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An *in vitro* study to compare the antibacterial activity of homoeopathic medicines on swab sample collected from gingivitis patient

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Abstract

Gingivitis is the inflammation of gingival tissues, which is very common and was caused by many microorganisms. When left untreated it may lead to loss of teeth. Homoeopathic medicines have the capacity to treat gingivitis and to kill the organism causing it. Conventional treatment uses antibiotic to treat gingivitis. In recurrent cases it will be difficult to treat using antibiotics due to the development of drug resistant bacteria. Even in those cases Homoeopathy can act well and give the cure to gingivitis. In this study Homoeopathic medicines Phosphorus, Mercurius solubilis and Silicea terra in potencies 30 and 1M were used to show its antibacterial activity against the organism isolated from the swab culture of a gingivitis patient. The result was assessed by measuring the zone of inhibition produced by each medicine. From this study it was concluded that the Homoeopathic medicines selected have potential antibacterial activity by the zone of inhibition produced, among these medicines Mercurius solubilis showed more activity and 1M potency showed more potent action.

Keywords: Antibacterial activity, gram positive bacteria, gingivitis, homoeopathy, Mercurius solubilis, Silicea terra, phosphorus, zone of inhibition

Introduction

A bacterial infection is frequently the cause of gingivitis, which is an inflammation of the gingival tissues. The connective tissue and gingival epithelium are involved ^[1]. Of all the several types of gingivitis, the one brought on by plaque appears to be the most common ^[1, 2]. Males are more likely than females to have gingivitis because they maintain better oral hygiene habits. Due to improved access to healthcare and a more favourable attitude toward dental hygiene, it is more common among those with lower socioeconomic status than in those with higher socioeconomic status. Pregnant women are more likely than non-pregnant women to experience severe forms of gingivitis, according to studies ^[1, 3]. The World Health Organization (WHO) estimates that periodontal diseases impact approximately 19% of the world's adult population, or over 1 billion cases globally ^[4]. Swelling, redness, soreness, a glossy appearance, and bleeding when the gingival tissue is gently probed are all signs of gingivitis. Since gingivitis is usually painless, patients often neglect to seek medical treatment and treat it early. If it persists, it can cause periodontitis, which causes inflammation to spread to the bones and tissues beneath, ultimately leading to tooth loss ^[1, 2]. As a comprehensive approach to treatment, homeopathy uses safe homoeopathic dilutions to treat gingivitis and stop it from worsening and leading to tooth loss. Homeopathy heals the patient from the inside out, improving their bodily and emotional well-being. Choosing medications based on the similia principle will help treat a condition in the way that is intended. There are very few evidence-based studies to support the activity of homoeopathic medicines in contemporary conceptions, despite the fact that their action is documented in our materia medica and that observable cures are achieved in clinical practice. Therefore, based on their indications in homoeopathic materia medica, the homoeopathic medications Phosphorus, Mercurius solubilis, and Silicea terra were chosen for this investigation in order to compare and evaluate their antibacterial activity against the tooth swab culture taken from a patient with gingivitis.

Aim & Objectives

- To assess the antibacterial properties of the specified homeopathic medications.

- To evaluate the effectiveness of the specified medications in 30 and 1M potencies.
- To compare the action of the specified homeopathic medications with that of amoxicillin.

Materials & Methods

It was an experimental study conducted at Research facilitation centre of Sarada Krishna Homoeopathic medical college to compare the antibacterial activity of Homoeopathic medicines Phosphorus, Mercurius solubilis and Silicea terra in potencies 30 and 1M on the dental swab culture.

Plate 1

Group I- Silicea terra 30

Group II- Phosphorus 30

Group III- Mercurius solubilis 30

Group IV- Amoxicillin

Plate 2

Group I- Silicea terra 1M

Group II- Phosphorus 1M

Group III- Mercurius solubilis 1M

Group IV- Amoxicillin

The dental sample is taken from a gingivitis patient. After that, the swab is cultivated in agar media and incubated for 24 hours at 37 °C in order to allow the bacteria to proliferate in the medium. To identify the organism, a biochemical test is performed on the bacterial strain that was extracted from the growth media. Following identification, the indicated bacteria are streaked throughout Muller Hinton Agar culture medium. One drop of the medication sample is mixed with one millilitre of distilled water, and the mixture is then impregnated into a circular filter paper disc. In Muller-Hinton broth, plain discs treated with Phosphorus, Mercurius solubilis, and Silicea terra in 30 and 1M potencies, as well as amoxicillin, were incubated for 24 hours at 37 °C. The zone of inhibition surrounding the discs is then measured to assess the antibacterial activity.

