

# COMPARATIVE STUDY OF AURAL PACKING WITH ANTIBIOTIC AND STEROID CREAM WITH ANTIBIOTIC AND STEROID EAR DROPS IN ACUTE OTITIS EXTERNA

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## ABSTRACT

Acute Otitis Externa (AOE) is a common inflammatory condition of the external auditory canal, typically presenting with acute pain, itching and swelling. Treatment usually involves topical antibiotic-steroid therapy, delivered either as aural packing or ear drops. However, the comparative effectiveness of these two methods in relieving pain has not been well established. This study aims to compare the effectiveness of antibiotic-steroid aural packing versus antibiotic-steroid ear drops in reducing pain among patients with AOE. A comparative prospective study was conducted at Nepal Medical College Teaching Hospital from January to June 2025. A total of 112 adults with clinically diagnosed AOE were enrolled and randomized into two groups: Group 1 received neomycin-betamethasone aural packing, and Group 2 received the same medication in ear drop form. Pain was assessed using the Numerical Rating Scale (NRS) on Day 0, Day 3, and Day 7. Both groups showed significant reductions in pain from baseline to Day 3 and Day 7 ( $p < 0.001$ ). Mean pain scores at Day 0, Day 3, and Day 7 were 7.91, 2.43, and 0.05 in Group 1, and 7.54, 2.29, and 0.05 in Group 2. No statistically significant differences were found between groups at any time point ( $p > 0.05$ ). Antibiotic-steroid aural packing and antibiotic-steroid ear drops are equally effective in relieving pain in acute otitis externa. Given the similar outcomes and greater ease of use, ear drops may be preferred as first-line therapy, while packing may be reserved for cases with severe canal edema or poor drop penetration.

## KEYWORDS

Acute otitis externa (AOE), external auditory canal, aural packing

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## INTRODUCTION

Acute Otitis Externa (AOE), commonly referred to as swimmer's ear, is a frequent and often painful condition characterized by inflammation of the external auditory canal. It is typically caused by bacterial or fungal pathogens that thrive in the warm, moist environment of the ear canal. The condition is marked by edema, erythema, and irritation of the canal, which together lead to symptoms such as pain, itching, swelling, and varying degrees of otorrhea.<sup>1</sup> AOE can be classified into diffuse or localized forms, depending on the extent of inflammation within the external auditory canal.

The pathophysiology of AOE is closely related to the unique anatomy of the external ear. The skin lining the canal is tightly adherent to the underlying cartilage, leaving little room for expansion. As a result, even a modest amount of inflammatory edema can stretch the richly innervated canal, eliciting significant discomfort. Because this stretch directly affects the sensory nerve fibers, patients often report severe otalgia that is disproportionate to visible external findings.<sup>2</sup>

Clinically, AOE is diagnosed through a combination of presenting symptoms and physical examination. Patients typically present with acute-onset earache, pruritus, ear discharge, and in some cases, conductive hearing loss due to swelling or obstruction of the canal.<sup>3</sup> A hallmark of the condition is tragal tenderness, manifested as pain when the tragus is pressed or when traction is applied to the pinna. This finding helps differentiate AOE from middle-ear pathology and is considered a reliable diagnostic indicator.<sup>4</sup>

Management of AOE involves both symptomatic relief and eradication of infection. Systemic analgesics are commonly used to manage pain, while topical therapies remain the mainstay for treating the underlying infection and inflammation. Traditionally, treatment includes aural packing, which serves as a mechanical splint to prevent further nerve stretching caused by swelling. One commonly used material is 10% Ichthammol Glycerin-impregnated packing, valued for its antiseptic and hygroscopic properties. This preparation reduces canal edema by drawing out excess fluid and also possesses specific antistaphylococcal activity, making it beneficial in cases involving bacterial pathogens.<sup>5,6</sup>

