



A Comparative Study Of Efficacy Of Acetic Acid Irrigation Over Suction Clearance With Topical Antibiotics In The Medical Management Of Chronic Suppurative Otitis Media

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Abstract

Background: Chronic suppurative otitis media (CSOM), sometimes referred to as chronic otitis media (COM), is a chronic inflammation and infection of the middle ear and mastoid cavity, characterised by ear discharge (otorrhoea) through a perforated tympanic membrane. The predominant symptoms of CSOM are ear discharge and hearing loss. Antibiotics and antiseptics kill or inhibit the micro-organisms that may be responsible for the infection. Antibiotics can be applied topically or administered systemically via the oral or injection route. Antiseptics are always directly applied to the ear (topically).

Aim of the study: To consider the most appropriate medical treatment modality for patients of CSOM by comparing the efficacy of irrigation with dilute acetic acid with topical antibiotics & aural cleaning with topical antibiotics.

Methods : This Comparative Study was conducted in the Department of Ent, Apollo Institute of Medical Sciences & Research, Chittoor, Andhra Pradesh, India in the year 2021. While including the patients, the inclusion and exclusion criteria mentioned above are applied. An informed consent will be taken from the patient. Patients included in this study were divided into 2 groups. In experimental group - patients treated with aural toilet & irrigation with acetic acid and topical antibiotics. In control group - patients were treated with aural toilet and topical antibiotics without acetic acid irrigation.

Results : 100 patients. 58 patients (58%) are diagnosed to have Right CSOM, & 42 patients (42%) are diagnosed as Left CSOM. the categorization of quantity of ear discharge. Mild ear discharge noted in 35 patients. 40 patients are having moderate ear discharge. 25 patients are with profuse ear discharge. Size of the perforation of tympanic membrane was classified into small, medium, large, subtotal depending on the involvement of quadrants of the tympanic membrane. Small - involves only one quadrant of the TM, Medium - involves more than one quadrant but less than two quadrants of the TM, Large - involves more than two quadrants of TM, Sub-total - involves all four quadrants of the TM, sparing the annulus of TM. The various sizes of perforation in 100 patients. In group 1 patients i.e., with acetic acid irrigation. We found dry ear in 44 patients (88%) in a mean period of 26 days, 21 patients (47.72%) had dry ear in 15 days, 11 patients (25%) had dry ear in 30 days, 7 patients (15.91%) had dry ear in 45 days, 3 patients (6.82%) had dry ear in 60 days, 2 patients (4.55%) had dry ear in 90 days. Perforation healed in 13 patients (26%). The minimum period for healing was 15 days and maximum 45 days as depicted in the graph. Failures i.e., persistence of ear discharge with acetic acid irrigation was noted in 6 patients (12%). In group 2 control group, i.e., with suction clearance with topical antibiotics, majority of the patients, i.e., 12 out of 50 (24%) got dry ear in 46 - 60 days, 0 patients

got dry ear in < 7 days, 4 out of 50 (8%) patients got dry ear in 8 – 15 days, 6 out of 50 (12%) patients in 16 – 30 days, 9 out of 50 (18%) in 31 – 45 days, and 1 out of 50 (2%) in 61 – 90 days, discharge persists (failure to treatment) in 18 (36%) patients. the healing of perforation of TM in group 1 & group 2. In group 1, i.e., with acetic acid irrigation, a total of 13 (26%) out of 50 had healed TM, out of those 5 (38.4%) had healed TM in 15 days, 6 (46.1%) had healed in a period of 16-30 days, 2 (15.3%) had healed in a period of 31-45 days. In 37 (74%) patients out of 50, size of the perforation remains same. In group 2. i.e., with suction clearance without acetic acid irrigation, a total of 3 (6%) out of 50 had healed TM, out of those 1 (33.3%) had healed in a period of 31-45 days, 2 (66.7%) in a period of 46-60 days. In 47 (94%) patients out of 50, the size of the perforation remains same. By assessing all the data, 13 patients had healed TM in a group of patients treated with acetic acid irrigation and 3 patients had healed TM in a group of patients treated with suction clearance without acetic acid irrigation, showing a significant p value ($p=0.005$).

