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Is Antibiotic Steroid Ear Pack Better than Ichthammol Glycerin Pack in Patients With Otitis Externa? A Systematic Review

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Abstract

Background: Acute Otitis Externa (AOE) is a common condition in ENT practice, often treated with ear packs containing topical medications and, in severe cases, oral antibiotics. Ichthammol glycerin is a frequently used topical medication in developing countries due to its cost-effectiveness and availability. Alternatively, antibiotic-steroid ear packs have been employed, and several studies have compared the effectiveness of these treatments. This systematic review evaluates the outcomes of ichthammol glycerin packs versus antibiotic-steroid ear packs.

Results: The review included eight full-text articles, six of which found that antibiotic-steroid ear packs generally led to better outcomes, particularly in reducing pain and promoting recovery. The remaining two studies did not show significant differences between the two treatments.

Conclusion: While the review supports the use of antibiotic-steroid ear packs, there are limitations to consider. The number of studies comparing the two treatments is relatively small, and the majority of research has been conducted in specific demographic groups, which may limit the generalizability of the findings. Therefore, further research with larger, more diverse sample sizes is needed to validate these results and offer a clearer understanding of the most effective treatment for AOE. This would help clinicians make more informed decisions when choosing the best therapeutic approach for their patients.

Keywords: Cochlear Implantation; Tonotopy; Frequency Range; Bandpass Filtering; Threshold Level; Frequency to Place Mismatch.

Abbreviations: AOE: Acute Otitis Externa; EAC: External Auditory Canal; IG: Ichthammol Glycerin; ARS: Numerical Rating Scale; VAS: Visual Analogue Score

Background

Acute Otitis Externa, also known as 'Swimmer's ear' or 'Tropical ear' is defined as diffuse inflammation of the external ear canal which may also involve the pinna or the tympanic membrane. For otitis externa to be termed 'acute', the onset should generally be within 48 hours, in the past 3 weeks of symptoms and signs of ear canal inflammation [1]. The lifetime incidence of otitis externa is approximately 10% [2]. Acute Otitis Externa can present in two forms: Localized or Diffuse. Localized form presents with furunculosis in the ear canal. Diffuse form is the otitis externa mostly encountered in daily practice. The symptoms of ear canal inflammation are: Severe pain, itching, ear fullness, with or without hearing loss or jaw pain, intensified by jaw movement. On examination of the patient, there is tragal tenderness with pain on moving the pinna in all directions. Ear canal is swollen and edematous with or without regional lymph node inflammation [3]. A number of factors contribute to the etiology of otitis externa. These are: Aggressive cleaning of the ear, water exposure, trauma, irritant exposure, soapy deposits, sweating, wearing hearing aids, allergy, stress, etc. Warmer climates and humidity also play a role [4–7]. Cerumen is protective to the ear as it acts as a barrier to moisture and dust particles [8]. It has slightly acidic pH which helps in preventing infection but this is altered due to excessive cleaning and other etiological factors. This predisposes a patient to otitis externa.

Treatment of acute otitis externa consists of topical and systemic antimicrobial therapy with analgesics [1]. Topical antimicrobial therapy is administered via ear packs which act by its chemical constituent as well as splinting action of the edematous tissue. Of the various chemical compounds used, 10% Ichthammol glycerine has been used traditionally for ear packing. Ichthammol has antiseptic action and glycerine has hygroscopic action. This combination has anti-staphylococcal action [9,10]. Antibiotic steroid ointment is also used frequently for ear packs. Antibiotic component of the ointment controls infection and the steroid component reduces edema by its action on the capillary

wall tone of the ear canal. Numerous studies have been conducted to compare the effectiveness between ear packs. The studies are mostly randomized with various parameters used to measure outcome [11-19]. This study aims to systematically review the outcomes of Ichthammol glycerin and antibiotic steroid ear packs in patients with otitis externa.

