

**KEYWORDS:**

Homoeopathy, Echinacea angustifolia, antibacterial, mouth wash.

## EVALUATING THE ANTI-BACTERIAL EFFECTS OF ECHINACEA ANGUSTIFOLIA MOUTH WASH AGAINST PATHOGENS CAUSING PHARYNGITIS



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**Abstract:**

Echinacea angustifolia due to its antibacterial properties is routinely used in homoeopathy for treating blood poisoning and upper respiratory tract infections. In this study Echinacea angustifolia mouthwash was used to reduce the pain and bacterial growth in patients with pharyngitis.

**Methods and materials:** 15 patients suffering from pharyngitis were selected, and were prescribed the Echinacea angustifolia aqueous mouth wash. The patients were advised to rinse their mouth: twice a day for four days. We collected throat swabs, before and after intervention for culturing the bacteria. We estimated the magnitude of the pain due to pharyngitis using the verbal analog pain scale, and used this data for assessing whether the mouth wash is effective in reducing the pain. We performed paired t test to prove the effectiveness.

**Result:** We found no evidence of anti-bacterial activity against any bacteria cultured from the patients, ( $p>0.05$ ). Nevertheless, we found the evidence of mouth wash reducing the pain due to pharyngitis. The mean value of the pain reduced from 6.23 to 0.93. ( $p<0.001$ ).

**Introduction:**

Pharyngitis is the inflammation of the mucous membranes of the oropharynx. In most cases, the cause is an infection, either bacterial or viral. About 50% to 80% of pharyngitis, or sore throat, symptoms are viral in origin and include a variety of viral pathogens. More severe cases tend to be bacterial and may develop after an initial viral infection.<sup>1,2</sup>

Bacteria and viruses can cause direct invasion of the pharyngeal mucosa. In almost all cases, there is a local invasion of the pharyngeal mucosa which also results in excess secretion and edema.

Most common manifestations of pharyngitis include pain, dryness, irritation, and scratchy feeling anywhere in the throat. Pain becomes worse when one swallows. Pharyngitis symptoms may also be part of the symptom complexes of other serious illnesses, including peritonsillar abscess, retropharyngeal abscess, epiglottitis, and Kawasaki disease.<sup>3,4</sup>

Echinacea angustifolia is used routinely in homoeopathy to treat conditions of acute autoinfection, symptoms of blood poisoning,

upper respiratory tract infections, skin infections and generally septic conditions.

The Echinacea are reported to boost the immune system, which aids the body to fight off the infection, thereby hastening the recovery process (Murphy, 1995).<sup>5</sup>

The main indications of Echinacea are the prevention and treatment of common cold, flu and upper respiratory infection. Later on, stimulation of immune cells such as macrophages, other monocytes and natural killer cells have also been demonstrated in vitro. The clinical evidences available on Echinacea derivatives have been recently reviewed by Barrett. The globality of the data tentatively supports the use of these preparations in the treatment of acute URIs, which corresponds with the most widespread utilization.<sup>6</sup>

Various Materia medica state the benefits of antiseptic wash of Echinacea

- William Boericke in his New Manual of Homoeopathic Materia Medica with Repertory under Echinacea angustifolia states that it is used 'locally, as a cleansing and antiseptic wash.'<sup>7</sup>
- While Dr S.K. Phatak in his Concise Materia medica of Homoeopathic Remedies, under Echinacea explains it as a 'Valuable local cleansing agent and antiseptic wash.'<sup>8</sup>

Thus, an In-vitro study is taken up to evaluate the effectiveness of the aqueous mouth wash of Echinacea angustifolia in patients of pharyngitis with throat pain to assess the bacterial growth.

**MATERIALS AND METHOD**

Approval of the Institutional Ethics Committee of Father Muller Charitable Institution was obtained before the initiation of the project, and the procedures followed were in accordance with the ethical guidelines for biomedical research provided by the Indian Council of Medical research, New Delhi. Informed consent was obtained from each individual before the screening. Patients attending the outpatient department of Fr Muller Homeopathic Hospital, Fr Muller Homeopathic Hospital extension in St Antony's ashram were chosen for the study. Approximately 20 patients were screened to ensure enrollment of which 15 patients were selected based on inclusion and exclusion criteria. (Table -1)

**Table - 1**

Inclusion Criteria	Exclusion Criteria
Patient with throat infection along with pain in the age group of 18 to 50	Patient already on any treatment for same complaints
Patient with only upper respiratory tract infection without any complication	Patient with any other illness involving respiratory system

Pain of 5 to 6 on verbal pain analogue scale
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Purposive sampling method was followed and the subjects fulfilling the inclusion criteria were included in the study. Throat swabs were collected for culture in blood and meconium agar. Physician then prescribed the Echinacea angustifolia aqueous mouth wash for 4 days, twice a day. (Echinacea mouth wash was prepared by adding 10 to 15 drops of Echinacea angustifolia in half cup of warm water.)<sup>9</sup>

These subjects were asked for follow up after a 4 days, throat swabs were again collected to substantiate changes in the bacterial growth by semiquantitative analysis.

Matrix-assisted laser desorption/ionization (MALDI) for identifying the strain of bacteria. MALDI Imaging mass spectrometry has unique advantages for analyzing tissue specimen in an unprecedented detail.<sup>10,11</sup>

Magnitude of the pain due to pharyngitis was assessed, using the verbal analog pain scale,<sup>12</sup> evaluating the effectiveness of mouth wash in reducing the pain before and after treatment.