Conclusion : Medical management of tubo-tympanic type of CSOM by frequent aural cleaning with dilute acetic acid irrigation with topical antibiotics can be more desirable choice as compared to the suction clearance with topical antibiotics. Because acetic acid is safe and economical without producing any side effects. Alteration of pH of ear canal is one of the main factor for healing, in addition to mechanical disruption of biofilm and removal of deep seated debris in poorly vascularized sites such as bones. So, acetic acid alters the pH of the ear from alkaline to slightly acidic, which will prevent the growth of micro-organisms.

Keywords: Chronic Suppurative Otitis media, Acetic acid, Topical antibiotics

Introduction

Chronic suppurative otitis media, is an infection of the middle ear lasting for more than 2 weeks. It is persistent and insidious disease, with perforation of tympanic membrane and discharging ear. It is one of the most common bacterial infections in the field of otolaryngology having significant economic and individual repercussion.¹ CSOM is considered as a biofilm disease and it also explains the observed resistance to antibiotics.² Biofilms are most prevalent microbial form in biological environment³ and thought to play a central role in chronic infections. Physical removal or disruption of bacterial biofilm is effective in treating chronic infections⁴. The recognition that chronic otolaryngological bacterial infections are biofilm related has been the impetus for the development of new technologies for the study of biofilms and their prevention and treatment. Microbial biofilm infections may be discerned from acute bacterial infections by persistence despite antibiotic therapy and the innate and adaptive immune and inflammatory responses of the host and in contrast to colonization, are characterized by a proinflammatory immune response and persisting pathology⁵. But the widespread use of antibiotics has precipitated the emergence of multiple resistant strains of bacteria which produce both primary and

postoperative ear infections. Drawback of treatment using antibiotics both orally and parenterally includes cost, adverse effects, toxic reactions, and inconvenience to the patients.⁶ Medical management of CSOM without cholesteatoma by frequent aural cleaning and irrigation using dilute acetic acid can be more desirable choice as compared to the topical and oral antibiotics. Alteration of pH of ear canal is one of the main factor for healing, in addition to mechanical disruption of biofilm & removal of deep seated debris in poorly vascularised sites. The prevention & treatment of deep seated infection in very poorly vascularised sites is difficult to treat with conventional systemic antibiotic therapy⁷.

Methods : This Comparative Study was conducted in the Department of Ent, Apollo Institute of Medical Sciences & Research, Chittoor, Andhra Pradesh, India in the year 2021. While including the patients, the inclusion and exclusion criteria mentioned above are applied. An informed consent will be taken from the patient. Patients included in this study were divided into 2 groups. In experimental group - patients treated with aural toilet & irrigation with acetic acid and topical antibiotics. In control group - patients were treated with aural toilet and topical antibiotics without acetic acid irrigation.

Inclusion criteria :

1. Patient with active mucosal disease with defect in pars tensa, patient with inflammed middle ear mucosa, presence of Mucopurulent discharge for more than 4 weeks

2. Patients who give consent to be a part of the study.

Exclusion criteria :

1. Dry ear with CSOM

2. CSOM with atticoantral type

3. Serous otitis media

4. CSOM with otomycosis

5. CSOM with vertigo

6. Patient on systemic antibiotics or any topical ear drops preparation preceeding 2 weeks in group of patients selected for irrigation.

