
Staphylococcus aureus + Candida albicans	2	4
TOTAL	**30**	**60**

Table 6: Antibiotic sensitivity pattern of Gram-positive Isolates (n=122)

Organisms	AMP	CIP	AK	GEN	CAZ	IMP	PIT	CAC	CTX	AT	CO
P. aeruginosa	24%	35%	91.5%	60%	77%	82%	92%	80%	35%	92%	88%
E. coli	35%	70%	85%	68%	65%	90%	100%	90%	65%	NT	NT
K. pneumoniae	25%	85%	75%	65%	75%	85%	90%	90%	50%	NT	NT
Proteus spp	20%	20%	80%	60%	50%	95%	98%	92%	57%	NT	NT
A. baumanii	-	-	25%	25%	50%	100%	75%	75%	25%	NT	NT

© 2023 IJMSAR, All Rights Reserved

Table 7: Antibiotic sensitivity pattern of Gram -positive Isolates (n=62)

Organism	AMP	AK	TEI	CD	CTX	CX	LZ	CIP	VA	AZ	LE
S. aureus	74%	89%	100%	85%	65%	55%	97%	42%	95%	93%	79%
CONS	42%	78%	100%	78%	55%	42%	100%	58%	100%	85%	78%

Table 8: Distribution of MDR strains among total isolates (n= 218)

Total isolates		MDR strains		*MRSA*		ESBL producer		MBL producers	
No.	%	No	%	No	%	No.	%	No.	%
218	100%	63	28.89%	27	12.38%	25	11.46%	11	5.04%

Figure Legends

Figure 1: Age and sex wise distribution of CSOM cases.

Figure 2: Ear wise distribution of cases among both sexes.

Figure 3: Distribution of cases based on Demographic area. (n=200)

Figure 4: ESBL producers among various gram –negative isolates (n = 25)

Figure 5: MBL producers among various gram- negative isolates (n = 11)

Figure 6: Distribution of MRSA strains S.aureus (38).

Figure 7: Therapeutic response of patients.

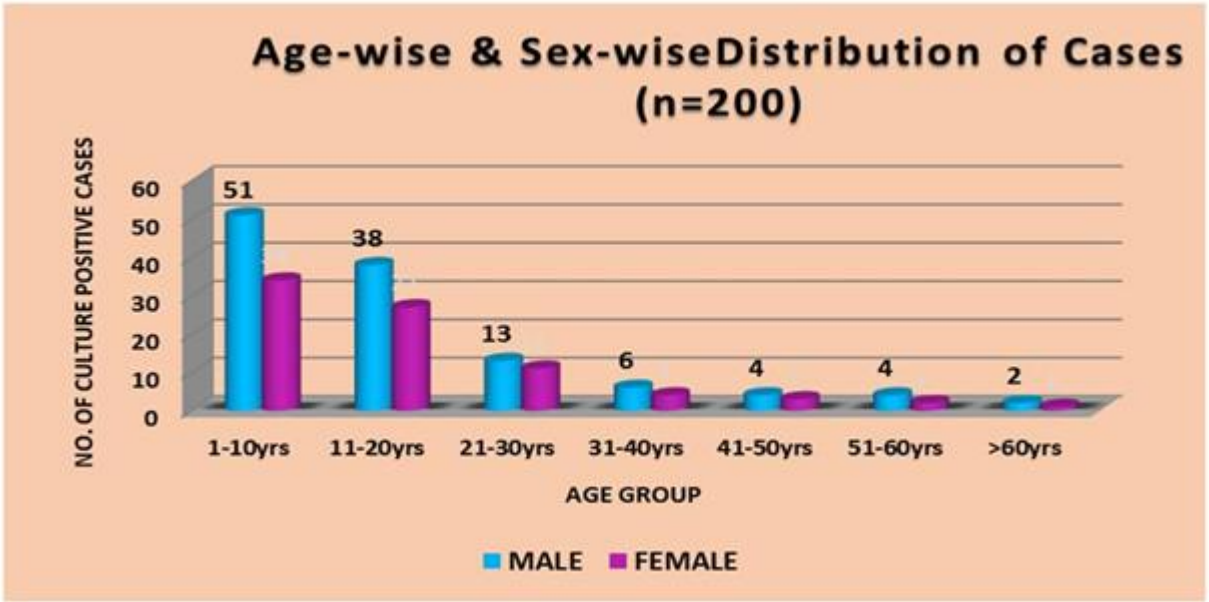

Figure 1. Age and sex wise distribution of CSOM cases.

