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The Effects Of Streblus Asper Against Growth Of Bacteria In Mouth

Oatthaya Kongsinkaeo[1*]
[1]Boonwattana School, Hua Thale, Nakhon Ratchasima, Thailand 30000

***Corresponding Author:**
Oatthaya Kongsinkaeo[1*]
[1]Boonwattana School, Hua Thale, Nakhon Ratchasima, Thailand 30000

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Abstract

The oral cavity is where a large number of bacteria accumulate. Due to biofilm accumulation and development, the most common oral infections are caries and gingivitis—periodontitis. Many researchers have focused on the various types of peach that can be extracted as an antimicrobial and anti-inflammatory agent, which has led to adding herbal extracts to beauty products. *Streblus asper* is a medicinal plant that can be used to treat gingivitis. Relieves fever and toothache. Indian traditional medicine says *S. asper* is used to treat diabetes. Several researchers have described the varied in vitro and in vivo biological activities of *S. asper*. It has been discovered that several sections of this plant have cardiotonic, antifilarial, anticancer, antibacterial, anti-allergic, and antimalarial properties. *S. asper* is its antioxidant and antimicrobial properties derived from polyphenol components. Research has revealed the antibacterial effectiveness of *S. asper* leaf extract against oral and nasopharyngeal pathogens, particularly *S. mutans*. Bactericidal activity has been demonstrated for a 50% (v/v) ethanol extract of *S. asper* leaves. The extract was selectively bactericidal against Streptococcus, particularly *S. mutans*, which is substantially linked with dental caries. Studies have also shown that it has a specific bactericidal effect against Streptococcus and *S. mutans*, which have been linked to caries. Therefore Streblus asper extract has the potential to be used as a natural tooth decay agent.

Keywords: Streblus asper, oral cavity, oral hygiene

Introduction

The oral cavity is where a large number of bacteria accumulate [1, 2]. The most common oral infections are gingivitis and periodontitis [1, 2]. Many researchers have focused on the various types of peach that can be extracted as an antimicrobial and anti-inflammatory agent, which has led to the addition of herbal extracts to beauty products [3]. *Streblus asper* Lour, or Moraceae, is a medicinal plant that can be used to treat gingivitis [4]. Relieves fever and toothache [5]. Indian traditional medicine says *S. asper* is used to treat diabetes, but recently it has been reported that α-amyrin acetate isolated from *S. asper* and *S. asper* stem bark petroleum ether extract can counteract the antidiabetic activity of streptozotocin [6]. Chlorhexidine-containing mouthwash is the most effective chemical used for antimicrobial activity. But there are many disadvantages of mouthwash, such as Discoloration of teeth, dry mouth, enamel erosion, etc.But herbal mouthwash is the best choice. Because it does not contain alcohol or chemicals, it causes no side effects or negative effects on teeth. By studying, we will use extracts from the leaves of Asperstrabulus [7]. *Streblus asper* belongs to the family of Moraceae which is a small tree mostly found in tropical countries like India, Sri Lanka, Malaysia and Thailand. It is known by various names such as Bar-inka, Berrikka, Rudi, Sheora, Koi it is also known as toothbrush tree [8]. In India it is known by its several vernacular names, the most commonly used ones being Shakhotaka (Sanskrit), Siora (Hindi), Sheora (Bengali) and Piray (Tamil) [9]. It has been used to treat leprosy, hemorrhoids, diarrhea, dysentery,

filariasis and cancer, as a shrub or gnarled in various *S. asper* biological experiments. The medicinal properties of this plant are associated with heart, nerve fibers, anticancer, antimicrobial, antiallergic and antimalarial properties [10]. The microbiome has evolved to respond to lifestyles and unique genotype-defining factors [10]. The oral microbial ecology has a wide range of biological features suitable for the accumulation of bacteria on the gingiva, tongue, cheeks, hard and soft palate, floor of the mouth, throat, saliva and teeth [10, 11].