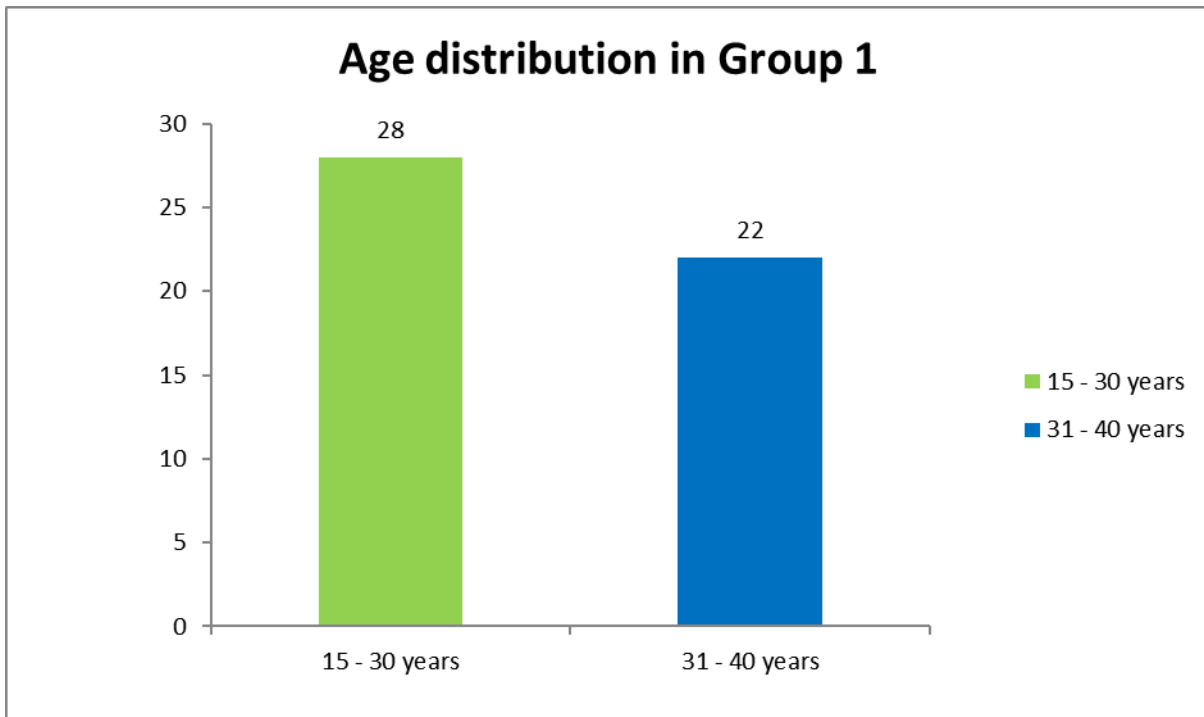
Patients follow up for 3 months & noted for

- 1. reduction in amount of discharge

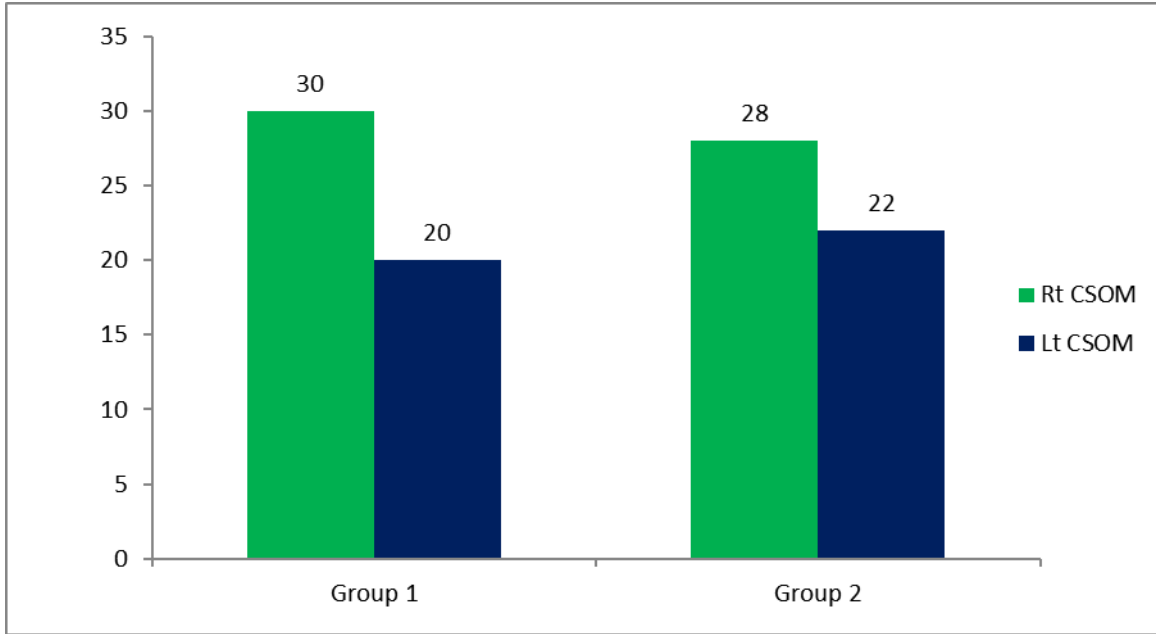
- 2. Healing of perforation

3. Status of middle ear mucosa

Graph – 1 : Age distribution in Group – 1 :