© 2023 IJMSAR, All Rights Reserved

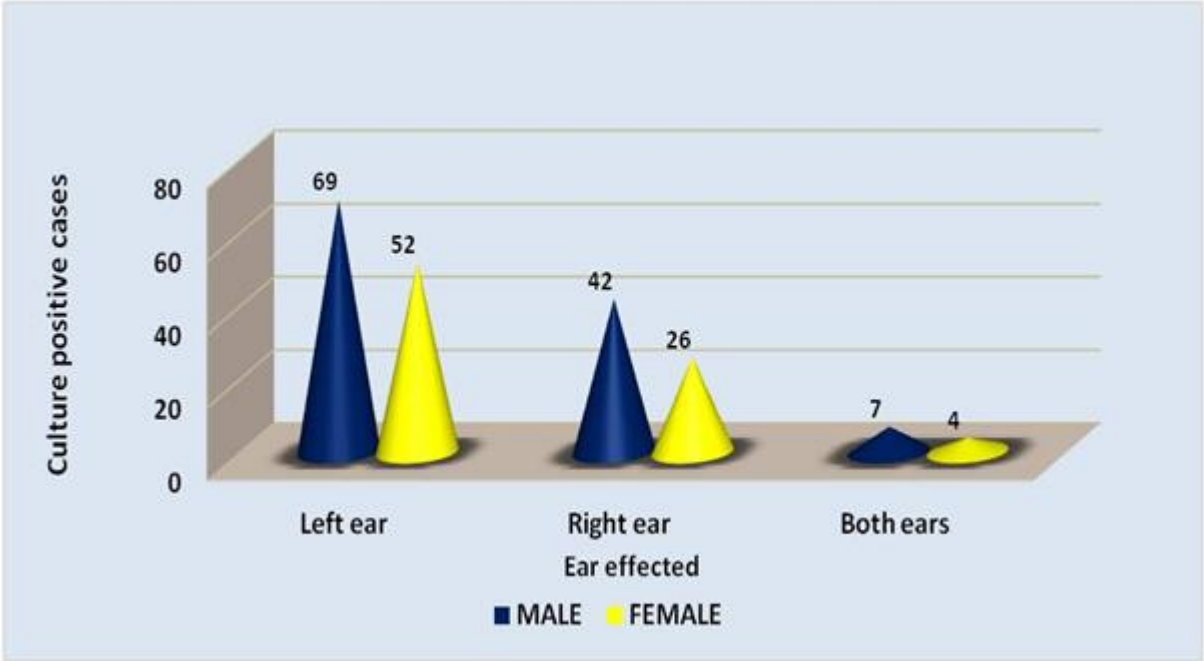

Figure 2. Ear wise distribution of cases among both sexes.