Criteria for deciding the efficacy of homeopathic drug was based on following parameters:

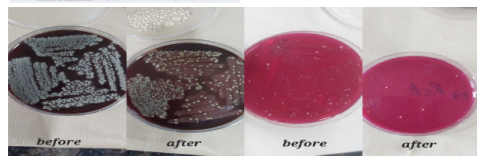
1. Changes in bacterial count before and after the treatment.
2. Changes in pain scale before and after the treatment

Data from the sample were subjected to McNemar test to determine the efficacy of the drug. The statistical test was executed by using open source software Jamovi.

**Result:** The following bacteria were cultured from the patients: Staphylococcus aureus, Streptococcus salivarius, Neisseria flavescens, Klebsiella pneumoniae, Streptococcus oralis, Streptococcus mitis, Rothia mucilaginosa, Pseudomonas aeruginosa, and Gemella haemolysans. No evidence of anti-bacterial activity was found against any bacteria cultured from the patients ( $p > 0.05$ ). Nevertheless, there was evidence that the mouth wash reduced the pain due to pharyngitis. The mean value of the pain reduced from 6.23 to 0.93. ( $p < 0.001$ ).

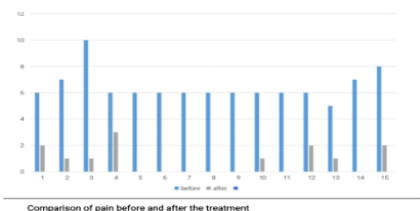
Result of Echinacea mouth wash before after treatment

patient	Bacteria in culture	Count before treatment	Count after treatment
1	Coff	****	****
2	Klebsiella haemolyans	****	****
3	Neisseria flavescens	****	****
4	Streptococcus oralis	****	****
5	Streptococcus oralis	****	****
6	Streptococcus oralis	****	****
7	Streptococcus oralis	****	****
8	Streptococcus oralis	****	****
9	Streptococcus oralis	****	****
10	Streptococcus oralis	****	****
11	Streptococcus oralis	****	****
12	Streptococcus oralis	****	****
13	Streptococcus oralis	****	****
14	Streptococcus oralis	****	****
15	Streptococcus oralis	****	****
16	Streptococcus oralis	****	****



Meconium agar

Blood agar



**Discussion:** In view of increasing resistance to existing antimicrobial agent herbal drugs are being looked as very important source for discovery of new agents for treating various ailments related to bacterial infections. The main indications of Echinacea are the prevention and treatment of common cold, flu and upper respiratory infections. The proposed mechanism of action is related to stimulate the immune system. In a

comprehensive review of 1996, Bauer already stated that relevant pharmacological effects have been demonstrated in vitro and in vivo for the expressed juice of the aerial parts of alcoholic extracts of the roots of E. angustifolia.<sup>5</sup> According to various articles, the effects are mainly linked to a modulation of nonspecific cellular immune system. And the compounds responsible for such an effect are: polysaccharides, glycoproteins, caffeic acid derivatives and alkylamides. Later on, stimulation of immune cells such as macrophages, other monocytes and natural killer cells have also been demonstrated in vitro.

Some studies also demonstrated that preparations of Echinacea are strongly involved in the reduction of inflammatory processes, which play a central role in the development of symptoms of primary illnesses for which the plant is used (common cold and sore throat) and reduction of pain. The phenolic components, i.e. echinacoside, of the Echinacea preparations are often responsible for these effects. A good level of evidence is available on the role played by the polysaccharidic fraction in the immune stimulatory effect of Echinacea preparations.

Data available on the lipophilic components present in Echinacea preparations are less consistent even if some of them such as alkylamides and in particular isobutylamides have been described to produce a strong stimulating effect on phagocyte functions and on lipoxygenase-inhibiting activity. The clinical evidences are available on Echinacea derivatives have been recently reviewed by Barrett. The globality of the data tentatively supports the use of these preparations in the treatment of acute URIs, which corresponds with the most widespread utilization.<sup>6</sup> Anti-inflammatory activity of Echinacea extracts have been attributed to direct inhibition of Hyaluronidase. Echinacea-derived alkylamides have immunomodulatory and anti-inflammatory activity<sup>14</sup>. Also, it was presented in a study that showed inhibition of PGE2 by Echinacea species which may be one process of contributing to the anti-inflammatory capability.<sup>15</sup> In one of the in-vitro study Echinacea showed anti-inflammatory activity to be 75% against MMP-2 and 68% against MMP-913. Alkylamides have become a major focus for researchers studying Echinacea & studies with this class of compounds to a vast repertoire of immunomodulatory activities including anti-inflammatory properties. Also, it was indicated in experiments that alkylamides are consistent inhibitors of PGE2 production. Regardless several of extracts of Echinacea containing a variety of alkylamides, ketones, caffeic acid derivatives at low concentration were able to inhibit PGE2 significantly. Further, it was found that the anti-inflammatory properties in Echinacea was not simply due to one constituent but several acting in a synergistic or additive manner.<sup>15</sup>

In this study, we found no evidence of anti-bacterial activity against any bacteria cultured from the patients, ( $p > 0.05$ ). Nevertheless, we found the evidence of mouth wash reducing the pain due to pharyngitis. The mean value of the pain was reduced from 6.23 to 0.93. ( $p < 0.001$ )

**Conclusion:** Though the study remains inconclusive against the effectiveness aqueous solutions of Echinacea against the Bacterial growth, but it was observed to be effective in reducing the intensity of pain in pharyngitis. Thus, we can conclude that the aqueous solutions of Echinacea angustifolia can be considered as a good choice for reducing throat pain in Pharyngitis.

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**Ethical Approval:** Approval of Institutional Ethics Committee of Father Muller Charitable Institution was obtained before the initiation of the project, and the procedures followed were in accordance with the ethical standards provided by Indian Council of

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