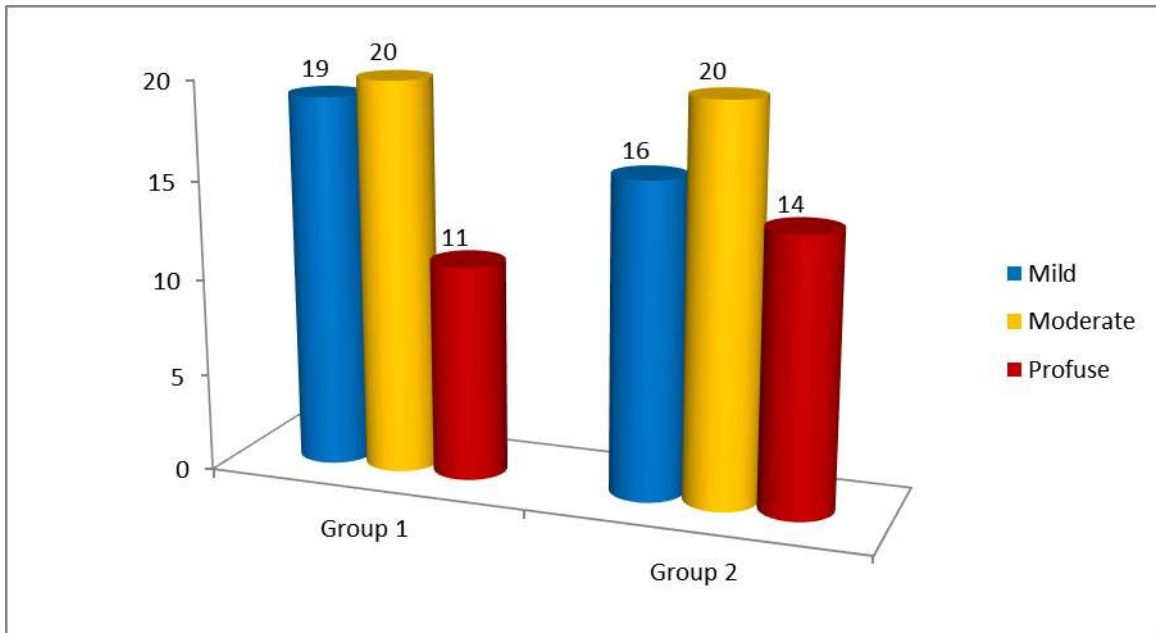


Graph – 2 : Comparison of Diagnosis in Group 1 & Group 2

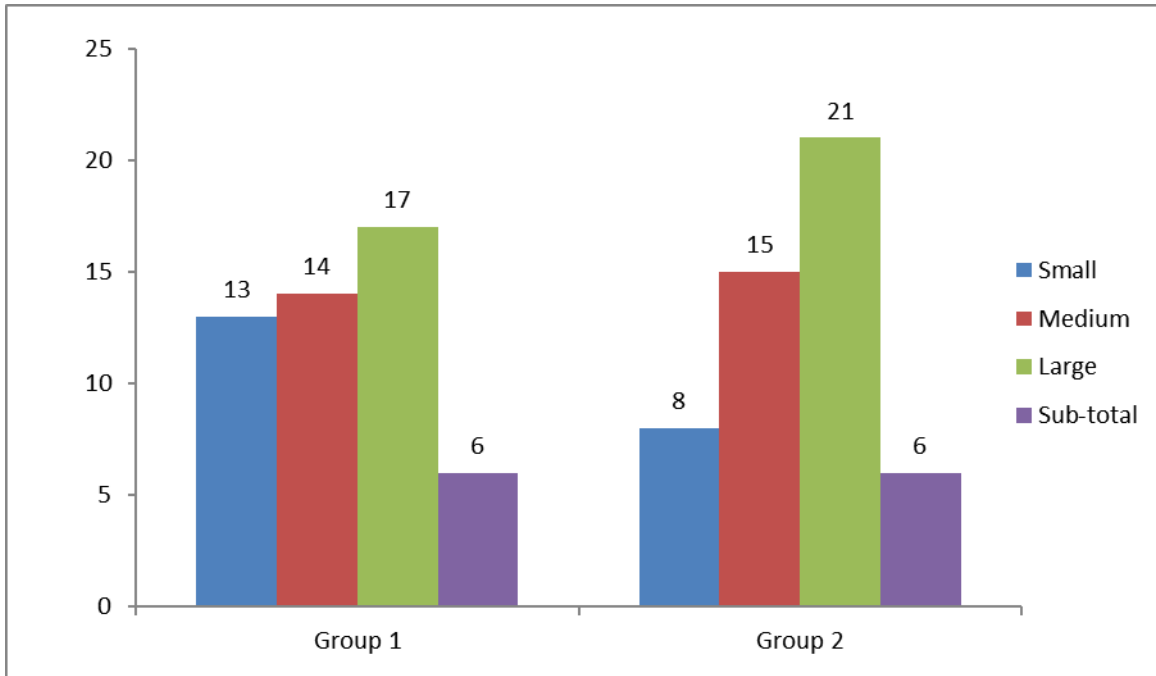


This is a graph showing comparison of diagnosis between two groups

