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IN PATIENTS WITH ACTIVE CHRONIC SUPPURATIVE OTITIS MEDIA, COMPARISON OF VINEGAR WASH AND CULTURE-BASED ORAL ANTIBIOTIC THERAPY

Otolaryngology

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ABSTRACT

Background: Chronic otorrhea in chronic suppurative otitis media (CSOM) has become a difficult task to treat for ENT specialists because of emerging resistance to the available antibiotics and patient's affordability for its cost. Also biofilms have been responsible for the chronicity of disease. Use of vinegar as an antiseptic and altering the pH of middle ear to treat otorrhea in CSOM needs to be studied. **Methods:**120 patients with active CSOM were recruited randomly for either vinegar wash or antibiotic therapy. Vinegar diluted with water in 1:1 ratio at pH 4 was used twice a day for 3weeks to one group. Oral antibiotics based on culture sensitivity report were given to other group for 3weeks. Both groups were followed up for a month and observed for resolution of ear discharge. **Results:** Pseudomonas (40%) and Staphylococcus aureus(25%) were the most common organisms detected. 96.2% of Pseudomonasand 50% of Staphylococcus aureusears became dry with vinegar wash. 81.67% of antibiotic group and 68.33% of vinegar group ears became dry in 3weeks. No statistically significant difference between vinegar wash and culture based oral antibiotic therapy in resolution of ear discharge was seen in active CSOM ($p > 0.05$). **Conclusions:** Management of otorrhea is long term in CSOM and vinegar can be used as an alternative to costly oral antibiotics for resolution of ear discharge in active CSOM. Two fold dilution of vinegar prevents chance of ototoxicity.

KEYWORDS

Otitis media, Acetic acid, Pseudomonas

INTRODUCTION

Chronic suppurative otitis media (CSOM) is one of the most common otological conditions encountered in day to day practice. 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.

CSOM is considered as a biofilm disease and it also explains the observed resistance to antibiotics.Medical management for resolution of otorrhea in active chronic suppurative otitis media is essential before surgery. Different treatment options like aural toilet, topical and systemic antibiotics are available. 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 antibiotic both orally and parenterally includes cost, adverse effects, toxic reaction and inconvenience for patients. The use of vinegar which is acetic acid as a medicine goes back to ancient times because of its antimicrobial properties. The objective of this study was to acidify the pH of middle ear with vinegar and compare its outcome with oral antibiotic treatment in CSOM to resolve chronic otorrhea.

METHODSA prospective study on 120 patients of active chronic suppurative otitis media attending the outpatient department of otorhinolaryngology at tertiary care hospital(Alluri sitarama raju of medical sciences , Eluru) in the year 2022-2024 were recruited. Patients who met the inclusion criteria were selected and randomly allotted to vinegar or antibiotic group.

Inclusion criteria were patients with active CSOM, age group between 20-60 years, patients who gave informed written consent for both the above treatment and willing for regular follow up

Exclusion criteria were CSOM cases who have not taken any antibiotics for a minimum duration of two weeks prior, those with symptoms and signs suggesting of complications, systemic illness like diabetes mellitus, chronic renal failure and immune compromised status, patients with other active focus of infection like acute rhinosinusitis.

Patients with ear discharge more than 3 months with tympanic membrane perforation on examination were selected.

Bone conduction of the ear repeated after 4weeks.Ototoxicity of vinegar was assessed based on the definition and criteria for it established by the American Speech-language-Hearing Association (ASHA) i.e. defined as: (a) 20 db or greater decrease in pure tone threshold at one frequency, (b) 10 db or greater decrease at 2 adjacent frequencies, or (c) loss of response at 3 consecutive test frequencies in which responses were previously obtained.Based on the culture sensitivity report, oral antibiotic therapy was given to another group for three weeks.

Few topical antibiotic preparations have acidic pH hence use of topical antibiotics was not considered in this study. Patients of both groups were followed up weekly for 4weeks. After 4 weeks any persistent discharging ear was considered as failure of treatment. Statistical analysis was done with SPSS v20 software. Chi square test was applied.

RESULTS

Age of 60% of the CSOM patients were less than 30years as given in Table 1. Mean age for antibiotic group found to be 31 with standard deviation of 15.16 years. Vinegar group found to have mean age of 27.97 with standard deviation of 12.43years. Chi square test was used and value noted as 1.0692 with $p=0.7842$. Since $p > 0.05$, both antibiotic and vinegar groups were comparable. 30 males and 30 females in antibiotic group whereas vinegar group 34 males and 26 females were distributed. Chi square test done and value found to be 0.5364 with p value=0.46. Hence no statistical difference in gender distribution observed.

Table 1: Age Distribution Of Patients In Antibiotic And Vinegar Groups.