In addition to traditional preparations, antibiotic-steroid combination therapies are

widely used in modern clinical practice. The rationale behind these combinations lies in their dual action: antibiotics target the causative microorganisms while corticosteroids reduce inflammation by acting on capillary wall tone and decreasing vascular permeability. Numerous studies have compared various combinations of otological antibiotics and corticosteroids in an effort to determine the most effective regimen for symptom control and microbial eradication.<sup>7-12</sup> Evidence consistently demonstrates that combination therapy provides superior symptomatic relief compared to antibiotic-only or steroid-only formulations.<sup>13,14</sup> Neomycin/polymyxin B/hydrocortisone preparations are a reasonable first-line therapy when the tympanic membrane is intact. Patients often experience faster reductions in pain, swelling, and discharge when treated with these combination drops, reinforcing their role as first-line therapy.<sup>15</sup>

Despite the effectiveness of ear drops, the use of aural packing remains common in many clinical settings, particularly in cases with significant canal edema that prevents adequate penetration of topical medications.<sup>16</sup> However, the relative effectiveness of antibiotic-steroid aural packing compared to antibiotic-steroid ear drops has not been uniformly established, creating a need for comparative evaluation in therapeutic decision-making.

The primary aim of this study is therefore to compare the effectiveness of antibiotic-steroid aural packing versus antibiotic-steroid ear drops in relieving pain associated with AOE. By evaluating pain reduction as the principal outcome measure, this study seeks to determine whether the traditional method of medicated packing offers any advantage over modern otological drop therapy, thereby guiding clinicians toward the most efficient and patient-friendly management strategy for AOE.

## MATERIALS AND METHODS

This comparative prospective study was conducted in Nepal Medical College Teaching Hospital, Department of Otorhinolaryngology and Head and Neck Surgery over a period of six months from January 2025 to June 2025. The study aimed to compare the effectiveness of aural packing with antibiotic and steroid cream versus antibiotic and steroid ear drops in the treatment of AOE.

All patients aged 18 years and above who presented to the ENT outpatient department with a clinical diagnosis of AOE and who

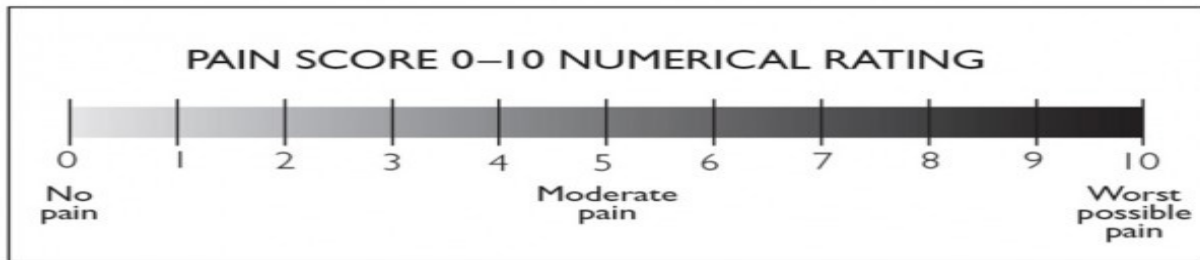


Fig. 1: Pain Score 0-10 numerical rating

provided informed consent were considered eligible for inclusion. Patients were excluded if they had coexisting ear diseases, such as otomycosis or chronic otitis media, a perforated tympanic membrane, known allergy to the study medications, or if they were pregnant or breastfeeding. Individuals unwilling to participate and those below 18 years of age were also excluded. Participants underwent detailed ear examination and assessed tragal tenderness and circumduction test.

The minimum required sample size was calculated to be 56 participants per group (Group 1: Aural packing and Group 2: Ear drop), based on a prevalence of AOE of 17.5%,<sup>17</sup> a 95% confidence interval, and a precision of 10%. Eligible participants were enrolled consecutively and then randomized into two groups using an odd-even sampling method. Patients with odd serial numbers were assigned to Group 1, while those with even serial numbers were assigned to Group 2.

Group 1 underwent aural packing using an ointment formulation containing neomycin and betamethasone. The packing was performed by an ENT faculty member, and patients were advised to return for follow-up on Day 3 and Day 7 for evaluation and pack change. Group 2 received neomycin and betamethasone ear drops, which were prescribed to be instilled three drops two to three times daily for seven days. Similar to Group 1, follow-up evaluations were conducted on Day 3 and Day 7. At each visit, patients underwent a detailed ear examination, and relevant clinical findings were recorded. Pain was assessed on Day 0, Day 3, and Day 7 using the Numerical Rating Scale (NRS).<sup>18</sup> Demographic information, clinical symptoms, and pain scores were documented in a standardized data collection proforma.

