

VOLUME 9 (SPECIAL ISSUE 1) 2023

ISSN 2454 – 3055

Guest Editor: Dr. S. Mohanasundaram
Assistant Guest Editor: Dr. S.S.Syed Abuthahir

**INTERNATIONAL
JOURNAL OF
ZOOLOGICAL
INVESTIGATIONS**

*Forum for Biological and
Environmental Sciences*

Published by Saran Publications, India



International Journal of Zoological Investigations

Contents available at Journals Home Page: www.ijzi.net

Editor-in-Chief: Prof. Ajai Kumar Srivastav

Published by: Saran Publications, Gorakhpur, India



ISSN: 2454-3055

Effectiveness of Siddha Formulation Kalipakku Tooth Powder: A Review

Keerthika R.^{1*}, Deepa R.², Periyasami D.¹, Mahadevan M.V.¹, Mahalakshmi V.³, Samundeswari P.⁴ and Muthukumar N.J.⁴

¹Department of Pura Maruthuvam, National Institute of Siddha, Chennai, India

²Siddha Reginal Research Institute, Pudhucherry, India

³Department of Siddhar Yoga Maruthuvam, National Institute of Siddha, Chennai, India

⁴Department of Varma Maruthuvam, National Institute of Siddha, Chennai, India

*Corresponding Author

Received: 28th January, 2023; **Accepted:** 17th March, 2023; **Published online:** 13th April, 2023

<https://doi.org/10.33745/ijzi.2023.v09ispl1.019>

Abstract: The Siddha system of medicine is one of the indigenous medical systems that is mostly practiced in South India. The raw materials used to make the remedies in this system include plants, minerals, metals, and animal products. Dental caries and periodontal diseases are the two most challenging oral health problems faced worldwide. Kalipakku Tooth Powder is a herbomineral Siddha formulation indicated for dental problems. It effectively cleans plaque and stains of teeth. It is recommended for halitosis and gingivitis. This review is focused on the pharmacological activity of this medicine to present scientific evidence for the therapeutic application of this Siddha tooth powder. The majority of its medications include astringent, antiseptic, anti-microbial, and anti-oxidant properties. Consequently, this supports its use as teeth powder. The components of Kaliakku tooth powder have been shown to have characteristics against dental problems and to be beneficial in maintaining oral hygiene.

Keywords: Siddha system, Tooth powder, Gingivitis, Kalipakku, Oral hygiene, Dental caries, Periodontal diseases

Citation: Keerthika R., Deepa R., Periyasami D., Mahadevan M.V.¹, Mahalakshmi V., Samundeswari P. and Muthukumar N.J.: Effectiveness of siddha formulation kalipakku tooth powder: Areview. Intern. J. Zool. Invest. 9(Special Issue 1): 122-127, 2023.

<https://doi.org/10.33745/ijzi.2023.v09ispl1.019>



This is an Open Access Article licensed under a Creative Commons License: Attribution 4.0 International (CC-BY). It allows unrestricted use of articles in any medium, reproduction and distribution by providing adequate credit to the author (s) and the source of publication.

Introduction

Ancient and modern cultures both use medicinal plants to treat illness. Due to the fact that plants naturally contain therapeutic components, Siddha and other Indian systems of medicine primarily utilize plant-based medications or formulations to treat a variety of human illnesses. Siddha medicines are utilized in dentistry to treat a

variety of dental conditions. The traditional usage of organic phytochemicals derived from plants is thought to offer advantages over synthetic compounds (Indian Medicinal Plants, 1995).

Due to their increased prevalence and negative consequences on a person's quality of life, oral diseases are a significant public health problem

(Butt et al., 2009). The World Health Organization (WHO), stated that-- A practical way to lessen the burden of oral illness, preserve oral health, and improve quality of life is to promote oral health. Among the most common dental conditions affecting people globally as well as in the Indian population are periodontal diseases, dental caries, malocclusions, and oral cancer. Dental caries, which can affect 60–80% of youngsters, is a significant public health issue in India (Nadkarni, 1976; Agarwal *et al.*, 2010).

