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Review on dental care management and antibacterial activity of *Solanum nigrum* Linn.

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Abstract
The nightshades, or Solanaceae family, are a kind of flowering plant that is classified as a dicot. Members of this family often seek dental care for cleanings and toothaches, according to scholarly research. In India, a number of tribal and rural cultures employ documented dental care techniques [1]. In order to investigate the traditional knowledge of the local people in the Kolli hills in the Namakkal district of Tamil Nadu, an ethno-medical study was carried out between 2010 and 2011. The findings show that the locals have historically employed eighteen different types of medicinal plants to treat and prevent a wide range of tooth conditions [2]. It is made up of many glycoproteins, polysaccharides, glycoalkaloids, and mixes of polyphenolic compounds, including rutin, epicatechin, gallic acid, and protocatechuic acid. There are several benefits of *Solanum nigrum*, including hepatoprotective, anticancer, immunomodulatory, anti-ulcer, relaxing, anti-convulsant, cardio defensive, antibacterial, antidiabetic, and pain relief effects. *Solanum nigrum* has been used in traditional medicine in India and other areas of the world to cure a variety of conditions, including liver problems, persistent skin infections, heat-related illnesses, menstrual cramps, fevers, diarrhea, eye infections, and dizziness [3].

Keywords: Solanaceae, dental care, toothaches, antibacterial, antiulcer, pain relief effects

Introduction
Black nightshade, or *Solanum nigrum* Linn, is a dicot weed belonging to the Solanaceae family. This African pediatric plant is used to treat a number of conditions that cause newborn death, including convulsions accompanied by fever. *Solanum nigrum* Linn. is an annual plant with branches that may grow up to 90 cm tall. Its leaves are glossy, dark green, ovoid or lanceolate, and either toothless or slightly toothed along the edges. Five widely spaced petals and a short pedicellate characterize the petite, white flowers. When mature, the fruits are tiny and black (Cooper and Johnson, 1984). Solanum nigrum is primarily found around roadsides, fence rows, ditches, waste ground, and the boundaries between cultivated and wooded areas [4].

Fig 1: *Solanum nigrum* Linn.

Solanum nigrum, often known as garden nightshade, black nightshade, or Ganikesopu in Kannada, is a member of the Solanaceae family.in Bengali in Gudakami, Kachchipandu in Telugu, Munatakali in Tamil, and Hindi [5, 3].

Table 1: Plant profile

Synonym	Taxonomical classification
Hindi: Makoya	Kingdom: Plantae
English: Black nightshade	Class: Magnoliopsida
Sanskrit: Dhvansamaci	Division: Magnoliophyta
Kannada: Ganikesopu	Family: Solanaceae
Bengali: Gudakamai	Order: Solanales
Malayalam: Manatakkali	Genus: Solanum-nightshade
Marathi: Kamoni	Species: *Solanum nigrum*

Dental care management

Many individuals still rely on medicinal herbs for tooth infections even though Western treatment is readily available for both minor and complex tooth disorders. Since the new generation doesn't seem to be interested, this store of wisdom might be lost in the not-too- distant future. Therefore, it becomes essential to obtain and maintain this conventional medical system through accurate specimen identification and recording. The purpose of this review is to record the oral tradition on the dental health benefits of certain plant species. The family of flowering plants known as nightshades, or Solanaceae, is significant to the economy. The family contains several significant agricultural crops, medicinal plants, spices, weeds, and tress, in addition to annual and perennial herbs, vines, lianas, epiphytes, shrubs, and trees. ornaments. Solanum is the family's most significant genus in terms of commerce [1, 6]. A person's oral hygiene is crucial to their overall health. Neglecting oral health can lead to many oral conditions, such as periodontal diseases and dental cavities. Because they can be extremely painful and have a substantial impact on a person's overall wellbeing, oral problems night cause discomfort, which lowers their standard of living. There exists a correlation between overall health and dental health, as the mouth serves as a mirror reflecting the health of the rest of our body. Teeth are delicate yet extremely durable organs that are cemented into the jaw bones. They facilitate communication in addition to helping with food biting and grinding. dental cavities, and the two most frequent hazards to oral health are periodontal diseases, which are significant public health issues due to their prevalence, effects on people and society, and high treatment costs. Food habits, lifestyle choices, and bacterial infections are the root causes of oral diseases. Any gum disease or tooth decay interferes with the digestive process. Poor dental hygiene, an abundance of meaty foods, and sugary foods harm our teeth by causing toothaches, pyorrhea, bleeding gums, and dental caries [8]. Considerable focus has recently been placed on the use of environmentally and biologically compatible plant-based products for the treatment and prevention of several illnesses in humans. Research shows that 80% of people on the planet rely on traditional medicine, especially plant-based medications, for their basic healthcare needs. Around 6,000 plants are said to be used in traditional, folk, and herbal medicine in India; this amount roughly corresponds to 75% of the third world's medical requirements. A survey was carried out in Tamil Nadu communities to raise knowledge of the therapeutic potential of plants, particularly for dental care [9]. Over 80% of Africans, according to the World Health Organization (WHO), rely on traditional medicine and indigenous knowledge to address their medical requirements. This is because most people choose traditional medicine over "exorbitantly priced" mainstream Western treatment since it is easily available, reasonably priced, and accepted in both culture and society. Since ancient times, plants and natural products have been utilized for their pharmacological uses, such as their antiulcerogenic, wound-healing, anti-inflammatory, antibacterial, and antioxidant qualities, among others [9].

