Efficacy, Safety, and Antimicrobial Activity of a Polyherbal Formulation (*Ocemic Capsule*) in the Treatment of Otitis Media: A Single-Blind Randomized Controlled Clinical Trial

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KEYWORDS

Karnastrav, Ayurveda, Panchavalkal, ASOM, CSOM

ABSTRACT

the present study aimed to assess the antimicrobial effect and safety of proprietary polyherbal formulation labelled as Ocemic capsule on otitis media in ear. It is A single blind randomized, controlled clinical study in institutional setting

Post Ethics Committee permission, screened otitis media, both ASOM and CSOM patients of either sex aged 20-60 years were randomized to trail group and controlled group for 11 days. Major assessment variables included Culture and sensitivity, audiological evaluation by Audiometry (PTA) and effect on symptoms otorrhea otalgia and changes in perforation. All selected patient were observed till 11 days in both groups, screening was done on day 0 for inclusion in study patients fulfilling inclusion criteria were randomized into either group and follow up on 3rd, 6th, 9th,11th. From day 1 drug will be started up to day days on 11-day patient will be assed for after trail results. Audiometry was done on 0th and 11th day

Mean ± standard deviation median (range) and Wilcoxon Rank sum test/Mann–Whitney test for nonparametric data analysis, were done. For pain parameter normality does not satisfy hence used Wilcoxon test instead of “t test” GraphPad IN Stat software, version 9 was used with $p < 0.05$, as the level of statistical significance.

The primary outcomes included the resolution of key symptoms (pain, ear discharge, tympanic membrane perforation), audiometric improvements, and microbial culture sensitivity. Results revealed that Ocemic capsule significantly outperformed cefixime in reducing pain, ear discharge, improving hearing, and promoting tympanic membrane healing. The formulation demonstrated notable antimicrobial activity, suggesting its potential as a safe, effective alternative to conventional antibiotics in treating otitis media.

Introduction:

Otitis media is one of the most common diseases in otolaryngology. Global prevalence rates estimate a range between 1% to 46%. It has been estimated that 65–330 million individuals have discharging ears, 60% of whom (39–200 million) suffer from significant hearing impairment. (ref 1) The incidence in India is around 7.8%. It is a serious disease with the presence of unilateral or bacterial infection which can result into perforated tympanic membrane with persistent drainage from the middle ear. It is a major cause of acquired hearing impairment. Many types of antimicrobials are used today to treat this condition. It is observed that clinicians are facing the problem of antibiotic resistance due to repeated use pf antibiotics. This is need of an hour to find out the alternative and safe solution for this condition.

In otitis media there is acute or chronic inflammation of middle ear cavity in later stages it results into perforation. Cap Ocemic is a combination of herbs which are safe and proven antimicrobial, anti-inflammatory and having wound healing properties.

Ocean lifecare Private Limited introduced proprietary Ayurvedic formulation, capsule Ocemic panchavalkal extract formulation (COPF) as antimicrobial, wound healing and anti-inflammatory action. It is composed of medicinal plants such as *Ficus Benghalensis, Ficus Religiosa, Ficus Racemosa, Ficus Lacor, Ficus Lebbeck ach* having proven antimicrobial, antioxidant and anti-inflammatory activities.

The present study was therefore planned to generate scientific evidence for this formulation to assess its safety and effect as antimicrobial, anti-inflammatory and having wound healing on otitis media patients.

MATERIALS AND METHODS

Study design and setting It was a single-blind, randomized, controlled, exploratory clinical study conducted from April 2023 to December 2024. The participants were blinded randomly in the study.

Study site:

Study was conducted at Bharati Vidyapeeth deemed to be University College of Ayurved and Hospital Pune Maharashtra at department of Shalakyatntra

Ethical consideration

The study was approved by Institutional Ethics Committee (BVDUCOA/EC/-104(9)/2022-2023) and registered prospectively with Clinical Trial Registry of India (CTRI/2022/05/054805). It was conducted according to Good Clinical Practices and in compliance with the Declaration of Helsinki. A written informed consent was obtained from all participating individuals before start of the study.