Data were entered and analyzed using SPSS version 16. Descriptive statistics, including frequency distributions, means, and standard deviations, were used to summarize the data. Differences between the two groups were analyzed using appropriate statistical tests such as the independent t-test depending on

data distribution. A p-value of less than 0.05 was considered statistically significant.

Ethical approval for the study was obtained from the Institutional Review Committee (IRC) of Nepal Medical College Teaching Hospital. (Ref. No.: 37-081,1082) Informed consent was taken from all participants, and confidentiality of data was ensured.

## RESULTS

A total of 112 patients were enrolled in the study, comprising 55 males (49.1%) and 57 females (50.9%), with a male-to-female ratio of 1:1.03. The age range was 18-60 years, with a mean age of  $30.42 \pm 10.77$  years. The distribution of patient according to the age group was shown in Fig 1 which showed the disease was more common in 18-30 years age group followed by 31-45 years and 46-60 years age group.

Out of 112 patients, 56 with odd numbers were assigned to group 1 who received antibiotic-steroid pack and 56 with even numbers as group 2 who were given antibiotic- steroid drops. The average duration of pain during presentation among included patient was  $3.54 \pm 2.95$  days. The overall mean pain score was  $7.72 \pm 1.03$  with maximum 9 and minimum 6 at day 0.

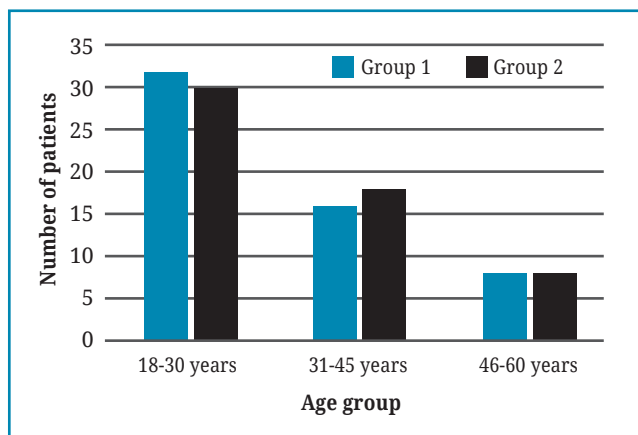


Fig. 2: Distribution of patient according to age group

**Table 1: Mean pain score and comparison between and among groups**

	Mean pain score			Comparison of means using Paired sample T-test (p-value)		
	Day 0	Day 3	Day 7	Day 0 and Day 3	Day 3 and Day 7	Day 0 and Day 7
Group 1 (antibiotic-steroid pack)	7.91	2.43	0.05	<0.001	<0.001	<0.001
Group 2 (antibiotic-steroid drop)	7.54	2.29	0.05	<0.001	<0.001	<0.001
Comparison of means using Independent sample T-test (p-value)	0.06	0.5	1			

The mean pain scores at day 0, day 3 and day 7 were  $7.91 \pm 1.13$ ,  $2.43 \pm 1.09$  and  $0.05 \pm 0.23$  in group 1 and  $7.54 \pm 0.89$ ,  $2.29 \pm 1.34$  and  $0.05 \pm 0.23$  in group 2 respectively. There was significant decrease in pain score from day 0 to day 3 and day 7 in both the groups which was statistically significant. However, the difference in mean pain scores between the two groups at day 0, day 3 and day 7 were not statistically significant (Table 1). These findings indicate that both the treatment modalities were equally effective and resulted in significant clinical improvement.

## DISCUSSION

AOE is a common clinical condition involving the inflammation of external ear canal usually caused by bacteria like *Pseudomonas* and *Staphylococcus*. It has a rapid onset and severe pain which follows after minor ear trauma from inappropriate cleaning and swimming.<sup>15</sup>

The treatment aims at reducing the pain and clearing the infection which is achieved by using analgesics and combination of topical antibiotic and steroid preparations.<sup>19</sup> In this study we tried to compare the effectiveness of different preparations of same antibiotic and steroid as ear pack and ear drop formulations for relieving pain in the management of AOE.