Age group (years)	Antibiotic group (n)	%	Vinegar group (n)	%	Total (n)	%
21-30	17	28.33	15	25	32	26.6
31-40	17	28.33	20	33	37	30.83
41-50	11	18.33	13	21.6	24	20
51-60	15	25.01	12	20	27	22.5
Total	60	100	60	100	120	100

Chi-square= 1.0692 p = 0.7842
Mean age = 31; SD =13.

113 (94.17%) cases were of tubotympanic type (TTD) and 7 cases (5.83%) were of Atticoantral disease (AAD). Among TTD cases, 59 and 54 cases were distributed in antibiotic and vinegar group

respectively. Chi square test with Yates correction applied. Chi square value was 2.4227 with p =0.1191. As p value >0.05, effects of two treatments in both types of CSOM were comparable.40% Pseudomonas followed by 25% Staphylococcus aureus were the most common organisms detected in culture sensitivity. 10.9% of the CSOM cases had a mixed growth, 6.7% Klebsiella, 5.8% coagulase negative Staphylococcus (CoNS), 2.5% E. coli, 0.8% Proteus, 0.8% Providencia were other organisms cultured. 2.5% non-fermentative gram negative bacilli were cultured for which species typing could not be done at our set up. 58.33% of the organisms were gram negative and 30.83% were gram positive organisms. Antibiotic sensitivity of various organisms detected in this study shown in descending order as follows and also given in Table 2.

Pseudomonas: ceftazidime > amikacin > imipenem > gentamicin > ciprofloxacin > levofloxacin > piperacillin+ tazobactum. Staphylococcus aureus: clindamycin > erythromycin > ciprofloxacin > amoxicillin+clavulanic acid.

Klebsiella: gentamicin > ciprofloxacin > ceftriaxone. Coagulase negative Staphylococcus: amoxicillin+clavulanic acid = clindamycin = ciprofloxacin.

Citrobacter: gentamicin > ciprofloxacin > cefotaxime and amoxicillin+ clavulanic acid.

Table 2: Antibiotic Sensitivity Of Various Organisms In CSOM (in terms of number of cases)

Organism	Am	Tx	Ak	Av	Cu	Cx	Pi	Cp	Px	Er	Cz	Ox	Ci	Cz	Lx	Ct	Ci	Az	Cx	Gn	Im
Pseud	-	-	-	15	14	-	27	-	32	6	12	15	14	15	18	10	2	15	37	18	28
Staph	-	5	4	-	-	15	18	4	2	5	14	-	-	-	-	-	14	-	-	14	-
Kleb	-	-	-	14	-	17	15	15	-	1	1	1	1	1	10	15	14	16	17	2	5
Cons	-	-	-	15	2	05	5	5	3	2	1	5	-	2	5	-	5	6	5	1	5
Citro	5	4	5	-	-	-	2	14	14	05	15	14	-	-	2	5	5	7	4	4	-
NGNB	-	1	5	2	1	5	4	1	1	8	3	-	8	4	1	-	5	-	-	-	-
Ecoli	-	1	1	2	4	4	7	5	4	1	8	-	4	-	-	-	-	-	-	1	1
Prot	-	4	5	4	4	1	8	5	4	9	1	1	1	4	4	8	-	1	-	-	-
Prov	-	-	-	-	-	12	14	15	-	18	04	18	1	1	1	1	5	1	1	1	-
Total	5	15	20	52	25	49	100	64	51	55	59	54	29	28	41	39	50	46	64	41	39

Am- Ampicillin, Tx- Cefotaxime, Ak-Amikacin, Av-Amoxicillin+clavulanate, Cu-Cefuroxime, Cx-Ciprofloxacin, PiPiperacillin+tazobactum, Cp-Cefoperazone, Px-Pefloxacin, Er-Erythromycin, Cz-Ceftazidime, Ox-Ofloxacin, Cl-Clindamycin, Cdcefpodoxime, Lx-Levofloxacin, Ct-Cefoxitin, Ci-Cefepime, Az-Azithromycin, Cx-Ceftriaxone, Gn-Gentamicin, Im-Imipenem, PseudPseudomonas, NGNB- Nonfermentative gram negative bacilli, Klebs- Klebsiella, Provi- Providencia, CoNS- Coagulase negative staphylococcus, Citro- Citrobacter

Decreasing order of organisms sensitivity are piptaz>ciprofloxacin and cefaperazone>ceftazidime and pefloxacin>amoxy-clavunate. Highest resistance observed to ampicillin followed by cefoxitin and erythromycin .

96.2% of the Pseudomonas and 50% of the Staphylococcidetected TTD cases became dry with 3weeks of vinegar wash as in Table 3. Other organisms were few and hence their results were not significant. Only 3 cases (5%) of active CSOM cases showed worsening of bone conduction at 3 consecutive frequencies after 3 weeks of vinegar wash.