The normal microbiome consists of bacteria, fungi, viruses, archaea, and protozoa [12, 13]. However, reports about the normal microbiome are limited to bacteria and there are very few reports to mention the different types of microbiome [14]. Approximately 700 species of prokaryotes have been identified in it [15]. These species belong to 185 genera and 12 phyla, of which approximately 54% are officially named, 14% are unnamed (but cultivated) and 32% are known only as uncultivated phylotypes [16]. The 12 phlya are *Firmicutes*, *Fusobacteria*, *Proteobacteria*, *Actinobacteria*, *Bacteroidetes*, *Chlamydiae*, *Chloroflexi*, *Spirochaetes*, *SR1*, *Synergistetes*, *Saccharibacteria* (TM7) and *Gracilibacteria* (GN02) [17]. The diversity in the microbiome is specific, although they are similar but include a wide variety of microbes, including anaerobic and anaerobic. Areas of low microbial diversity include the buccal mucosa and palate [17]. The oral microbiome may exhibit large and rapid changes in both spatial and transient dynamics composition and activity, these multiplexed imbalances are the result of a number of factors, such as host and food transient frequency. response to the change of pH reaction between bacteria [18, 19]. The symbiotic relationship between bacterial oral microorganisms is generally harmless, bacteria are pathogenic only if they break the barrier of commensals, causing infection and disease. The main bacteria found in healthy oral cavity are as follows [7, 20, 21];

Gram Positive:

Cocci – Abiotrophia, Peptostreptococcus, Streptococcus, Stomatococcus

1. Rods – Actinomyces, Bifidobacterium, Corynebacterium, Eubacterium, Lactobacillus, Propionibacterium, Pseudoramibacter, Rothia.

Gram Negative:

1. Cocci – Moraxella, Neisseria, Veillonella
2. Rods – Campylobacter, Capnocytophaga, Desulfobacter, Desulfovibrio, Eikenella, Fusobacterium, Hemophilus, Leptotrichia, Prevotella, Selemonas, Simonsiella, Treponema, Wolinella.

Ethnomedicinal uses of *Streblus asper*

S. asper is a member of the family Moraceae, is a tiny tree also known as Siamese rough bush, Koi, Bar-inka, Berrikka, Rudi, Sheora, Serut, and toothbrush tree [9, 22]. The leaves are between 2 and 4 inches long, inflexible, oval-shaped, with unevenly spaced teeth, and borne on tiny petioles. The flower heads of staminate flowers are spherical with minute florets. The peduncles of pistillate flowers are longer [10, 13]. It is a medicinal plant native to several Asian nations, including India, Southern China, Sri Lanka, Malaysia, the Philippines, and Thailand [23, 24]. Streblus asper contains a high concentration of cardiac glycosides. Reichstein and colleagues isolated more than 20 cardiac glycosides from the root bark of *S. asper* and were able to structurally characterise 15 of these compounds, primarily through degradative techniques [25, 26]. These compounds include kamloside, asperoside, strebloside, indroside, cannodimemoside, strophalloside, strophanolloside, 16-O-acetyl-glucogitomethoside, glu

α-amyrin acetate, lupeol acetate, β-sitosterol, α-amyrin, lupeol diol, strebloside, and mansonin have been isolated from the stem bark of this plant. Additionally, sioraside, a pregnane glycoside, has been identified [27]. The aerial portions included n-Triacontane, tetraicontan-3-one, β-sitosterol, stigmasterol, betulin, and oleanolic acid [28]. An unidentified cardenolide, β-sitosterol, α-amyrin, and lupeol were extracted from root bark and leaves. The volatile oil from fresh *S. asper* leaves was produced as a brown liquid with a 0.005% yield. phytol (45.1%), α-farnesene (6.4%), trans-farnesyl acetate (5.8 percent), caryophyllene (4.9%), and trans-trans-α-farnesene were the primary components of the volatile oil (2.0%) [29-31]. An α-copaene, δ-elemene, caryophyllene, geranyl acetone, germacrene, -

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cadinene, caryophyllene oxide, and 8-heptadecene were the remaining components [32].