Observation & Results

In this study antibacterial activity of three homoeopathic medicines in two potencies against the dental swab culture was assessed. Amoxicillin is the positive control used here. The dental swab collected from the patient with gingivitis was cultured and biochemically assessed to identify the organism. After biochemical assay the organism is identified as *Pseudomonas aeruginosa*, which is a gram negative bacteria with multiple drug resistance commonly found in oral cavity and produces gingivitis in diabetic patients.



Fig 1: Culture medium before incubation



Fig 2: Zone of inhibition

Table 1: Antibacterial activity of Homoeopathic medicines and control

Plates	Medicine	Zone of inhibition
Plate 1	Silicea terra 30	4 mm
	Phosphorus 30	4 mm
	Mercurius solubilis 30	7 mm
	Amoxicillin	9 mm
Plate 2	Silicea terra 1M	5 mm
	Phosphorus 1M	5 mm
	Mercurius solubilis 1M	7 mm
	Amoxicillin	8 mm

The homoeopathic medicines Phosphorus, Mercurius solubilis and Silicea terra in potencies 30 and 1M showed antibacterial activity against dental swab culture and its effectiveness was observed in the zone of inhibition around the disc ranging from 4 mm to 9 mm for different medicine and potencies.

Discussion

In this study the effect of antibiotic and homoeopathic medicines are evident by the zone on inhibition in figure 2. The study evaluated the antibacterial activity of selected homeopathic medications Silicea terra, Phosphorus, and Mercurius solubilis in two potencies (30C and 1M) against *Pseudomonas aeruginosa*, with Amoxicillin serving as the positive control. Silicea terra and Phosphorus both showed limited inhibition of 4 mm in Plate 1, which included 30C potencies, but Mercurius solubilis had a 7 mm inhibition zone. Amoxicillin had a maximal inhibition of 9 mm and served as a positive control. In Plate 2, which contained 1M potencies, Silicea terra and Phosphorus showed somewhat improved inhibition of 5 mm each, but Mercurius solubilis again showed the highest inhibition among the homeopathic medicines at 7 mm. Among the homeopathic medicines studied, Mercurius solubilis consistently shown the strongest antibacterial action in both potencies, approaching Amoxicillin's zone. Silicea terra and Phosphorus showed only modest inhibition, indicating a limited antibacterial activity. High potency 1M exhibited a slight increase in inhibition for Silicea terra and Phosphorus compared to 30C, but no significant difference for Mercurius solubilis. The results revealed that among the selected medicines, Mercurius solubilis medicine has potential antibacterial properties, with 1M having the highest antibacterial activity when potency was compared.

Conclusion

This study has demonstrated the antibacterial activity of Homoeopathic medicines Phosphorus, Mercurius solubilis and Silicea terra against the microorganism *Pseudomonas*

aeruginosa. Mercurius solubilis demonstrated the most significant antimicrobial effect among the selected homeopathic medicines, with inhibition zones close to that of Amoxicillin. Silicea terra and Phosphorus showed weak activity, which shows that it has limited antimicrobial potential under the tested conditions. The difference between 30C and 1M potencies were minimal, though a slight increase in inhibition was observed for Silicea terra and Phosphorus in 1M potency. From the results of this study it was proved that these medicines has significant antibacterial action and it can be used successfully for the treatment of bacterial diseases. It will be very useful especially in cases where conventional treatment faces difficulty due to antibiotic resistance. Homoeopathic medicine is safe with its own advantages and also cost effective. Homoeopathic Further with larger sample sizes, multiple organisms using various potencies are required to understand the therapeutic value of different homoeopathic medicines and also clinical studies are necessary to show its potential action in clinical setting.

Conflict of Interest

Not available

Financial Support

Not available

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