Chemical constituents

Numerous compounds that have demonstrated pharmacological relevance to the effects of *Solanum nigrum* Linn produced from whole plants have been identified from various *Solanum nigrum* fractions. A different investigation revealed that the content of organic acids varied between *Solanum nigrum* seedlings and mature plants. The main organic acids in *Solanum nigrum* Linn were found to be acetic acid, tartaric acid, malic acid, and citric acid. However, it was claimed that the two acids that are most crucial for *Solanum nigrum* Linn's adaptive reactions to environmental stressors are tartaric and citric. Most portions of *Solanum nigrum* Linn have large amounts of the glycoalkaloid solanine; however, the greatest concentrations are found in *Solanum nigrum* Linn berries that are still unripe [10].

Materials and Methods

Collection of Plant Material

We randomly selected fresh, complete *Solanum nigrum* plants as well as plant component, including the stem, berries, and entire plant, from nurseries in Bangalore. Plant material was identified botanically by the Department of Botany, Indian Academy Consortium of Schools. The plant materials were thoroughly cleaned three to four times with running tap water to get rid of any dust and twice with sterile distilled water. They were then shade dried at room temperature on sterile blotting paper, and once they had completely dried, they were ground into a powder using a blender and put away in individual airtight bottles. afterwards used in the production of ethanolic and methanolic extracts [11].

Antibacterial activity

During three months in 2015, the Central Research Laboratory at MAHER University conducted an *in vitro* research design in an experimental laboratory environment. The research was authorized by Meenakshi Ammal Denal College's Institutional Ethical Committee. The organisms' standard strains were acquired from the ATCC and MTCC. The organisms that were arranged in order of appearance were *Lactobacillus acidophilus* MTCC no. 10307, *Streptococcus mutans* MTCC no. 890, *Streptococcus oralis* MTCC no. 2696, Streptococcus sanguinis ATCC no. 10556, and *Streptococcus salivarius* ATCC no. 13419. Throughout the stationary phase, the organisms were brought back to life, and the sugar-limited cultures were kept at a pH of 7. The *Solanum nigrum* plants' leaves were ground into powder using a blender after being dried in the shade. Following that, the powder was kept in airtight, wide-mouth containers. In 75 ml of ethyl alcohol (1:3 w/v), 25 mg of herbal powders were dissolved and taken at room temperature. After that, the mixture was put in an orbital

shaker and left for three days. Using Whatman filter paper, the resultant solution was filtered. A rotary evaporater held the filtrate. The resulting powder was weighed, and 100 mg was combined with 1 ml of DMSO (dimethyl sulfoxide) and kept in amber-colored vials for later use at a temperature of -20 °C [12]. On TSA-BA and MRS agar, the inoculum suspension from the nutritional broth was evenly streaked. With a sterile borer, wells were bored into the grass cultures of 0.5 cm in diameter in the medium containing the pathogen. Each extract was aseptically added to the well in 50 µl increments. For one hour, the plates were left at room temperature to allow the extract to diffuse into the agar. After that, it was incubated at 37 °C for 24 hours. After 24 to 48 hours, the diameter of the zone of inhibition was measured to record the results. As a positive control, 0.2% chlorhexidine was utilized, and as a negative control, DMSO medium devoid of herbal extracts was used [13].