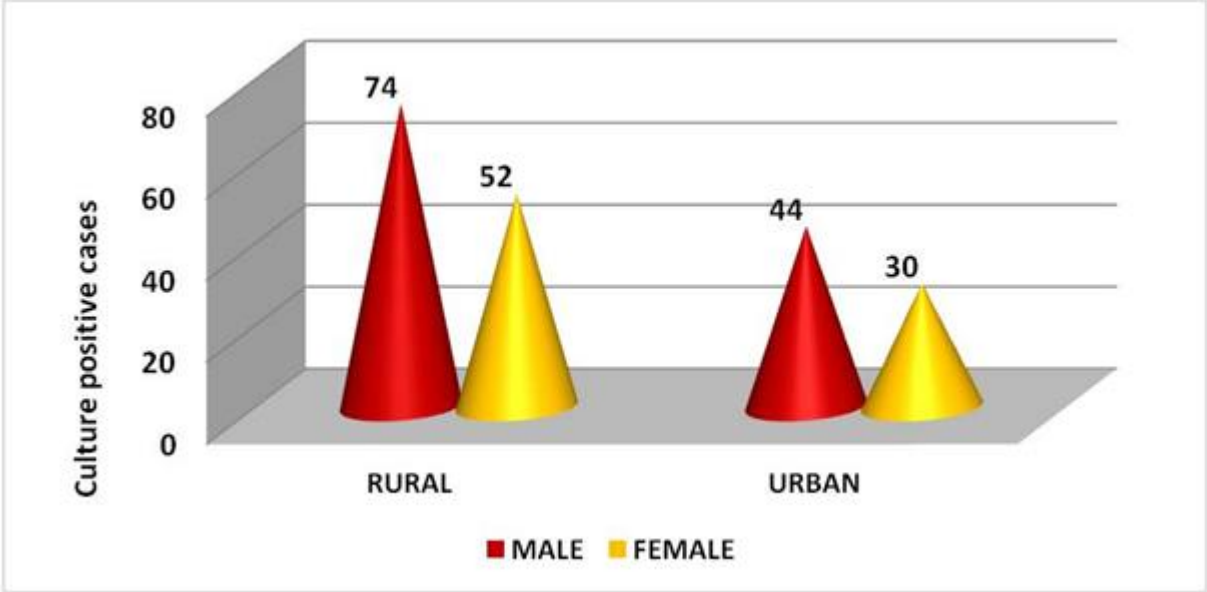

Figure 3. Distribution of cases based on Demographic area. (n=200)

© 2023 IJMSAR, All Rights Reserved

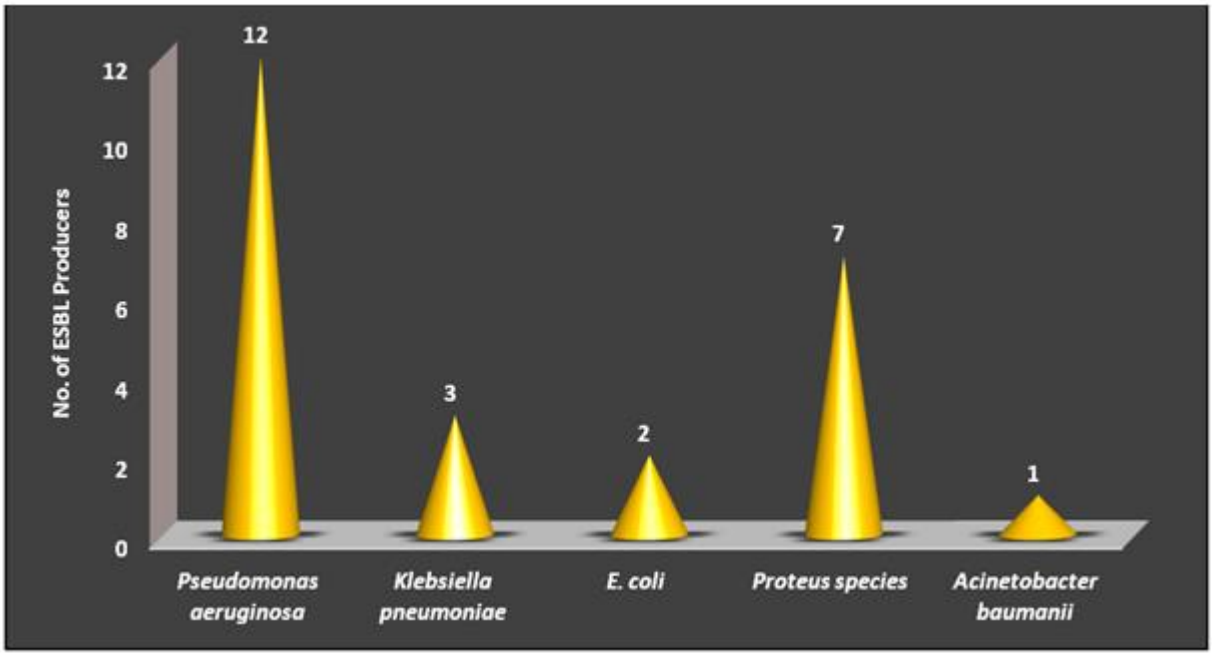

Figure 4. ESBL producers among various gram –negative isolates (n = 25)