Pharmacological properties

Several researchers have described the varied in vitro and in vivo biological activities of *S. asper* [11]. It has been discovered that several sections of this plant have cardiotonic, antifilarial, anticancer, antibacterial, anti-allergic, and antimalarial properties [33]. *S. asper* has attracted a great deal of interest comparable to tea since its polyphenolic constituent is a potent anti-oxidant, and earlier research has revealed several biological activities and parameters of metal biosorption [34]. This plant has been utilised in Ayurveda and other traditional remedies to cure various illnesses, including filariasis, leprosy, toothaches, diarrhoea, dysentery, and cancer [35]. Chemically, this beverage made from tea leaves is distinguished by the presence of health-promoting polyphenols and flavonoids. Due to its gritty texture, Streblus asper leaves and branches were the most favoured in Thailand for cleaning teeth in the past [34]. In addition, these components have an astringent test in Ayurveda for the treatment of wound healing [34]. This plant is no longer popular because of the widespread usage of toothpaste. However, the most significant positive benefits of *S. asper* are its anti-oxidant and anti-microbial properties derived from polyphenol components [36]. The essential elements in tea leaves are polyphenols. *Streptococcus mutants* (*S. mutants*) is a gram-positive bacteria that is the agent responsible for tooth-rotting [37]. Mutants of Streptococcus produce extracellular water-insoluble glucans via glucosyltransferase (Gtase) [38]. The glucans are produced from sucrose by the coordinated activities of Gases and have high adhesion to many solid surfaces, including tooth surfaces [39]. The adhesion causes dental plaque buildup and the development of dental caries [40, 41].

For Oral Hygiene

Research has revealed the antibacterial effectiveness of S. asper leaf extract against oral and nasopharyngeal pathogens, particularly *S. mutans* [31]. Bactericidal activity has been demonstrated for a 50% (v/v) ethanol extract of *S. asper* leaves [12]. The extract was selectively bactericidal against Streptococcus, particularly *S. mutans*, which is substantially linked with dental caries [11]. The extract showed no impact on *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Staphylococcus coagulase*-positive, *Staphylococcus coagulase*-negative, *Serratia marcescens*, *Klebsiella pneumoniae*, Enterobacter, *P. aeruginosa*, *Burkholderia pseudomeallei*, or *Candida albicans* cultures. The lowest growth inhibitory concentration and minimum bactericidal concentration of S. asper extract against 108 CFU per millilitre of *S. mutans* were 2 mg/m1 [10, 31].

In vitro (HBEC), the effects of a sublethal dosage of *S. asper* leaf ethanolic extract on the adhesion of Candida albicans to human buccal epithelial cells were investigated *in vitro* [8, 12]. The results suggested that the sublethal dose of this extract may alter candidal colonisation of the oral mucosa, inhibiting the pathogen's invasive potential [24]. The antibacterial efficacy of a mouth rinse containing *S. asper* leaf extract against *S. mutans* and total salivary bacteria following a single 60-second rinse was determined using an in vivo one-group time-series design and a single-blind trial [22]. The results indicate that a mouth rinse containing leaf extract from S. asper can eliminate *S. mutans* without altering oral ecology. The impact of *S. asper* extract solution at a concentration of 0.5 percent (w/v) on the adhesion of *S. mutans* to glass surfaces was examined [42, 43]. However, no substantial inhibition of bacterial adhesion to glass surfaces was observed [42, 43]. In addition, a single-blind, crossover trial was conducted to examine the efficacy of the mouth rinse containing *S. asper* leaf extract on gingivitis and plaque development [44]. The results demonstrated that the *S. asper* leaf extracts significantly affected gingival health only when used in mouth rinses [1]. It decreased the gingival index but had no discernible effect on plaque development [45].

Leaf extract of *S. asper* was evaluated in vitro for its antibacterial activity against six anaerobic bacteria: *Porphyromonas gingivalis* W50, *Prevotella intermedia*, *Actinomyces naeslundii* (T14V), *Peptostreptococcus micros*, and *Actinobacillus actinomycetemcomitans* ATCC 43717 and ATCC 43718. It was shown that 15 l of the leaf extract at 250 and 500 mg ml1 inhibited the growth of all investigated bacterial strains except *A. actinomycetemcomitans* ATCC 43701. *P. intermedia* and *A. naeslundii* were immune to the extract's bactericidal properties (T14V) [46, 47]. Although the