Graph – 3: Comparison of quantity of discharge in Group 1 & Group 2

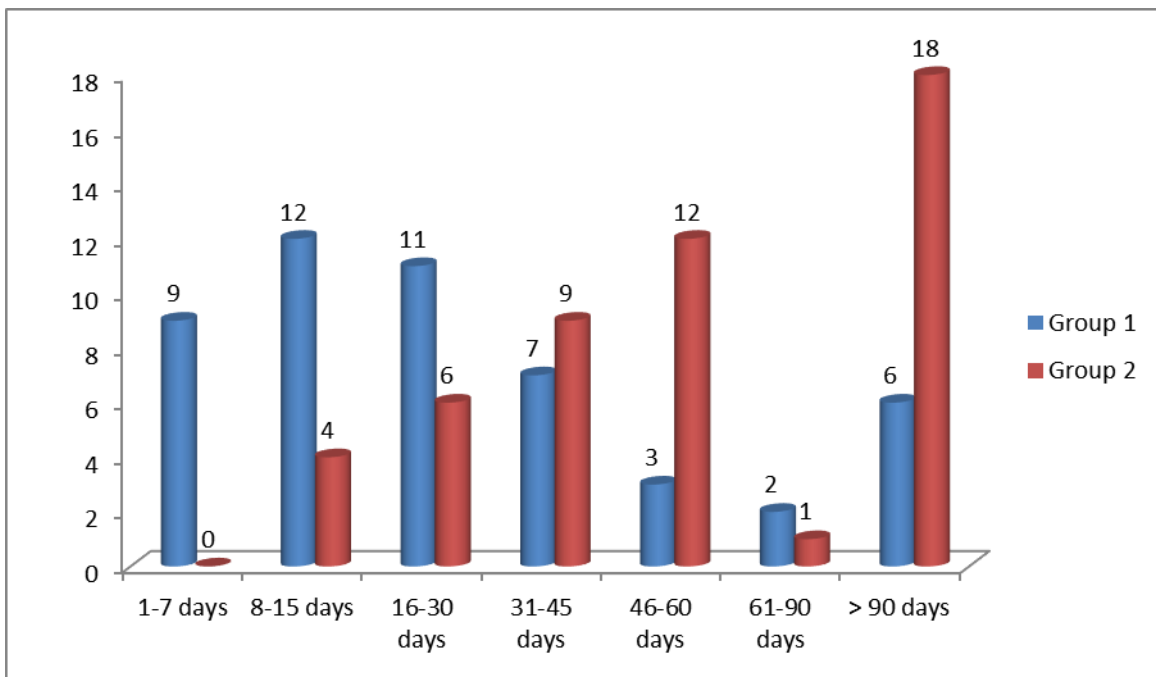


Graph – 4 : comparison of size of perforation of TM in Group 1 & Group 2



This graph shows the comparison of sizes of the perforation of TM in Group 1 & Group 2.