Table 3: Results Of Vinegar Wash In Tubotympanic Disease.

Organism	Dry ear(%)	Improved(%)	Fail(%)
Pseudomonas	96.2	3.8	0
S.aureus	50	14.3	35.7
Klebsiella	33.3	33.3	33.3
CONS	66.7	33.3	0
Citrobacter	66.7	33.3	0
NGNB	50	50	0
Mixed	0	33.3	66.7

CoNS- Coagulase Negative Staphylococcus, NGNB Nonfermentative gram negative bacilli

Table 4: The Final Analysis Of Two Groups (antibiotic And Vinegar) In Active CSOM.

Results	Antibiotic group n	%	Vinegar group n	%	Total n	%
Dry	49	81.6	41	68.33	90	75
Improved	5	8.33	11	18.33	16	13.67
Fail	6	10	8	13.33	14	11.33
Total	60	100	60	100	120	100

Chi-square= 3.2473; P = 0.1972

83% of the active TTD cases became dry when treated with culture based oral antibiotic therapy for 3weeks. 73.7% of the Pseudomonas and 81.3% of the Staphylococcus infected ears became dry.Out of 6 AAD cases, 3 cases became dry following vinegar treatment. One AAD case with mixed growth was treated with antibiotic therapy but ear failed to become dry. Hence vinegar wash has a role in reducing the ear discharge in AAD. Pseudomonas cases responded better to vinegar when compared to antibiotics. Out of 11 cases with granulation, in 6 cases granulation disappeared after vinegar wash. Chi-square =1.9057; p= 0.1689. No statistically significant difference was observed in reduction of granulation with vinegar and antibiotic treatment in CSOM (p >0.05).Two modes of therapy in CSOM were compared. 81.67% of the vinegar wash treated ears and 75% of culture based antibiotic treated ears became dry as given in Table 4. Chi-square value=3.2473 and p =0.1972. As p >0.05, we concluded that no statistically significant difference between antibiotic therapy and vinegar wash seen in active CSOM.

DISCUSSION

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 present study was conducted with an intention to know the role of systemic antibiotics and vinegar wash in the management of chronic otorrhea in CSOM.Chronic suppurative otitis media found common in age group less than 30years in this study. Due to increased susceptibility of people in this age group it has become a burden to people and economy of country like India.Since 1993 Pseudomonas is the most common organism detected in CSOM in Indian scenario.3-8 Pseudomonas(40%) followed by Staphylococcus aureus (25%) were the most common organisms in our study which is similar to previous studies. Gram negative infections (69.2%) were more common than gram positive infections (30.8%). Pseudomonas to ceftazidime, Staphylococci to clindamycin, Klebsiella and Citrobacter to gentamicin and coagulase negative Staphylococcus to amoxicillin+clavulanate were the highest sensitivity pattern of organisms detected in our cases.The present study showed decreasing order of organisms sensitivity are piptaz>ciprofloxacinandcefaperazone>ceftazidimeandpefloxacin>amoxy-clavunate. Highest resistance observed to ampicillin followed by cefoxitinandery thromycin.

Table 5: Results Of Vinegar Wash For Tubotympanic CSOM In Various Studies.

Year	2024	2015	2010	2006	1996	1975
Study	Present	Gupta (14) et al	Choi HG (15) et al	Somayaji (13) et al	Aminifarshid(17) et al	Malik(16) et al
Dry	70.4%	84%	79.5%	96.7%	57%	40%
Fail	14.8%	16%	15%	3.3%	8%	20.4%

Hence vinegar wash can be tried as a first line of management in active uncomplicated CSOM. Culture based oral antibiotic therapy had 83% improvement and 8.5% failures in resolution of otorrhea. In the study by Gupta et al where empirical treatment with topical and systemic antibiotics was used in CSOM, 60.04% of ears became dry and 39.96% failed.12 This shows culture based oral antibiotic treatment has significant improvement than empirical treatment in CSOM. Hence antibiotics to be advised based on culture sensitivity report, judiciously

to avoid future resistant strains.Vinegar wash can be added in the first line management of active CSOM tubotympanic cases especially with cultures showing Pseudomonas and Staphylococcus aureus. Vinegar helps in reduction of granulation in CSOM. Chances of ototoxicity are less with diluted vinegar in the ratio 1:1. However, further studies has to be conducted on standardisation of the vinegar treatment in terms of dilution, type of vinegar (synthetic or fruit based), duration of therapy, pH and long term sequelae of vinegar wash like ototoxicity.

CONCLUSIONS:

Management of otorrhea is long term in CSOM and vinegar can be used as an alternative to costly oral antibiotics for resolution of ear discharge in active CSOM. Two fold dilution of vinegar prevents chance of ototoxicity.

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