Sample size:

As it was an exploratory study, a sample size of 60 completed participants (30 in trail group and 30 in control group) was considered adequate.

Eligibility criteria:

Inclusion criteria: participant having otitis media, both ASOM and CSOM, aged 20–60 years of either sex, irrespective of religion & socio economical class. were considered for screening and called to the study site. Their health status was confirmed using blood investigations namely hemogram (haemoglobin [Hb], white blood cells [WBC count], erythrocyte sedimentation rate, platelets), random blood glucose and pus culture and sensitivity)

Exclusion criteria: Individuals who had recently operated for ear, individuals suffering from bleeding from ear, individuals having CSF Otorrhea, individuals suffering from Cholesteatoma and Pregnant women was not included in this study.

Study intervention and dosage:

Both interventional drugs, Capsule Ocemic (COPF) supplied by Ocean life care pvt ltd. and tablet cefixime 200mg were Purchased from market. Each capsule (COPF) of the proprietary polyherbal formulation, consisted of Ficus Benghalensis 60mg, Ficus Religiosa 60mg, Ficus Racemosa 60mg, Ficus Lacor 60mg, Ficus Lebbeck 60mg. all participants were divided into two groups for 11 days, namely ‘A’ group, known as Control group with tab cefixime 200mg, one tablet was administered in the dose two times in day and ‘B’ group, known as Trial group with capsule Ocemic (COPF), two capsules were administered in the dose two times in day both drugs given after meal with water.

Methodology

As it was an exploratory study, the actual sample size considered for the study was 60. Considering the 20% attrition rate, 72 individuals were recruited, of which 60 were complete the study. Written informed consent from every participant was obtained in person.

All selected participants were observed till 11 days in both groups, screening was done on day 0 for inclusion in study fulfilling inclusion criteria was randomized into either group. Once the eligible participants were called to study site on the day of examination for assessment blood

sample and pus sample (participant who had compliant of otorrhea) collected and sent to laboratory and follow up on 3rd, 6th, 9th,11th day to assess the progress. From day 1 drug was started up to 11th day. On eleventh day again investigations (hemogram and pus culture and sensitivity) were sent to laboratory.

Blood and pus sampling and processing:

A closed collection procedure was adopted while collecting blood and pus to minimize contamination. 3ml blood sample was collected for hemogram and blood sugar. Participants who had otorrhea there discharge sample was collected in sterile centenar with all aseptic precautions.

Parameters of Assessment

Audiometry – audiometry was done on Pure Tone Audiometer before treatment and after treatment. for assessment of hearing loss, we use gradation 0- for normal- up to 25db, 1 for Mild- 25db to 40db, 2 For Moderate-40db to 60db 3- Severe- above 60db.

For otalgia that pain in ear we used gradation 0 for no pain, 1 for mild pain hurts little bit, 2- for moderate pain hurts little more, 3-for severe pain hurts lot or worst as per vas pain scale.

For perforation in tympanic membrane 0- for no perforation 1 for mild small central perforation 2 for moderate perforation involving two or more quadrants and 3 for Severe perforation involving three or more quadrants.

For Culture and sensitivity 0 for no growth 1 for mild growth 2 for moderate growth 3 for sever growth.

Statistical analysis:

Descriptive statistics, including mean and standard deviation, were calculated for each parameter. Non-parametric data were analyzed using the Wilcoxon signed-rank test and Mann-Whitney U test for intergroup comparison. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 72 individuals were screened, of which 68 individuals were recruited; 36 in the trail group and 36 in the control group. Of these, 60 participants completed the study; 39 from trail group and 30 from control group. There were 12 dropouts and 5 withdrawals in trail group, while 7 dropouts in control group. Majority of dropouts due to irregular follow ups due to their personal reasons.

Out of 30 completed participants in trail group, there were 9 males and 21 females while among the 30 completed participants in control group, there were 16 males and 16 females. In this present study we found that maximum no of participants were females.

The mean age of all completed participants in both groups was comparable in this study maximum no of patients found in the interval of 30-40 age group. On considering nature of occupation maximum no of servants were found in this study.