Objective

To perform a systematic review to compare the effectiveness of Ichthammol glycerin pack in comparison to antibiotic steroid pack as treatment for acute otitis externa.

Methods

The manuscript was prepared according to the guidelines outlined in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement, ensuring a systematic and transparent approach to conducting and reporting the systematic review. Furthermore, prior to conducting the systematic review, a detailed protocol was developed and registered in the International Prospective Register for Systematic Reviews (PROSPERO). The protocol registration is identified by the unique Registration Number CRD42023393549.

Literature search

An author conducted a comprehensive literature search spanning the years 2008 to 2021 across multiple databases, including PubMed, Scopus and Google scholar. This systematic exploration aimed to identify relevant studies, articles, and scholarly works pertinent to the research topic. The details of the search terms employed by the author can be found in Appendix 1.

Eligibility criteria

All the studies in which the patients were diagnosed as otitis externa and underwent packing with 10% Ichthammol glycerin pack and any form of Antibiotic steroid pack were included. Both randomized and non-randomized clinical trials were included. Studies which used only antibiotic or steroid ointment, topical drops application or comparison with other forms of treatment were excluded from the study (Chart 1).

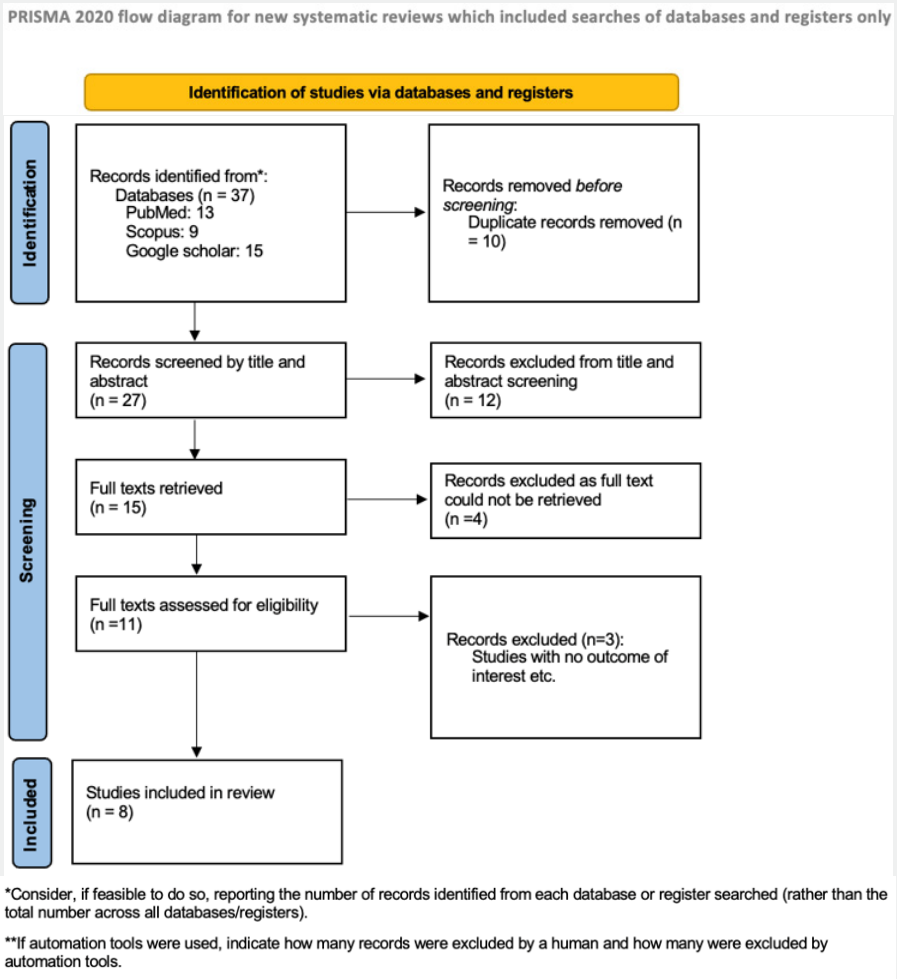

Chart 1: Comparisons

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Data collection and analysis