Results

The results have been summarized as follows: *Streptococcus mutans* show a greater zone of inhibition than *Streptococcus sanguis*, *Streptococcus salivarius*, *Streptococcus oralis*, and *Lactobacillus acidophilus*.

The present *in vitro* study showed that the herbs *Solanum nigrum* and *Phyllanthus niruri* have an inhibitory effect on the growth of cariogenic organisms *Streptococcus mutans*, *Streptococcus sanguis*, *Streptococcus salivarius*, *Streptococcus oralis*, and *Lactobacillus acidophilus* which were cultured in their respective mediums. Any agent showing a zone of inhibition of more than 3 mm is considered to be an effective antimicrobial

Table 2: Effect of *Solanum nigrum* leaves extract on cariogenic micro-organisms, zone of inhibition

Organisms	1st test	2nd test	3rd test	Mean
Streptococcus sanguis	14	15	14	14.3
Streptococcus salivarius	15	14	14	14.3
Streptococcus oralis	14	14	15	14.3
Streptococcus mutans	15	15	14	14.6
Lactobacillus acidophilus	12	13	12	12.3

Fig 1: Antibacterial zones of inhibition against *Streptococcus salivarius* (14.3 mm)

Fig 2: Antibacterial zones of inhibition against *Streptococcus sanguis* (14.3 mm)

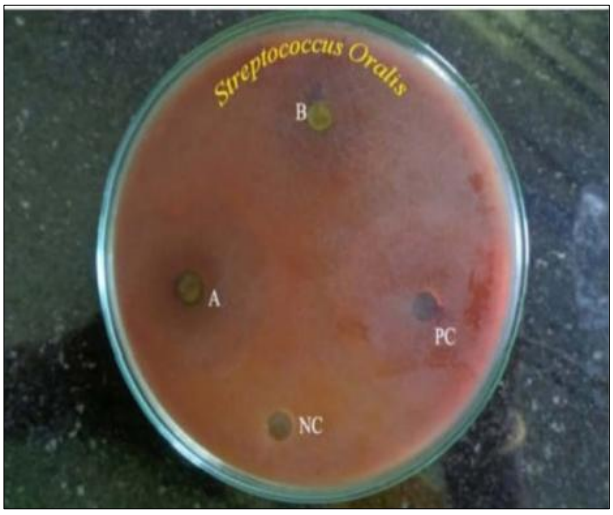

Fig 3: Antibacterial zones of inhibition against *Streptococcus oralis* (14.3 mm)

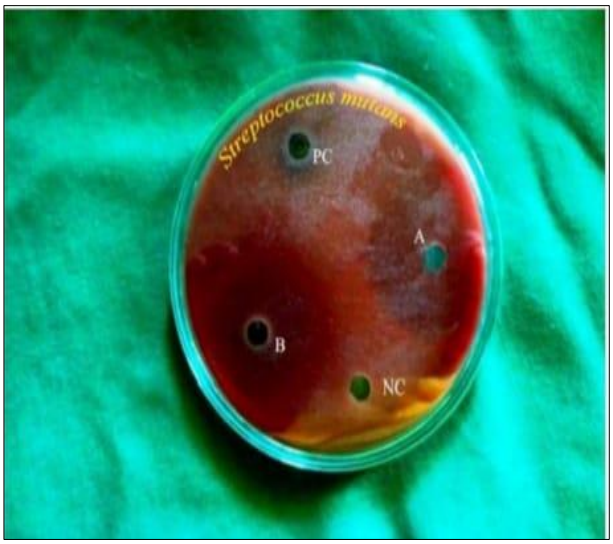

Fig 4: Antibacterial zones of inhibition against *Streptococcus mutans* (14.6 mm)

Fig 5: Antibacterial zones of Antibacterial zones of inhibition against *Lactobacillus acidophilus* (12.3)

Conclusion

Thus, the current investigation leads us to the conclusion that *Solanum nigrum* are effective antibacterial agents against *Streptococcus mutans*, *Streptococcus sanguis*, and Streptococcus *Lactobacillus acidophilus*, salivarius, and Streptococcus mitis. and aslo traditional use of plants for dental and oral health care, which demonstrated the widespread use of oral health plants grown by Tamil Nadu villagers or ethnic groups.

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