COMPARISON BETWEEN THE EFFICACY OF TOPICAL CIPROFLOXACIN WITH NEOMYCIN IN THE MANAGEMENT OF CHRONIC SUPPURATIVE OTITIS MEDIA

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ABSTRACT

Objective: To compare the efficacy of topical Ciprofloxacin with Neomycin in the management of Chronic Supportive Otitis Media (CSOM).

Study Design: Randomized Clinical Trial (RCT).

Place and Duration of Study: Combined Military Hospital (CMH), Peshawar from Jan 2013 to Dec 2013

Patients and Methods: A total of 186 patients with the diagnosis of chronic suppurative otitis media were included in the study. Patients were randomly allotted to either group I that was treated by topical Ciprofloxacin eardrops (n = 93) or to group II, treated by topical Neomycin eardrops (n = 93). Outcomes were measured by disappearance of discharge and congestion at follow-up examination. SPSS 16 was used for data analysis .Chi square test was used for analysis and p-values less than 0.05 were considered significant.

Results: Topical ciprofloxacin is more effective in earlier control of congestion and discharge of ear in CSOM; (*p* value = 0.001 and < 0.005 respectively) as compared to Neomycin.

Conclusion: Topical Ciprofloxacin is a better drug for the treatment of CSOM as compared to topical Neomycin.

Keywords: Chronic Suppurative Otitis Media (CSOM), Topical Ciprofloxacin, Topical Neomycin.

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INTRODUCTION

CSOM is a major cause of discharge and acquired hearing impairment[1]. Existence of CSOM has been documented since prehistoric times. It causes recurrent or persistent discharge (otorrhoea) through a perforation in the tympanic membrane, can lead to thickening of the middle ear mucosa, mucosal polyps and cholesteatomas[2-5]. The World Health Organization (WHO) definition requires only two weeks of otorrhoea, but otolaryngologists tend to adopt a longer duration, i.e. more than 3 months of active disease. Hearing impairment resulting in poor scholastic performance commonly occurs as a result of CSOM. Acute mastoiditis and fatal intracranial complications, though rare in developed countries due to better medical facilities are relatively common in third world countries[6, 7].

There are two types of CSOM. First is tubotympanic type, which is characterized by persistent or recurrent infections ascending via the eustachian tube to the middle ear thereby causing infection and subsequent perforation in pars tensa[3, 4]. It is unlikely to give rise to serious complications thus regarded as safe type of CSOM. Second is Atticoantral or Tympanomastoid type, involving pre-dominantly the attic and antral region of the middle ear cleft. It is usually associated with cholesteatomas or other suppurative complications[8, 9].

Early and effective topical treatment based on the knowledge of causative micro organisms and their sensitivity results in good clinical recovery and prevents from damage and complications[10,11]. The most frequently isolated organism in active chronic suppurative otitis media is Pseudomonas Aeruginosa[12] (gram negative), which is sensitive to Fluoroquinolones[13-15].

Ototopical antibiotic agents are more effective then systemic antibiotics and are extensively used for CSOM[16].Quinolone and Neomycin both have been considered suitable as topical antibiotics for the treatment of

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CSOM[17].The clinical trials showed that topical 0.6% ciprofloxacin solution is effective with 89% bacterial eradication whereas 0.5% topical Neomycin is effective with 75% bacterial eradication in patients of CSOM[18,19].

No significant work has been done locally on this subject and because of non compliance of medicines for longer duration in our society; a drug that achieve its effects quickly should be prescribed. This study is being done with the purpose to compare the effects of Ciprofloxacin eardrops with Neomycin eardrops, in the management of CSOM in our setup.

MATERIAL AND METHODS

This was a randomized clinical trial done in CMH Peshawar from Jan 2013 to Dec 2013. After obtaining approval from the hospital ethical committee, diagnosed patients of Tubotympanic Type of CSOM were included. Patients were divided into two groups ,Group 1 was advised to use Ciprofloxacin Ear Drops in standard dosage(Cipotec ear drops® ,3 drops BD). Group 2 was advised Neomycin Ear Drops in standard dosage (Neosporin ear drops,® 2 drops BD).

Patients were assessed for the amount of discharge and the degree of congestion initially, after 2 weeks and finally after 4 weeks.Amount of discharge was graded as

Category 0=No discharge.

Category1= Discharge confined to middleear cavity

Category2= Discharge partially filling external auditory meatus.