Two authors independently searched using the search strategy in different databases. Studies written in languages other than English were excluded. Duplicate studies were then removed. The remaining articles were then screened from title and abstract. Studies not fitting the inclusion criteria were excluded. Full texts of the screened articles were retrieved. Then, all the full texts were reviewed one by one and those studies with relevant study characteristics and outcome were extracted for inclusion by two independent authors. Studies with no outcome of interest were excluded. If there was disparity in any step of this process, discussion was conducted among all the authors and final decision was made based upon majority's decision.

Primary outcome

Pain was taken as the primary outcome. This was assessed after 48 hours of pack insertion.

6.5. Secondary outcome

a) Number of hospital visits: This was defined as number of follow up visits to the hospital until the pain subsided or there was no tragal tenderness.

b) EAC edema: This was taken as visible edema of the external auditory canal.

c) Debris/discharge: Presence or absence of debris and discharge was taken as a secondary outcome measure.

Risk of Bias within Studies

Risk of bias was assessed for all randomized control trial and non-randomized studies by two authors independently. For randomized control trial studies, Cochrane risk of bias tool for randomized trial version 2 (ROB 2) was used for assessment in 5 domains (randomization process, deviation from intended interventions, missing outcome data, measurement of outcome, selection of reported result), along with the overall risk of bias. For non-randomized study, ROBINS-I tool was used. If there were any disagreements during assessment, it was resolved by further discussion.

Summary Measures and Synthesis of Results

Information regarding the study (study details, country where study was conducted, aim, study design, sampling technique, sample size of population included and various outcome measures) were tabulated and a systematic narration was done. Risk of bias and quality of evidence were also summarized. GRADE (Grading of Recommendation, Assessment, Development and Evaluation) approach will be used to assess the certainty of the evidence for the eligible studies.

Decisions on meta-analysis were planned to be made on a consensus regarding the quality of evidence synthesized from systematic review. RevMan5 will be used to conduct meta-analysis on the basis of heterogeneity. Heterogeneity will be assessed by I square and accordingly, either fixed effect model or random effect model is planned to be used. Further, results will be calculated on the basis of the variable (dichotomous or continuous variable).

Results

Study selection and characteristics

We identified 37 studies from databases using the search strategy. All papers written in English language were included. 10 duplicate studies were then removed. 27 of the remaining studies were then screened for title and abstract. 12 articles were excluded after going through the title and abstract which was not in accordance with our inclusion criteria. Out of the 15 remaining articles, 11 full texts were found. These full texts were analyzed. 3 studies had no outcome of interest and were excluded. A critical review of the eight full-text articles included in the analysis is summarized in Table 1.

Table 1: Summarizing studies.

Study details/ Author	Adhikari, Prakash [18]	Bhatta, Rishi [11]	Jamalullah 2008	Khan [15]	Masood [13]	Raffat [16]	Shrestha Bl [12]	Shrestha Karuna [19]
Country	Nepal	Nepal	Pakistan	Pakistan	UK	Pakistan	Nepal	Nepal
Aim/ Objective	To compare clinical efficacy of 10% IG pack with steroid antibiotic pack	To compare clinical efficacy of 10% IG pack with steroid antibiotic pack in relieving pain of otitis externa	To compare the efficacies of 10% Icthammol glycerine and 3% Ciprofloxacin-1% Dexamethasone	To compare the efficacy of steroid antibiotic wick and IG wick in terms of tenderness and clearance of discharge/debris	To compare the efficacy of 10% GI and TAC (Triadcortyl) dressings	To compare the efficacy of 10% Ichthammol glycerin and 3% Ciprofloxacin-1% Dexamethasone for controlling pain associated with AOE	To compare the efficacy of treatment between steroid-antibiotic and 10% Ichthammol glycerin packs	To compare the efficacy of 10% Ichthammol Glycerine pack with steroid-anbioc ointment pack for relieving the pain in acute os externa.
Study Design	Prospective, clinical trial	Prospective	Quasi experimental study	Quasi-experimental study	Prospective	Cross-sectional study	Prospective	Prospective