Graph – 5: comparison of duration of days to get dry ear in Group 1 & Group 2

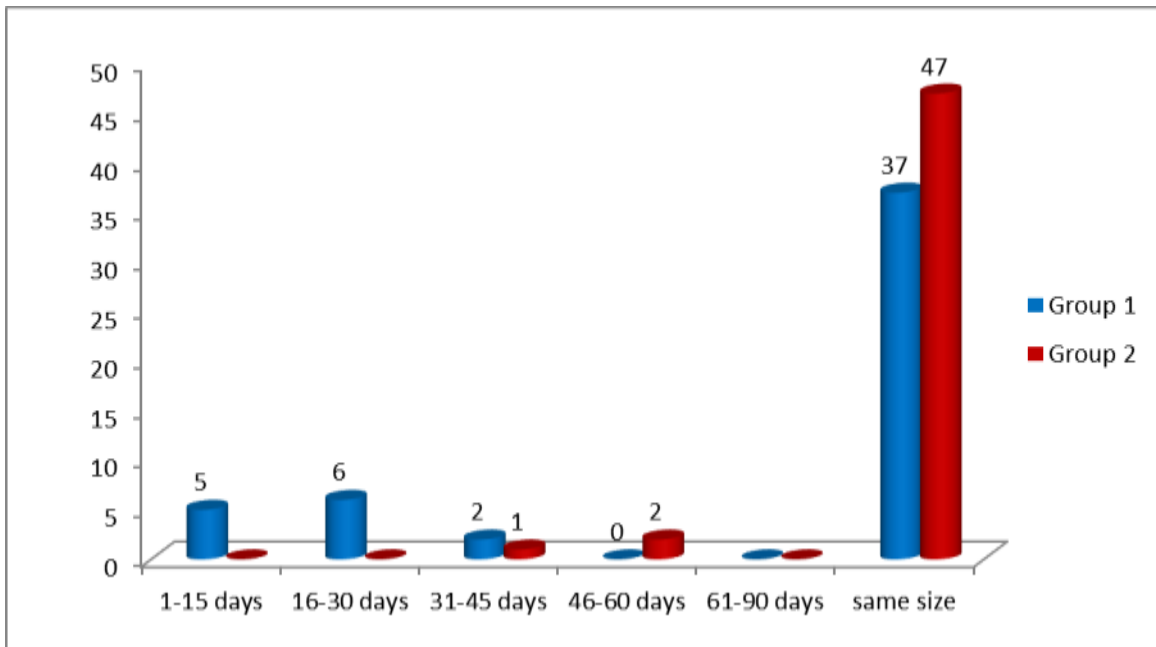


In this graph in group 1: 44 (88%) patients had dry ear in 3 months period. Out of those 21 (47.7%) had dry ear in 15 days, 11 (25%) had dry ear in a period of 16 – 30 days, 12 (27.3%) had dry ear in a period of 30 – 90 days. Failures (i.e., persistence of discharge) in experimental group are 6 patients (12%).

In group 2: a total of 32 (64%) had dry ear in 3 months period. Out of those 4 (12.5%) had dry ear in 15 days, 6 (18.75%) in a period of 16 – 30 days, 9 (28.13%) in a period of 31 -45 days, majority number of patients 12 (37.5%) had dry ear in a period of 46 – 60 days, 1 (3.13%) in a period of 61 – 90 days. Failure to the treatment

in control group (i.e., with suction clearance) are 18 (36%) patients, and p value is significant showing 0.000 (p=0.000).