In our study, 112 patients were enrolled, comprising 55 males (49.1%) and 57 females (50.9%), with a male-to-female ratio of 1:1.03. This finding is similar to the other studies done by Adegbiyi *et al.*<sup>17</sup> Salim *et al.*<sup>20</sup> who found the male-to-female ratio of 1:1 and 1:1.1 respectively. This shows that the both gender are equally susceptible to the disease.

In this study the disease was more common in 18-30 years age group followed by 31-45

years and 46-60 years age group respectively which is similar to the study done by Adegbiyi *et al.*<sup>17</sup> who found the peak age group of 20-30 years. Whereas the other studies done by Sabarinath *et al.* 2024<sup>21</sup> and Salim *et al.*<sup>20</sup> found the disease was more common in 31-50 years and 26-45 years age group respectively. This difference may be due to different geographical distribution of the studied population.

The present study compared the effectiveness of antibiotic-steroid aural packing versus antibiotic-steroid ear drops in reducing pain among patients with AOE. Both treatment modalities demonstrated significant improvement from baseline to Day 3 and Day 7, with no statistically significant difference in pain reduction between the groups. These findings are similar to the study done by Sabarinath *et al.*<sup>21</sup> where there is reduction in pain with both modalities of treatment but they found higher degree of reduction with antibiotic-steroid ear packing. This may be due to addition of one more antibiotic (i.e. bacitracin zinc) in packing group which was not used in drop formulation. Similarly, Saha *et al.*<sup>22</sup> compared steroid-antibiotic aural pack with antibiotic ear drop in otitis externa and observed reduction in pain with both modalities of treatment with a higher degree of reduction with antibiotic-steroid ear packing. This higher degree of reduction in pain with packing group is due to the addition of steroid in pack.

These findings suggest that either approach may be used effectively in the management of AOE, and that traditional packing offers no measurable advantage over modern ototopical drop therapy in terms of pain control. This is also supported by the study done by Hornigold *et al.*<sup>23</sup> who has done a randomised controlled trial of a glycerol and ichthammol ribbon gauze

versus topical antibiotic and steroid drops but failed to show any difference.

The rapid decline in pain scores in both groups aligns with established knowledge that topical antibiotic-steroid combinations are highly effective in reducing inflammation and eradicating causative pathogens. Previous studies have consistently shown that combination therapy provides superior symptomatic relief compared with antibiotic-only or steroid-only regimens, owing to the synergistic effects of antimicrobial activity and inflammation reduction.<sup>7-14</sup> The comparable outcomes observed in both groups reinforce the central role of topical corticosteroids in alleviating canal edema and nociceptive stimulation, regardless of whether the medication is delivered through packing or drops.

The lack of significant difference between the two treatments may be explained by several factors. First, the antimicrobial and anti-inflammatory compounds used were identical in both modalities, suggesting that the pharmacological effects of the medication, rather than the mode of delivery, are primarily responsible for symptom relief. Second, although aural packing theoretically improves drug contact time and may mechanically splint the edematous canal, the high viscosity and adequate penetration of modern ear drop formulations may render packing unnecessary

in many cases. Third, patients receiving drops were able to administer the medication multiple times daily, potentially achieving therapeutic concentrations comparable to or exceeding that achieved by intermittent packing changes.

Historically, aural packing has been advocated in cases with significant canal edema to enhance medication delivery and prevent further narrowing of the canal. However, packing may cause discomfort, impede natural drainage, and require repeated clinic visits for changes.<sup>16</sup> Our findings support the growing evidence that routine packing may not be essential for effective management, especially when canal edema does not severely limit topical drug penetration. Several previous studies have similarly reported no additional benefit of packing over topical therapy alone, reinforcing our results.<sup>21-23</sup>

Given that both treatment modalities demonstrate equivalent effectiveness, clinicians may reasonably favor ear drops as first-line therapy due to their ease of use, lower cost, better patient comfort, and reduced need for follow-up visits. Packing may still have a role in selected cases, such as when canal edema prevents drop penetration or when patient compliance with self-administration is questionable.

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