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Sampling technique	Quasi-randomized sampling	Randomized	Random sampling	Random number table	Randomized using computerized random number generator	Randomized using lottery method	Randomized	Non-randomized
Population	Patients <=12 years of age (33: IG, 32: Steroid-antibiotic)	Patients of all age and gender (55: IG, 51: Steroid pack)	100 patients (50-IG, 50- Antibiotic Steroid pack)	Patients of both genders above 12 years of age (125-IG, 125- Antibiotic Steroid)	All adult patients (>=18 years) (32 for each group)	60 patients of age 12-60 years, of both gender	82 patients	94 patients
Intervention	Ear pack with Betnovate-N (Betnovate Sodium phosphate 0.1% and Neomycin sulphate 0.5%)	Ear pack with Antibiotic steroid pack (not specified)	Ear pack with 3% Ciprofloxacin- 1% Dexamethasone	Ear pack with Ciprofloxacin-Dexamethasone	TAC ointment in ribbon gauze	3% Ciprofloxacin-1% Dexamethasone wick	Betnovate-N (Betamethasone valerate and Neomycin)	Mupirocin and Beclomethasone
Comparator	10% Ichthammol glycerin pack (Glycerol: Ichthammol= 9:1)	10% Ichthammol glycerin pack	10% Ichthammol glycerin pack	Ichthammol Glycerin wick	10% GI solution	10% Ichthammol Glycerin wick	10% IG pack	10% IG ribbon gauge pack
Pain	Wong Baker scale	Wong Baker scale in children <12 years and Numerical Rating Scale in patients >12 years	Visual Analogue Scale	Tenderness: Present/ Absent	11-point pain scale	Visual Analog Score	Ten-point Numerical Rating Scale (NRS)	Visual Analog Score
Number of Hospital Visits	Packing and reassessment until tragal tenderness disappeared	Packing and reassessment until tragal tenderness disappeared	Once on 3rd day of packing	On 3rd and 7th day	After 48 hours and then topical eardrops was started	On 3rd day after starting treatment		After 48 hours, tragal tenderness was assessed by VAS
EAC edema			Visible reduction in edema				EAC was divided into 4 parts with 25% for each and scoring was done as per the percentage of involvement of canal	
Debris/				Presence/				
discharge				Absence				
Signs Score					By signs score scale. Maximum score was 4. Improvement score of 2 was considered clinically significant			

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Primary outcomes

All the studies mentioned pain as their primary outcome measure. However, the scales used were different in different study as summarized in Table 2.

Table 2: Pain scales used for primary outcome measure.

Study	Assessment of Pain
Adhikari, Prakash [18]	Wong Baker scale
Adhikari, Prakash [18]	Wong Baker scale in children <12 years and Numerical Rating Scale in patients >12 years
Jamalullah 2008	Visual Analogue Scale
Khan [15]	Tragal tenderness: Present/ Absent
Masood [13]	11-point pain scale
Raffat [16]	Visual Analog Score
Shrestha Bl [12]	Ten-point Numerical Rating Scale (NRS)
Shrestha Karuna [19]	Visual Analog Score

Secondary outcomes

Number of hospital visits: 7 out of 8 studies measured the number of hospital visits as the secondary outcome measure.

EAC edema: 2 studies measured the reduction in EAC edema. One study subjectively measured edema according to visible reduction and another study divided EAC into 4 parts with 25% for each and scoring was done as per the percentage of involvement of the canal.