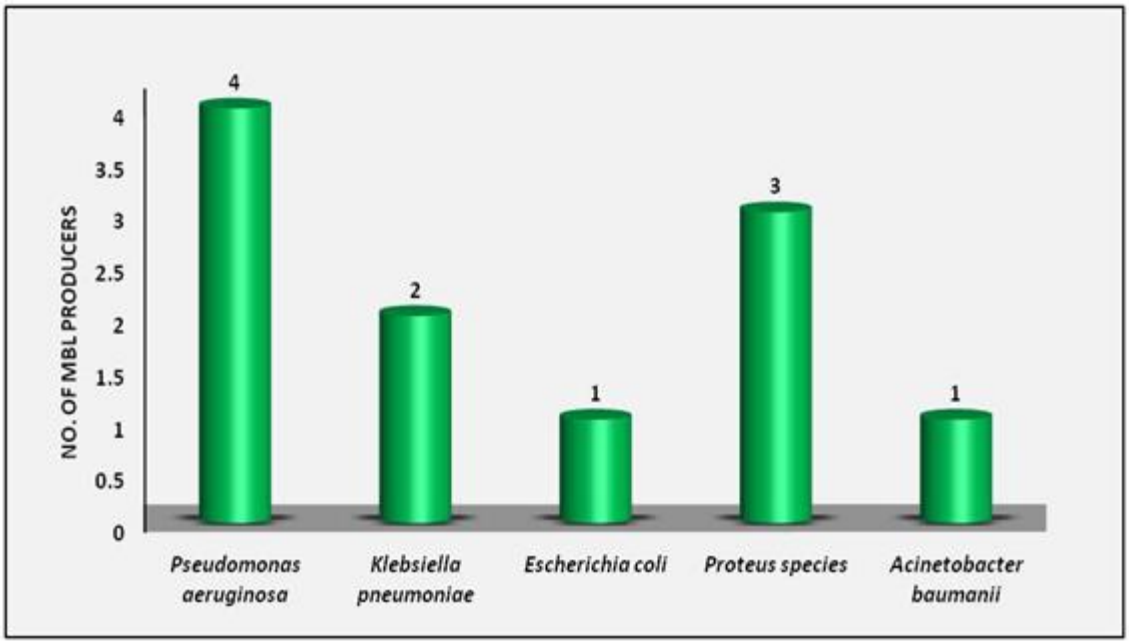

Figure 5. MBL producers among various gram- negative isolates (n = 11)