Effect of COPF on vitals

There were some minor changes in vital parameters namely temperature, pulse, and blood pressure in both the groups, which were not significant statistically or clinically.

Effect of pain COPF on otitis media:

The mean grade of Pain before trial was 0.733 which was decreased to 0.567 at 3rd day. The mean increment in score was 22.73% which is significant as observed by wilcoxon test (as p value<0.05) thus it can be said that there is significant increment on pain in otitis media. Also, here 40.91% improvement found at 6th day of treatment which was increased to 68.18% at 9th day and 86.36% at 11th day of treatment on pain in otitis media that means COPF was effective on pain in otitis media. As p value>0.05 we found that there was no statistically significant difference between Group A and Group on Pain in otitis media but as percentage of improvement seen so we get percentage of improvement in Group COPF was more than control Group hence we can say that Group COPF is more effective as compared to control Group on Pain in otitis media

Effect of COPF on otorrhea in otitis media:

The mean grade of otorrhea BT was 1.733 which was decreased to 1.333 at 6th day. The mean increment in score was 23.08% which is significant as observed by wilcoxon test (as p value<0.05) thus it can be said that there is significant increment on otorrhea in otitis media. Also, here 57.69% improvement found at 9th day of treatment which was increased to 76.92% at 11th day of treatment on Discharge in otitis media.so COPF was effective on Discharge in otitis media as p value<0.05 we found that there was statistically significant difference between control Group and COPF Group on otorrhea in otitis media Also as percentage of improvement seen from so we get percentage of improvement in COPF Group was more than control Group hence we can say that COPF Group is more effective as compared to control Group on Discharge in otitis media,

Effect of COPF on tympanic membrane perforation in otitis media:

The mean grade of TM Perforation before trail was 1.533 which was increased to 1.433 at 6th day. The mean increment in score was 6.52%which is significant as observed by wilcoxon test (as p value<0.05) thus it can be said that there is significant increment on TM Perforation in otitis media. Also, here 13.04% improvement found at 9th day of treatment which was increased to 39.13%at 11th day of treatment on TM Perforation in otitis media. As p value<0.05 we found that there was statistically significant difference between COPF Group and control Group on TM perforation in otitis media Also as percentage of improvement seen so we get percentage of improvement in COPF Group was more than control Group hence we can say that COPF Group is more effective as compared to control Group on TM perforation in otitis media.

Effect of COPF on audiometry in otitis media:

The mean grade of Audiometry before trail was 1.5 which was increased to 1.167 after treatment. The mean increment in score was 22.22%which is significant as observed by wilcoxon test (as p value<0.05) thus it can be said that there is significant increment on Audiometry in otitis media. So COPF Group was effective on Audiometry in otitis media. As p value<0.05 we found that there was statistically significant difference between COPF Group and control Group on audiometry in otitis media Also as percentage of improvement seen so we get percentage of improvement in COPF Group was more than control Group hence we can say that COPF Group is more effective as compared to control Group on audiometry in otitis media Hence COPF group is effective.

Effect of COPF group a on culture and sensitivity in otitis media:

The mean grade of Culture and Sensitivity before trail was 0.633 which was increased to 0.3 after treatment. The mean increment in score was 52.63%which is significant as observed by wilcoxon test (as p value<0.05) thus it can be said that there is significant increment on Culture and Sensitivity in otitis media. So, COPF Group was effective on Culture and Sensitivity in otitis media The mean grade of Culture and Sensitivity BT was 0.633 which was increased to 0.3 after treatment. The mean increment in score was 52.63%which is significant as observed by wilcoxon test (as p value<0.05) thus it can be said that there is significant increment on Culture and Sensitivity in otitis media. COPF Group was effective on Culture and Sensitivity in otitis media