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extract did not suppress the growth of *A. actinomycetemcomitans* ATCC 43717 when tested using the disc diffusion method, it did so using the broth microdilution method [14, 48]. *S. asper* is used to inhibit mutant Streptococcus growth [38]. The most fundamental misconception concerns the numerous components of the evergreen *S. asper* plant. The most common methods of processing are brewing and hot water extraction [49]. The leaves of *S. asper* contain chemical compounds that may be involved in the plant's defense against invading diseases, bacteria, and fungus [49]. Polyphenols and flavonoids are the fundamental organic components that are often extracted using hot water. Asperoside, Strebloside, and Mansonin are the primary biologically active glycosides of *S. asper* [49]. Some studies demonstrated the cytotoxicity of S. asper extract against human cancer cells, which promoted human health and prevented diarrhoea in albino rats [15, 39]. The leaf extracts of *S. asper* contain triterpenoids, polyols, sugar acids, aldehydes, diterpenes, terpenes, carboxylic chemicals, and sugar [50]. The polyphenol showed efficiency in inhibiting bacterial growth [50]. The polyphenolic compounds found in plants exhibited favourable qualities for the development of *S. mutants* as well as antibiofilm action [50]. Streptococcus mutations isolated from the volunteers' saliva grew enormously on nutrition medium, which was then used to select and test mutants using MS media [50]. The counting method determined the number of bacteria at a tenfold dilution of four. The most significant number of streptococci bacteria was seen when incubated for 36 hours; this is the log phase of growth [28, 34]. It was demonstrated that additional streptococci were excluded from this investigation due to their conditions [51]. The addition of sucrose or bacitracin has been demonstrated to reduce the number of bacteria. in the MS medium base or the addition of MS medium with sucrose of 2.5% [52]. In contrast, the number of bacteria growth in MS medium with sucrose of 2.5% and 1.0 unit of bacitracin did not demonstrate a statistically significant difference between sucrose of 2.5% and 2.0 unit of bacitracin. In varying doses, S. asper extracts were incubated with 1.0106 log-phase *S. mutant* cells [52]. The extracts of the S. asper leaves at concentrations of 4.0, 6.0, and 8.0% w/v exhibited statistically significant differences in the percentage of inhibition compared to other concentrations [52]. However, the extracts of the *S. asper* leaves at a concentration of 4.0% w/v exhibited the best effect on the survival of *S. mutant* cells [53]. The survival rates of *S. mutants* treated with *S. asper* leaf, bark, and branch extracts were 25.551.26, 40.460.65, and 37.303.90%, respectively [53]. Microorganisms are inhibited by *S. asper*, which contains high polyphenolic compounds. Similar to what was previously reported, it was discovered that *S. asper* extract inhibited microorganisms potently [53]. Our conclusion is consistent with prior findings that tea polyphenols might suppress the proliferation of S. mutants because of their anti-oxidant properties.

Conclusion

The *S. asper* branch has been used as a toothbrush to strengthen teeth and gums. Studies have also demonstrated that it has a specific bactericidal action against Streptococcus, particularly *S. mutans*, which has been significantly linked to dental caries. Thus, *S. asper* extract has the potential to be employed as a natural caries-controlling agent. Strebloside and mansonin have been identified as the anticancer components. In addition, the volatile oil from the fresh leaves has demonstrated anti-tumour action. According to studies, *S. asper* contains cardiotonic, antimalarial, anti-allergic, antitrypanosomal, and insecticidal effects. It is, therefore, a highly significant ethnomedicinal plant whose potential has not yet been thoroughly explored. There is a growing global interest in herbal remedies, supported by an increase in laboratory research into the pharmacological characteristics of the bioactive constituents and their capacity to cure various disorders. Through the investigation of ethnopharmacology and traditional medicine, several medications have entered the global market. Although many Indian botanicals have been the subject of scientific research, far fewer commercial pharmaceuticals or phytochemical entities have entered evidence-based treatments. Therefore, it is necessary to establish and confirm data about the safety and use of Ayurvedic medications. The leaf extracts of *S. asper* might be used to produce tooth powder, mouthwash, and gum care products.

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