© 2023 IJMSAR, All Rights Reserved

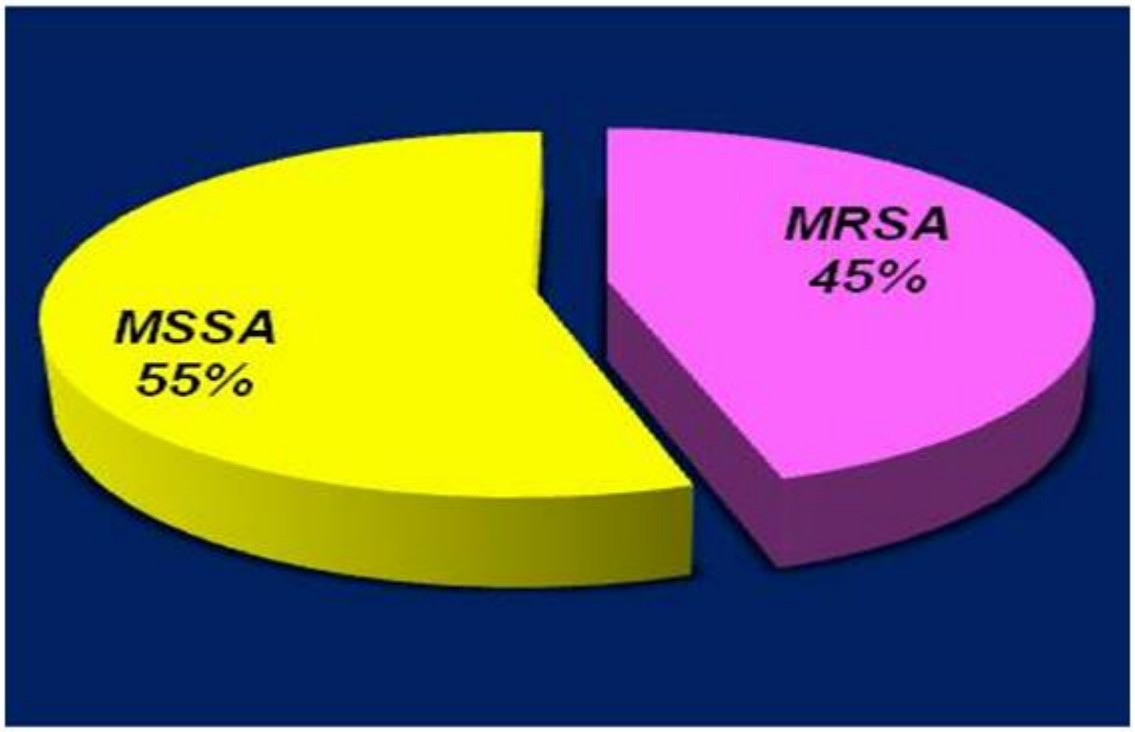

Figure 6. Distribution of MRSA strains S.aureus (38).

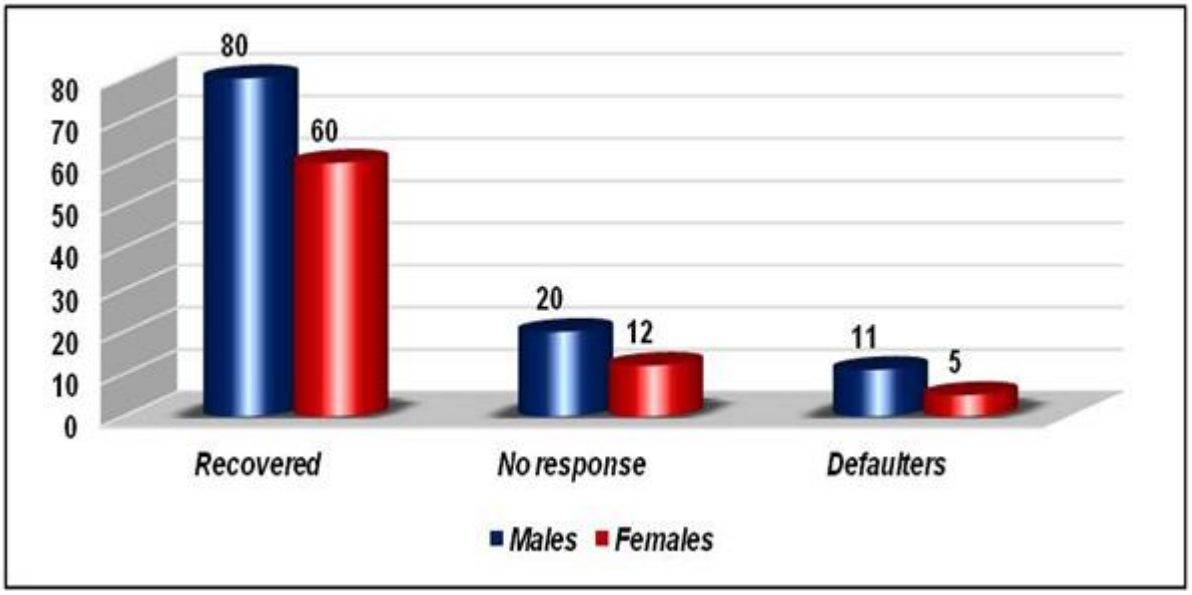

Figure 7. Therapeutic response of patients.

© 2023 IJMSAR, All Rights Reserved