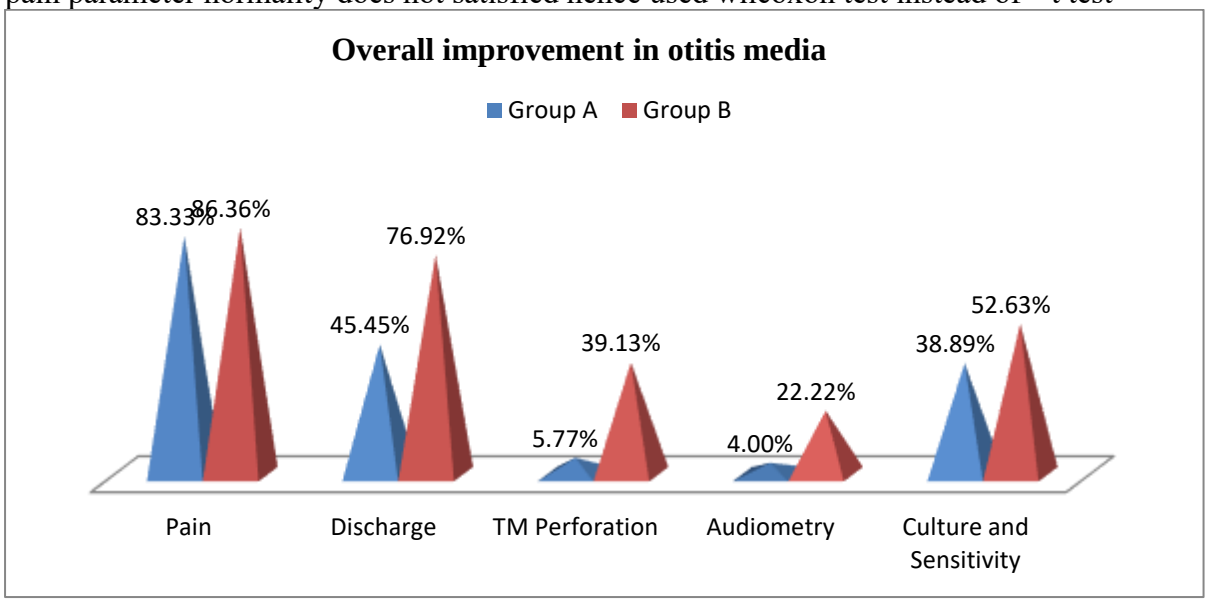
Tables

Table 1: Effect of *Ocemic Capsule* on Various Parameters in Otitis Media

Parameters	***Ocemic* (n=30) Day 0**	***Ocemic* (n=30) Day 11**	**Control (n=30) Day 0**	**Control (n=30) Day 11**
Pain (otalgia)	0.733	0.010	0.581	0.097
Otorrhea	1.733	0.400	1.744	0.968
TM Perforation	1.533	0.934	1.677	1.678
Audiometry	1.500	1.168	1.613	1.584

Parameters	*Ocemic* (n=30) Day 0	*Ocemic* (n=30) Day 11	Control (n=30) Day 0	Control (n=30) Day 11
Culture and Sensitivity	0.633	0.300	0.581	0.358

*Wilcoxon test is used to check efficacy and for comparison mann whitney test was used For pain parameter normality does not satisfied hence used wilcoxon test instead of " t test"



Discussion:

The primary aim of this clinical study was to evaluate the efficacy and safety of a proprietary polyherbal formulation, *Ocemic capsule* (COPF), in the treatment of otitis media (OM). This single-blind, randomized, controlled trial demonstrated that COPF significantly improved several clinical parameters associated with OM, including pain (otalgia), otorrhea, tympanic membrane perforation, hearing loss (audiometry), and microbial growth, compared to the conventional antibiotic treatment (cefixime).

Efficacy of COPF in Pain Relief (Otalgia)

Pain is one of the most debilitating symptoms of otitis media. In this study, participants in the COPF group exhibited a substantial reduction in pain over the course of the 11-day treatment period. The reduction in pain scores from 0.733 at baseline to 0.010 by day 11 (an 86.36% improvement) indicates a significant therapeutic effect. The improvement in the COPF group was more pronounced than in the control group, suggesting that the polyherbal formulation may have superior analgesic properties compared to conventional antibiotic therapy. This aligns with the known anti-inflammatory and analgesic effects of the herbs present in COPF, particularly the *Ficus* species, which have been documented to possess analgesic properties in various traditional medicinal systems.