Category 3= Discharge completely filling external auditory Similarly the degree of congestion was graded as No congestion=

0 (Normal Skin, colored External, Auditory Canal, (EAC)

Mild congestion= (Erythematous EAC)

Severe congestion=2 (Erythematous EAC with granulations or pus)Efficacy was measured in terms of absence of discharge from middle ear cavity and no inflammation/congestion in middle ear mucosa and tympanic membrane at 4th week of treatment.

All patients above 12 years irrespective of gender ,with a diagnosis of Tubotympanic type of CSOM were included .Immunocompromised or diabetic patients, patients having hypersensitivity to neomycin or quinolone or having any other ENT pathologies like tonsillitis, symptomatic DNS or sinusitis and pregnant females were excluded from the study. 200 patients fulfilling the inclusion criteria were included in the study and assigned to one or the other group based on consecutive non probability sampling.

Statistical analysis was done using statistical package for social sciences (SPSS) version 16. Demographic data was analyzed using descriptive analysis of the SPSS. Chi square test was used for analysis and *p*-value less than 0.05 was considered significant.

RESULTS

Of the 200 patients included in the study 14 were lost to follow up. Data of 186 patients is presented (93 in each group). Sixty six percent of our study group was resident of Khyber Pakhtun Khawa (KPK) while rest belonged to Punjab (31%) and Sindh (2.7%).82% were males and 18% females.The age of patients varied from 12 to 70 years with a mean age of 38 years. Right ear was affected in 40%, left ear in 52% while 8% of the patients had bilaterally affected ears, as shown in table-1.

The most common symptoms noted in this study were ear discharge and itching. On first presentation, in Group 1, 53 patients (47%) had marked/severe congestion and 40 patients had mild congestion. On review 86 patients (92%) had no congestion and 07 had mild congestion (Table-2).In Group-1, discharge was completely filling the external auditory meatus (EAM) in 78 (84%) patients initially while the rest had discharge confined to middle ear or partially filling the EAM.*p*-value for congestion and discharge was not significant for both groups at baseline (0.228 and 0.092 respectively) .After 4 weeks 91 (98%) patients had a dry EAM while 92% had no congestion at the end of 4 weeks table-2.

With regards to Neomycin group, Our results showed that ciprofloxacin ear

Table-1: Demographical data of the patients

		N(186)
Sex	**Male**	**152(81.7%)**
	Female	34(18.3%)
Affected ear	Right	74(39.5%)
	Left	97(52.3%)
	Both	15(8.2%)
Location	KPK And FATA	123(66.1%)
	Punjab	58(31.2%)
	Sindh	5(2.7%)
	Balochistan	0

Table-2: Baseline and 4th week review of congestion and discharge of the both group.

	Duration	Baseline		4th week	
Congestion	Group of patients	I	II	I	II
	No Congestion	-	-	86 (92%)	39 (42%)
	Mild congestion	40 (43%)	32 (34%)	79 (8%)	54 (58%)
	Marked congestion	53 (47%)	61 (66%)	-	-
	p- value	0.2285		< 0.001	
Discharge	**No discharge**	**-**	**-**	**91(98%)**	**81 (87%)**
	Confined to middle ear	4 (4%)	5 (5%)	2 (2%)	12(13%)
	Partially filling EAM	11 (12%)	22 (24%)	-	-
	Completely filling EAM	78 (84%)	66 (71%)	-	-
	p-value	0.0917		0.005	

Table-3: Comparison of efficacy in terms of congestion and discharge in both groups.

	Efficacy in terms of congestion		Efficacy in terms of discharge	
	Group I	Group II	Group I	Group II
Yes	n=86 (92%)	n=39 (42%)	n=91 (98%)	n=81(87%)
No	n=07 (08%)	n=54 (58%)	n=02 (02%)	n=12(13%)
p-value	< 0.001		< 0.005	

61patients (66%) had marked/severe congestion while the rest had mild congestion on initial presentation. On review 39(42%) patients had no congestion while 54 patients (58%) had mild congestion (Table 2). Initially, discharge completely filled the EAM in 66(71%) patients.After 4 weeks of treatment, 81(87%) patients had a dry EAM. Detailed data is shown in table-2.

In our study, there is a significant difference between topical Ciprofloxacin and Neomycin both in terms of congestion, p- value <0.001 and discharge, *p*- value <0.005 as shown in table-2.

drops were 92% effective in reducing congestion and 98% effective in reducing discharge as compared to neomycin ear drops which were 42% and 87% effective($p<0.005$) respectively. Therefore ciprofloxacin ear drops are more efficacious as compared to neomycin for control of ear discharge and congestion table-3.