Graph – 6 : comparison of healing of TM in group 1 and group 2

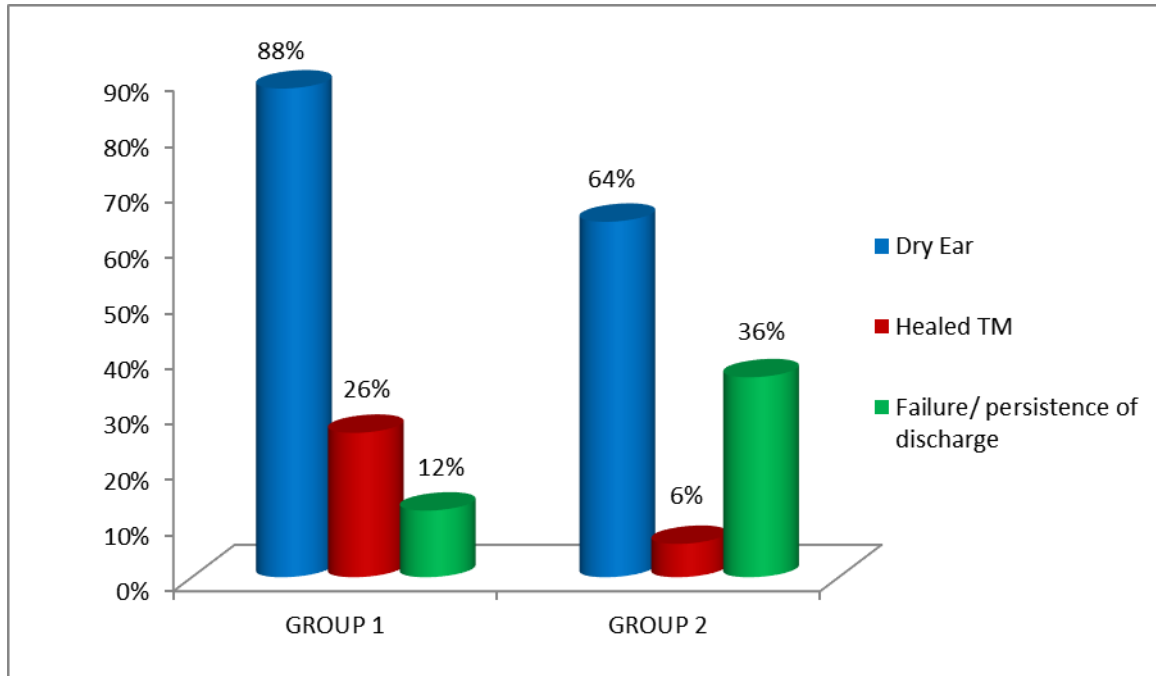


This graph showing the healing of perforation of TM in group 1 & group 2.

In group 1, i.e., with acetic acid irrigation, a total of 13 (26%) out of 50 had healed TM, out of those 5 (38.4%) had healed TM in 15 days, 6 (46.1%) had healed in a period of 16-30 days, 2 (15.3%) had healed in a period of 31-45 days. In 37 (74%) patients out of 50, size of the perforation remains same.

In group 2, i.e., with suction clearance without acetic acid irrigation, a total of 3 (6%) out of 50 had healed TM, out of those 1 (33.3%) had healed in a period of 31-45 days, 2 (66.7%) in a period of 46-60 days. In 47 (94%) patients out of 50, the size of the perforation remains same.

By assessing all the data, 13 patients had healed TM in a group of patients treated with acetic acid irrigation and 3 patients had healed TM in a group of patients treated with suction clearance without acetic acid irrigation, showing a significant p value (p=0.005).

Graph – 7 : comparison of total results in group 1 & group 2

This is a graph showing the final results in Group 1 & Group 2. In group 1 (with acetic acid irrigation), a total of 44 patients (88%) had dry ear in a mean period of 26 days, had healed TM in 13 patients (26%), and failure i.e., persistence of ear discharge noted in 6 patients (12%). In Group 2 (with suction clearance), a total of 32 patients (64%) had dry ear in a mean period of 45.4 days, had healed TM in 3 patients (6%), and failure to treatment i.e., persistence of ear discharge was noted in 18 patients (36%).

Discussion

Chronic suppurative otitis media (CSOM) are one of the ENT diseases resistant to current antibiotics used in acute otitis media treatment. Incidence of CSOM is high in developing countries because of overcrowding, inadequate health care, poor hygiene, recurrent upper respiratory tract infections, poor nutrition and pollution. [8] CSOM is considered as a biofilm disease and it also explains the observed resistance to antibiotics. It is a persistent disease with risk of irreversible complications and is an important cause of preventable hearing loss in adults and children. [9] Management of otorrhea in chronic suppurative otitis media has become a difficult task to otologists. It is because of the emerging resistance to antibiotics, patient compliance for long term treatment and biofilm formation by organisms. The