Debris/discharge: Only one study took the presence or absence of debris and discharge as the outcome measure. A detailed analysis of the secondary outcome parameters utilized in each study is provided in Table 1 & Figure 1.

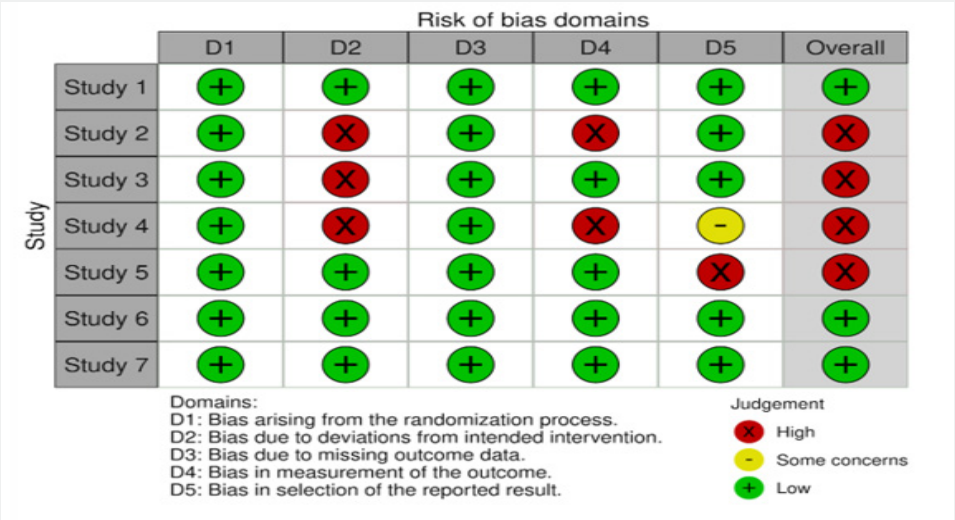

Figure 1: Traffic light plot

Discussion

Numerous studies have investigated the treatment of acute otitis externa, comparing various modalities, including topical antibiotic treatments, ear drops with or without steroids, polyurethane foam, boric acid, non-pharmaceutical methods, and oral antibiotics for severe cases [17,20-22]. Systematic reviews have previously compared antibiotic versus non-antibiotic treatments, but this is the first review to specifically compare ichthammol glycerin with an antibiotic-steroid ear pack [23]. A majority of the studies included in this review were conducted in Nepal and Pakistan, with only one study from a hospital in the UK. This disparity may be attributed to the more widespread use of ichthammol glycerin in developing countries, where it is considered a cost-effective and accessible treatment option.

Among the studies reviewed, one found no significant difference in clinical finding between ichthammol glycerin and the antibiotic-steroid ear pack. This study recommended ichthammol glycerin over the antibiotic-steroid ear pack, citing its cost-effectiveness, avoidance of resistance and toxicity. Another study observed improvements in pain relief with the use of

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the antibiotic-steroid wick, while also noting that ichthammol glycerin was equally effective in terms of overall efficacy and discharge reduction. However, the majority of studies reported significantly better outcomes with the antibiotic-steroid ear pack. Despite the promising findings, higher-quality studies are needed to strengthen the evidence base. Future research should include more diverse populations, larger sample sizes, and multiple outcome measures to better assess the comparative effectiveness of these treatments. Due to the use of different scales to measure outcomes across studies, we were unable to perform a meta-analysis. After careful consideration, all three authors agreed that conducting a meta-analysis would not provide meaningful insights for this review.

Conclusion

The analysis of the evidence revealed that antibiotic-steroid ear packs tended to produce better results, particularly in reducing pain and aiding recovery. However, the review also pointed out several limitations. The available studies comparing the two treatments are limited in number, and most of the research has been carried out on specific demographic groups, which restricts the broader applicability of the findings. Therefore, additional research with more diverse and larger participant groups is needed to confirm these results and provide a clearer insight into the most effective treatment for AOE.

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