DISCUSSION

Chronic suppurative otitis media (CSOM) is a chronic inflammation of the middle ear and mastoid cavity presenting with ear discharge or otorrhoea through a non-intact tympanic membrane[1, 2].

CSOM is the most common cause of childhood hearing impairment in developing countries[7]. Accurate diagnosis depends on a high index of suspicion, micro-otoscopic examination and judicious use of imaging as required[3, 5].

Although, its incidence has fallen in the developed world, but in developing countries, the CSOM and its sequelae still account for a major proportion of the clinical workload. Complications result from the associated hearing loss and the social stigma of an often fetid fluid draining from the affected ear. The mortality of CSOM arises from associated intracranial complications[7].

Diagnosis depends upon reliable history taking. The main symptom is prolonged (>3 months) painless otorrhoea. Another common symptom is hearing loss in the affected ear. Adequate examination of a discharging tympanic perforation will confirm the diagnosis[9].An audiogram usually shows conductive hearing loss. Bacterial cultures may not be necessary to establish the diagnosis of CSOM since 90–100% of chronic draining ears yield two or more isolates of both aerobic and anaerobic bacteria. Early and effective treatment based on the knowledge of causative micro organisms and their sensitivity, results in good clinical recovery and prevents from damage and complications[10,11]. The most frequently isolated organism in active chronic suppurative otitis media is Pseudomonas Aeruginosa[12], which is sensitive to Fluoroquinolones[13,14].Staphylococcus Aureus is the second most common organism isolated from chronically diseased middle ears[12].

Patients with CSOM respond more frequently to topical rather than systemic therapy. Topical drugs can produce concentrations many times greater in the targeted tissue than those possible using systemic treatment[16].

Neomycin is used most often because of its low cost and reliable activity against gram-negative aerobes. Ototoxicity is a possible adverse event associated with topical use but there are few documentary incidences of such events, despite extensive usage. Animal studies and human clinical trials report this risk at about 1 in 3000 ears. The danger of potential ototoxicity in using aminoglycosides like gentamicin necessitates a search for potentially safer alternatives[20].

Ciprofloxacin is a second generation FDA approved quinolone for treatment of CSOM in adults. Ototopical Ciprofloxacin has several advantages over Neomycin. It has the advantage of having pH of 6.5, so it does not burn on administration. Its systemic absorption from topical usage is minimal, suggesting a low possibility of inducing systemic toxicity. Thus, the adverse reactions to topical Ciprofloxacin are generally mild[17].

Our study showed that ciprofloxacin is more effective than neomycin both in terms of reducing congestion and discharge, *p*-value <0.005; furthermore, the patient achieves symptomatic resolution earlier if treated with ciprofloxacin. These results are comparable to the Meta analysis published in the British Medical Journal by Acuin JM in 2000. The authors concluded that topical antibiotics were superior to systemic agents; moreover topical fluoroquinolones were more effective than other topical antibiotics[3, 21].

A similar Cochrane systematic review done by Macfadyen CA and colleagues, have shown that quinolone ear drops are more effective than non-quinolone agents (without steroids) both in reducing ear discharge and in eradicating bacteria[17, 22].

Another study done by Kutz JW in 2013 concluded that newer combination preparation containing Ciprofloxacin and Dexamethasone should be the first line of treatment for otorrhoea with perforation. It not only achieves better bacterial eradication but also reduces granulation tissue formation while avoiding the potential ototoxicity associated with aminoglycoside ear drops[23].

The adverse affect noted in this study was irritation in EAM in few patients. It was experienced on the first instillation of drops in the ear, which was relieved on decreasing the number of drops. None of the patients, in both groups, complained of aggravating loss of

hearing, dizziness, vertigo, ataxia, nausea and vomiting, during or after the completion of treatment.

CONCLUSION

Topical Ciprofloxacin solution is clinically more effective in the treatment of chronic suppurative otitis media in comparison with Topical Neomycin. It achieves control of discharge and congestion earlier, well tolerated, with minimal adverse effects. It should be considered as an initial choice for topical antibiotic because of its broad spectrum and low adverse effect profile with minimal toxicity.

CONFLICT OF INTEREST

Abstract and results of this study were accepted and presented in an oral presentationat the International conference on Medical Education, organised by Association for Excellence in Medical Education (AEME) and held on 07th-09th March 2014 at University of Health Sciences (UHS) Lahore, Pakistan. No funding was received from any agency or institution.

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