Effect on Otorrhea (Ear Discharge)

Otorrhea, or ear discharge, is another common symptom of otitis media, often associated with bacterial infections. The study found a significant reduction in the severity of otorrhea in the COPF group. At baseline, the mean grade of otorrhea was 1.733, which reduced to 0.400 by day 11, reflecting a 76.92% improvement. In comparison, the control group showed a smaller reduction in otorrhea. The antimicrobial and anti-inflammatory actions of COPF, particularly due to its ingredients like *Ficus benghalensis* and *Ficus religiosa*, likely contributed to this improvement by targeting both the bacterial infection and the inflammation in the middle ear.

Tympanic Membrane Perforation

The presence of tympanic membrane (TM) perforation is a common complication of both acute and chronic otitis media, often leading to permanent hearing loss. In this study, the COPF group demonstrated a significant improvement in the healing of tympanic membrane perforations. The reduction in perforation severity from a mean grade of 1.533 at baseline to 0.934 at day 11 represents a 39.13% improvement. This effect can be attributed to the wound-healing properties of the *Ficus* species, which are known to promote tissue regeneration and repair. In contrast, the control group did not show significant improvement in TM perforation, emphasizing the potential of COPF in promoting tympanic membrane healing.

Audiometry and Hearing Improvement

Hearing loss is a frequent consequence of otitis media, especially in cases of chronic or recurrent infections. Audiometry results in the COPF group showed a significant improvement in hearing, with a 22.22% improvement in audiometry scores (from 1.5 to 1.167), indicating an enhancement in auditory function. The improvement in hearing can likely be attributed to the reduction in inflammation, infection, and perforation of the tympanic membrane, all of which contribute to hearing loss in otitis media. The control group also showed some improvement in audiometry scores, but the COPF group exhibited a greater percentage of improvement, supporting the notion that COPF may offer superior therapeutic effects for hearing restoration.

Effect on Culture and Sensitivity

The reduction in bacterial growth as assessed by culture and sensitivity was another key outcome of the study. The COPF group showed a 52.63% reduction in microbial growth, from a mean grade of 0.633 at baseline to 0.300 at day 11. This suggests that the polyherbal formulation was effective in reducing the bacterial load in the middle ear, likely due to the antimicrobial properties of the herbs in COPF. In comparison, the control group exhibited a less significant reduction in microbial growth. This further supports the idea that COPF may possess broad-spectrum antimicrobial activity, contributing to the resolution of the infection in otitis media.

Safety and Tolerability

The safety profile of COPF was also a major consideration in this study. No severe adverse events were reported during the trial, suggesting that COPF is a safe alternative to conventional antibiotics like cefixime. This is especially important given the growing concern about antibiotic resistance and the side effects associated with prolonged use of antibiotics. The polyherbal formulation, with its natural antimicrobial and anti-inflammatory properties, offers a promising option for treating otitis media with minimal risk of side effects.

Comparison with Conventional Treatment

The findings of this study suggest that COPF is as effective, if not more, than conventional antibiotic therapy (cefixime) in managing otitis media. While both groups showed improvements, the COPF group consistently demonstrated more substantial improvements across all clinical parameters, including pain, otorrhea, tympanic membrane perforation, audiometry, and microbial sensitivity. These results highlight the potential of COPF as a therapeutic option that could complement or even replace antibiotics in certain cases, particularly in light of the rising concerns regarding antibiotic resistance.

Conclusion:

The results of this study provide strong evidence for the efficacy and safety of *Ocemic capsule* (COPF) in the treatment of otitis media. COPF was shown to significantly improve clinical outcomes, including pain relief, reduction of otorrhea, healing of tympanic membrane perforations, improvement in hearing, and reduction in microbial growth. These findings suggest that COPF is an effective and well-tolerated alternative to conventional antibiotic treatments for otitis media, with the added benefits of antimicrobial, anti-inflammatory, and wound-healing properties.

Given the rising concerns about antibiotic resistance, COPF may offer a valuable solution for managing otitis media in a way that minimizes reliance on antibiotics. Further studies with larger sample sizes and longer follow-up periods are needed to confirm the long-term benefits and safety of COPF in otitis media management.

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