Herbal extracts have been used successfully in dentistry as analgesics, antiseptics, antioxidants, antimicrobials, antifungals, and plaque-fighting agents as well as for lowering inflammation and avoiding histamine production. Additionally, they promote recovery and are successful in reducing microbial plaque in gingivitis and periodontitis, enhancing immunity. The Siddha classical text Pathaartha Guna Sinthamani recommends methods to prevent various dental problems and rules for maintaining oral hygiene. To prevent the diseases of teeth and gum, this text states that the teeth are cleaned with materials of powders, leaves, and twigs of astringent taste. Dental diseases are classified as Pal Noiga (Tooth disorders) and Palladi Noigal (Disease of the Gums) and their treatment methods are illustrated in Siddha system (Damle, 2010).

The Siddha system can distinguish between 32 types for internal medicines and external applications. Tooth powder is one among external medicine. Oral hygiene products are among the earliest creations ever made by humans. Around 3000-5000 BC, the ancient Egyptians invented dental tooth powder. Various things, including egg shells and oxen bones, have been ground into ashes and used as teeth powder. Because of its detoxifying properties, using charcoal-based toothpaste to clean the teeth is becoming more and more common. Parpam is a unique substance created by calcining and burning cow dung ash. Parpam is regarded as an old Indian nanomedicine that can prevent free radical

damage, neutralize toxic acids, and preserve optimal alkalinity (Murugesu Muthaliyar, 2003).

Despite the effectiveness of many commercially available chemical toothpaste formulations, there is always a growing societal desire to rely on naturally occurring substances for oral health care. This study is attempted to evaluate the impact of *Kalipakku* tooth powder on oral hygiene.

Trail drug:

The *Kalipakku* tooth powder (KTP) is a poly herbal Siddha formulation described in this study which is chosen from the Siddha classical text, Gunapadam mooligai vaguppu. The preparation of this tooth powder is simple, cost-effective and ingredients are easily available throughout the year.

Ingredients and preparation of tooth powder:

KTP contains five herbomineral drugs (Table 1) which are taken in equal quantities. The *Kalipakku* is fried and made into powder. Then it is mixed with other powdered ingredients coarsely and mixed well. It is indicated for various dental diseases, halitosis and gingivitis. It effectively cleans teeth of plaque and stains. This is recommended to brush with this KTP twice daily. The current study encompasses the scientific details of phytochemical constituents and activities present in all the five herbals used as the ingredient of KTP.

Pharmacological Activities:

1. Kalipakku:

Areca catechu Linn. is frequently used in the form of different formulations, particularly in powdered form, to cure a variety of ailments. It is one of the basic components of Siddha medicine. *Areca catechu* Linn. was mentioned for its many therapeutic qualities, including its antiviral and antibacterial effects. Betel quid, which also contains lime with or without tobacco, areca nut (*Areca catechu*), and the leaf of the creeping vine piper betel. Chewing betel nut has become

Table 1: Ingredients of Kalipakku tooth powder

S. No.	Ingredients	Botanical name / Chemical name	Parts used
1	<i>Kalipakku</i>	<i>Areca catechu</i>	kernals/nut
2	<i>Kaichukatti</i>	<i>Acacia catechu</i>	Bark, Heartwood.
3	<i>omam</i>	<i>Trchyspermum ammi</i>	Seeds
4	<i>Indhuppu</i>	Sodium Chloride Impura	Rocksalt
5	<i>Padikaram</i>	Aluminium potassium sulphate	Alum

widespread, particularly in several South-eastern Asian nations (Pal *et al.*, 2014).

Prevention of Dental cavities:

To prevent cavities, betel nuts were traditionally added to toothpaste. Betel nuts may have antimicrobial properties, according to laboratory research, which might prevent cavities. But there are safer alternatives to betel nut therapy, and the potential advantages of betel nut therapy are probably not more than the hazards. Since areca nuts have astringent qualities, they are used to make dentifrice. It is thought to make the gum stronger and the breath sweeter. A dentifrice is made from the seed after it has been powdered and reduced to charcoal (Chu, 1995).

Saliva stimulant:

It has been observed that those who chew betel nuts create a lot of saliva. However, it is unlikely that the risks of using it exceed the advantages. Arecoline, Commercial salt hydrobromide has more potent laxative effects than eserine and is a more potent salivary gland stimulant than pilocarpine. It is used in treating horse colic.