prevention and treatment of deep seated infection in very poorly vascularized sites is difficult to treat with conventional systemic antibiotic therapy.[10] Present study is having 100 study population, between age group of 15-40 years, mean age is 31.2 years. mean age of 29.4 years. Age is a non-mastoid factor that may influence the outcome. We have excluded the patients under 15 years of age, as this group has adenoid hypertrophy in general. [11] Repeated respiratory tract infections are more frequent in this group. In this study, we have found CSOM to be more common in 15-30 years of age group, and due to increased susceptibility of this age, it is considered to be an economic burden. In our study, the slight male preponderance is seen in both groups.[12] CSOM is considered to be a disease of a developing country. It has been proven that socioeconomic factors such as poor living conditions, overcrowding, poor hygiene, and poor nutrition are predisposing factors. In our study, we have categorized patients according to socioeconomic status by Modified Kuppaswami classification.[13] Maximum patients were present in upper lower class i.e., 78 patients (39%) and in lower middle class 58 Patients (29%) which was comparable with the study of Aditya Singhal *et al.* 2017 of 495 patients, 129 patients (26.6%) were in Upper lower class, 102 patients (20.61%) in the lower middle class and 148 patients (29.9%) in the lower class. [14] As the maximum

population in a developing country is in this class, this disease is considered a socioeconomic burden. So, a cost-effective method is required for this class for this disease. Amongst 100 patients in the acetic acid group, 36% *Staph aureus* followed by 30 patients, *Pseudomonas* was the most common organism detected on Culture and sensitivity. With increased and irrational use of wide-spectrum antibiotics on a long term basis, the emergence of multiple resistant strains of bacterial isolates has become very common. The main aim in cases of treatment of CSOM who are managed conservatively is to control of infection and elimination of ear discharge for a short period. Eventual healing of the tympanic membrane perforation and hearing improvement is the ultimate goal (15). In our present study, the efficacy of both the topical agents are evaluated in their respective group i.e., Group A for antiseptic, Acetic acid & Group B for topical antibiotics according to their sensitivity profile were compared based on patient's treatment succeeding rate. Various clinical aspects are kept in view such as, including overall success rate, symptomatic relief in discharge pain and congestion, according to this study clinically onto topical Acetic acid was found to be comparatively slightly better with otorrhea resolution in 92% with healed perforation in 22% than its comparative topical antibiotic group with otorrhea resolution in 88% with healed perforation in 14 %, but statistically, both the topical agents are equally effective. The present study showed that both the topical antibiotics and Acetic acid groups were equally effective (p -value < 0.05), the difference in effectiveness for otological symptom score between two groups are narrowed after one week of treatment, but remained both the drugs was statistically significant till the end of treatment. [16] For topical antibiotic group: the various previous studies showed that *Pseudomonas aeruginosa* and anaerobes are the most frequently isolated organisms and aminoglycosides such as tobramycin and Gentamicin, neomycin sulfate, are commonly used in patients with otitis media (17). Topical antibiotics are ototoxic but highly effective against gram Negative & positive bacteria, which was chosen for the study as it is commonly employed in the topical treatment of chronic otitis media (18). Despite their topical ototoxicity, antibiotics eardrops are frequently used in clinical practice for patients with otitis externa,

otitis media with or without perforations, and infected mastoid cavities. Various studies have shown that topical antibiotics eardrops cause ototoxicity when used for longer than 7 days in patients with a tympanic membrane defect. After the discharge has stopped, these eardrops should be discontinued in the presence of healthy middle ear mucosa (19,20)

Conclusion

Medical management of tubo-tympanic type of CSOM by frequent aural cleaning with dilute acetic acid irrigation with topical antibiotics can be more desirable choice as compared to the suction clearance with topical antibiotics. Because acetic acid is safe and economical without producing any side effects. Alteration of pH of ear canal is one of the main factor for healing, in addition to mechanical disruption of biofilm and removal of deep seated debris in poorly vascularized sites such as bones. So, acetic acid alters the pH of the ear from alkaline to slightly acidic, which will prevent the growth of microorganisms. The present study is a comparative study to show duration of days to get dry ear and healed TM with dilute acetic acid irrigation with topical antibiotics when compared to suction clearance with topical antibiotics. However, this study had the limitations of relatively short follow-up duration (every 3 days for the patients who were treated with acetic acid irrigation). In spite of these limitations, the present study demonstrated a significant results in early resolution of ear discharge, and healed TM in patients treated with acetic acid irrigation with topical antibiotics compared to those treated with suction clearance with topical antibiotics.

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