Antimicrobial activity:

The alcoholic nut extract exhibited antibacterial activity against *Tricophyton interdigitale*, *Candida albicans*, *Candida tropicalis*, and *Escherichia coli*. Gram positive and Gram negative isolates from both humans and animals were tested against

areca nut extract by spectrometrically assessing the growth of the organisms. It is discovered that areca nut extract is effective against both Gram positive and Gram negative organisms. For Gram positive and Gram negative, the concentrations needed to completely limit growth were determined to be in the range of 3.3–7 mg/ml and 16 mg/ml, respectively. Additionally, the extract was shown to limit the development of the New Castle Disease Virus and the egg Drop Syndrome Virus in embryo culture. It also prevented *Aspergillus flavus* from producing aflatoxin (Uthayamarayan, 2005).

Antioxidant activity:

Using the DPPH radical scavenging test and the Folin-Ciocalteu technique, total phenolic content and antioxidant activity of *Areca catechu* were both measured. The study's findings demonstrated that the antioxidant activities of the water and methanolic extracts of the seeds had greater percentage inhibition than the root and adventitious root, as measured by the 1, 1-Diphenyl-2-picrylhydrazyl (DPPH) assay. The antioxidant activity of the methanol extracts were equivalent to those of BHT and vitamin C and greater than those of the aqueous extracts. These findings imply that the antioxidant properties of areca nut extracts have the ability to shield healthy cells from oxidative damage (Chu, 1995).

2. Kaichukatti (*Acacia catechu*):

Acacia catechu has a variety of pharmacological effects and has been used extensively in the traditional medical system to treat a number of ailments. Due to its potent antioxidant and astringent properties, *Acacia catechu* is extremely valued. It may be used as an astringent to stop chronic wounds and ulcers from leaking as well as for dental, oral, and throat infections. For oral ulcers and aching gums, a topical medication called *Acacia catechu* is helpful (Indian Medicinal Plants, 1995; Subash and Kuttan, 2007).

Role of *Acacia catechu* against Dental plaque:

Acacia catechu, Menthol, and camphor were combined in a dentifrice/herbal tooth powder in the proportions of 91%, 2.7%, and 6.3%, respectively. It has been demonstrated that while menthol and camphor were utilised as flavouring agents, the powder from *Acacia catechu* was effective in removing tartar, plaque, and stains as well as cleaning and polishing tooth surfaces without causing any abrasion. In around 15 days of therapy, a clinical research on this herbal toothpaste demonstrated 87-95%, 70- 72%, and 80-95% reductions in plaque, gingivitis, and dental calculus, respectively.

Antibacterial activity:

The heartwood of the *Acacia catechu* plant has been discovered to be a potent antibacterial. The effectiveness of *Acacia catechu* heartwood extract as a strong antibacterial agent has been demonstrated. It has been discovered that the antibacterial action of *Acacia catechu*'s heartwood is due to the presence of taxifolin (Stiani *et al.*, 2022).

Anticaries activity:

Dental caries, a microbiological disease, destroys the mineralized tissues of the teeth. *Streptococcus mutans* and *Lactobacillus acidophilus* are major contributors to dental caries around the world. In endodontics, *Acacia catechu* heartwood extract can be used to eliminate *Enterococcus faecalis*, which is present in infected root canals and may

be the cause of root canal failure. It also has a high level of activity against oral pathogens and can be used in periodontics to treat dental caries, gingivitis, and mouth sores.

Acacia catechu in Root Canal Treatment:

The primary cause of endodontic failure is *E. faecalis* persistence in the apical area of teeth with filled roots. *E. faecalis* may adhere to root canal walls, accumulate, and organise communities in biofilm. By being more resistant to phagocytosis, antibodies, and antimicrobials than organisms that do not generate biofilm, the bacteria are able to survive and escape being eliminated. Due to their soothing, analgesic, antibacterial, and anti-inflammatory properties, herbs have been used in dentistry.

3. Omam (*Trachyspermum ammi*):

The seeds of the *Trachyspermum ammi* are used as a spice in Iran, Pakistan, India, and the South and Near East. Ajwain seeds are a good source of fiber, vitamins, minerals, and antioxidants. The main phenolic ingredient in ajwain, thymol, has been shown to have antimicrobial, antispasmodic, and germicidal properties. Monoterpenes (20-35% -terpinene and 20-25% paracymene, -pinene, and limonene) and phenols (30-50% thymol and 1-7% carvacrol) are found in ajwain seeds. The main phenolic ingredient in ajwain, thymol, has been shown to have antifungal, antispasmodic, and germicidal properties. Additionally, ajwain has trace levels of additional phytochemicals such as limonene, terpinene, pinene, and cymene. Terpenes, glycosides, and sterols present in plants have been proven to have anti-inflammatory properties (Singh *et al.*, 2004).

Antibacterial property:

Streptococcus mutans and *Enterococcus faecalis* both demonstrated a dose-dependent antibacterial response to ajwain oil. The greatest zone of inhibition for the ajwain oil against *E. faecalis* was 40 mm, and for *S. mutans*, it was 48 mm, both at a concentration of 100 l/ml. 35 mm and 40 mm, respectively, suggesting that

chlorhexidine 0.2% is an effective antibacterial agent when compared to control. It is possible that ajwain's main phenolic ingredient, thymol has antibacterial properties. The clinical treatment of oral microorganisms may thus utilise it (Hajare *et al.*, 2005).

4. *Indhuppu (Sodium Chloride Impura):*

The mineral form of sodium chloride is what is frequently referred to as "rock salt" (NaCl). Source Typically clay and calcium sulphate are present in large layers where it is found in nature. Small white crystalline grains or clear cubes containing it are common. It Act as Carminative , Stomachic, Digestive. It is given in dyspepsia and other abdominal disorders. It promotes the appetite and assists digestion and assimilation. It is a one of the most common ingredient used in toothpaste and toothpowder (Mani *et al.*, 2015).

Antibacterial activity:

The oral rock salt water rinses alkalize the oral environment, and an acidic environment promotes bacterial development, according to findings provided in the dental literature. Additionally, antimicrobial mouthwash rinses can lessen the amount of infectious dental plaque, but they cannot entirely eradicate the presence of viruses in saliva. When studying children who used water and rock salt, There was a decrease in bacterial biofilm and, more generally, in plaque indices; when examining adults with gingivitis, Mani *et al.* (2015) confirmed the effectiveness of the dental health of those who used a sea salt mouthwash (Hoover *et al.*, 2017).

5. *Padigaram (Aluminium potassium sulphate):*

This alum is available in nature and found in combination with special form of clay in places such as Nepal, Kathiyawar, Punjab, Bihar. The alum is separated from the clay. This appears like clusters and white in colour. It has sweet, sour and also astringent in taste. The alum is dissolved in water filtered, then boiled and dried to get purified form. It has astringent, antiseptic and antispasmodic in actions. 35 g of alum dissolved

in 10.4 ml of water is used as mouth wash. It is used to treat gingivitis (Putt *et al.*, 1996).

Use of alum against dental diseases:

In dentistry, alum is used extensively. From its clinical effectiveness to its pharmacological application in the creation of dental materials and equipment, it has a variety of uses. In dentistry, the use of alum as an anti-caries agent has been investigated. Alum's dental caries treatment process and fluoride's dental caries treatment mechanism may be fairly comparable. Alum was demonstrated to have anti-caries benefits when used as an aluminium rinse in clinical settings. In a rat experiment, alum demonstrated anti-caries properties. Rats' *S. sobrinus*-infected dentine was treated with aluminium preparation $AlK(SO_4)_2$, which was observed to reduce caries fissures on both the smooth surface and the sulcus.

Siddha literature refers to brushing as *Dhandhavanam*. Ancient peoples utilized the twigs and tooth powders of certain plants to brush their teeth, and this custom is still practiced in many areas today. The twigs themselves included therapeutic elements needed to maintain and clean teeth. It should only be done in maintaining the *Kukudasanam* position (Hen posture). Chewing is required to break one end of the twig. For cleaning teeth, the crushed end that looked like a brush was utilized. The bristles were created by chewing the twig's edges, which prevented the formation of dental plaque. The mouth is a mirror of the body. Our whole health depends on maintaining proper dental hygiene. Preventing gingivitis and cavities begins with managing the quantity and quality of the oral biofilm. Dental caries/plaque is an infectious illness that is quite common and has been linked to major health issues. The present study developed a novel composition to provide a remedy for oral health issues (Babu and Madhavi, 2005).

It is clear from the above mentioned literature review that KTP's ingredients have pharmacological properties like antibacterial,

anti-inflammatory, analgesic, wound-healing property, anti-microbial, anti-oxidant, and antiseptic activity, which give rise to the therapeutic indications claimed in traditional Siddha literature. The physiologically active chemicals found in herbs are what give them their therapeutic benefits. KTP effectively cleans teeth plaque and is recommended for halitosis and gingivitis (Kleber and Putt, 1984).

Conclusion

The ingredients of *Kalipakku* tooth powder is found to have properties against dental diseases and found to be effective in oral hygiene maintenance. It could be an alternative to the commercially available Tooth powders. Further studies should be carried out to explore its activity and KTP can be used effectively to treat the dental problems.

Acknowledgements

The authors extend gratitude to Prof. R. Meenakumari, Director, National Institute of Siddha for supporting this study.

References

Agarwal V, Khatri M, Singh G, Gupta G, Marya CM and Kumar V. (2010) Prevalence of periodontal Diseases in India. *J Oral Health Community Dent.* 4: 7-16.

Babu SS and Madhavi M. (2005) Green remedies: Healing power of herbs. *Pustak Mahal*, pp. 55- 56.

Butt AM, Ahmed B, Parveen N and Yazdanie N. (2009) Oral health related quality of life in complete dentures. *Pak Oral Dent J.* 29: 397-402.

Chu NS. (1995) Sympathetic response to betel chewing. *J Psychoactive Drugs* 27: 183-186.

Damle SG. (2002) *Pediatric dentistry.* Arya Publishing House, New Delhi.

Hajare SS, Hajare SN and Sharma A. (2005) Aflatoxin inactivation using aqueous extract of Ajowan (*Trachyspermum ammi*) seeds. *J Food Sci.* 70(1): C29-C34.

Hoover J, Tovar E, Zlatnik T and Karunanayake C. (2017) Efficacy of a rinse containing sea salt and lysozyme on biofilm and gingival health in a group of young adults: A pilot study. *Int J Dent Med.* 2017: 4056708.

Indian Medicinal Plants (1994) A compendium of 500 species, 1st Ed, Orient Longman Ltd, pp. 180.

Kleber CJ and Putt MS. (1984) Aluminum and dental caries. A review of the literature. *Clin Prev Dent.* 6(6): 14-25.

Mani A, Mani S and Anarthe R. (2015) A clinical pilot study to evaluate the efficacy of sea salt based oral rinse in gingivitis patients. *Int J Exp Den Sci.* 4: 116-118.

Murugesu M. (2003) *Gunapadam mooligai vaguppu.* Indian Medicine Homoeopathy Chennai, 7th Ed, pp. 260.

Nadkarni K.M. (1976) *Indian Materia Medica*, 3rd Ed., Bombay Popular Prakashan, Bombay, pp. 1142.

Pal D, Sahu CK and Hakdar A. (2014) Bhasma: The ancient Indian nanomedicine. *J Adv Pharm Technol Res.* 5(1): 4-12.

Putt MS, Kleber CJ and Smith CE. (1996) Evaluation of an alum containing mouth rinse in children for plaque and gingivitis inhibition during 4 weeks of supervised use. *Pediatric Dentistry* 18(2): 139-144.

Singh G, Maurya S, Catalan C and De Lampasona MP. (2004) Chemical constituents, antifungal and antioxidative effects of ajwain essential oil and its acetone extract. *J Agric Food Chem.* 52(11): 3292-3296.

Stiani SN, Susanti L and Indriatmoko DD. (2022) Formulation and anti-bacterial activity test for liquid soap betel nut extract (*Areca catechu* L.) against *Staphylococcus aureus*. *Res J Pharmacy Technol.* 15(3): 1003-1007.

Subash RR and Kuttan R. (2007) Antibacterial, antifungal and antiviral activity of Areca nut (*Areca catechu* Linn). *Amala Res Bull.* 27: 244-251.

Uthayamarayan CS and Siddhar Aruvai M. (2005) *Directorate of Indian Medicine Homeopathy, Chennai*, 4th Ed.

WHO Health (2006) Action plan for promotion and integrated disease prevention. New York: World Health Organization.