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CLINICAL EFFECTIVENESS OF *HIBISCUS SABDARIFFA* (ROSELLA) IN DENTISTRY: A MINI-REVIEW: ROSELLA IN DENTISTRY

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ABSTRACT

In today's global scenario dental health maintenance have become a matter of concern. In order to overcome these several treatment modalities have been devised using a wide range of technologically advanced products as well. However taking into consideration the monetary refrains, toxicity levels still continue to persist amidst all this. Hence to overcome these herbal alternatives are being researched. Their high viability, biocompatibility and cost effective manner paved the way for the utilization of more herbal additives in dental treatment and management. *Hibiscus sabdariffa* is a common herb found along Indian tropical land. This herb have been investigated to possess high medicinal value which has been found to be beneficial to the general health of the individual, hence this review will evaluate the profound applications of *Hibiscus sabdariffa* in dentistry.

Keywords: Dental health, Herbal extract, *Hibiscus sabdariffa*

INTRODUCTION

Dental health is considered to be an integral part of general health and well being of the individual. Deterioration of dental health hampers the quality of life as it undeniably hinders with individual's speech, mastication, aesthetics and good health of the individual [1]. In today's global scenario dental diseases appears to one of the significant and rapidly progressing health concerns affecting mankind. Treatment for oral diseases also signifies to be one of the most expensive treatment modalities [1]. However the anticipated requirement of oral hygiene measures and accessibility in receiving these dental services still assumes to be beyond the trails of reach for population especially those belonging to developing nations. The existing dental health scenario have research well and over the retaining and substantiating the antimicrobial properties of different products. Several commercialized dental products due to its high antimicrobial effects are being broadly utilized however inspite of highly potential activity against microorganisms most of them continue to possess the inherent side effects of oral mucosal irritation, staining, burning sensation etc. [2]. Hence then came into light the need for exploring plant derivatives which would provide harmless and acceptable dental solutions for the

existing dental problems. These scientific queries led to the definition that herbal ingredients along with multiple designed combinations have been studied to provide comparatively safe and effective cure of dental diseases [3].

Scientific studies in the field of Natural Medicine have confined the fact that the preexisting inherently available constituents in medicinal plants provides a better confinement of restoring health with considerably less or minimal side effects. The utilization of herbal products not only reduces the harmful effects of existent commercial products but also provides a detailed preventive and maintenance modalities in defining and restoring normal oral health status. A wide variety and species variants of herbal plant extracts have been found to exhibit a highly active properties which is found to reestablish the deteriorating oral health. The naturally grown herbal species have been investigated in detail as they have been determined to possess highly lucrative medical benefits with significant oral merits as well. These traditional herbs produces subsidiary biproducts which can be effectively utilized in the preparation and manufacture of novel drugs and medicaments in the treatment of dental diseases. Today, oral

care products combined with medicinal plant extracts are gaining high interest due to their low toxicity and less side effects all over the world out of the most commonly available extracts of herbal origin include tulsi, oregano, green tea, curcumin, aloe vera, mint and rose mary [4, 5].

The existence of evidence based literature thereby establishes the determining fact that these available natural herbal extract have had tremendously remarkable and satisfactory microbial inhibitory effects thereby preventing the occurrence of dental caries and periodontal diseases. Apart from these herbal medications and products possess one of the greatest advantage of being sugarless and alcohol free when compared to other commercially available products. However one such commonly grown herb is *Hibiscus sabdariffa* which had already found its wide application in medicine. This review will discuss in detail about the dental implications of *Hibiscus sabdariffa*, widely grown herb in Indian subcontinent which has proven its undeniable medicinal properties [5].

***Hibiscus sabdariffa* (Rosella)**

Hibiscus sabdariffa (Rosella) is a tropical herb which belongs to Malvaceae family. The first evidence of *Hibiscus sabdariffa* was estimated to be in West Africa. Apart from West Africa it is also found to have a wide

variety of distribution across Asia including various parts of tropics. It has a spread out from India across over to Malaysia. There exists two varieties of Hibiscus which include *H. sabdariffa* var altissima Wester and *H. sabdariffa* varsabdariffa [6]. The flowers of this herb appears to be yellow in color and calyces appear red and green. Tropically this herb is cultivated for large scale production of fiber from it's stem. The plant is proven to possess numerous beneficial effects beginning from stem, leaves, calyces to seeds. The plant is commonly cultivated for the production of bast fiber from the stem of the plant. This forms an inevitable part in daily culinary and large scale industrial production involved in the manufacture of drugs and other fiber products [6].

APPLICATIONS IN DENTISTRY

ANBACTERIAL AGENT

H.sabdariffa L calyx extract constitutes of multitude of phytochemical components. These include phenols, tannins, saponins, flavonoids, glycosides and triterpenoids. The extensive studies conducted by Purba *et al* on determining the antimicrobial properties of *H. sabdariffa*, it was furnished that the saponins present in it exhibited remarkable antibacterial activity bacterial cell wall penetration [7]. Fauzi A *et al* conducted wide range of studies on the polyphenol component

namely tannins present in rosella and stated that these polyphenols have the innate potential aggregation of platelets thereby promoting platelet plug formation which signifies the fact that it can be used as an ideal astringents on injured blood vessels as well as in regeneration of gingival tissue [8]. Jagani S *et al* described in her experimental studies that the phenolic component present in it supposedly possess evident activity against biofilm of *P. aeruginosa* [9]. In another antibacterial study conducted on flavonoid by Achmad MH *et al* proved that these flavonoids acts as inhibitor of GTF enzyme produced by *S.mutans* which forms the most significant pathogenic microorganism in formation and progression of dental caries [10]. Studies on *H.sabdariffa* conducted by Nagarajappa *et al* . established the findings that both the aqueous and ethanol extracts thus obtained have significant inhibition against *L. acidophilus* and *S. mutans* [11]. The study demonstrated the therapeutic potential of the plant extract against two proven cariogenic bacteria. The triterpenoids present in rosella have been studied by Raja AF *et al* who has justified his findings satting that it inhibited formation of biofilm of both *Actinomyces viscosus* and *S. mutans* [12]. The remaining group of glycosides is found to be antimicrobial against a group of

microorganisms including *S.mutans* and *Lactobacillus* groups, hence Rosella is being commercialized as mouth washes due to its high antibacterial properties [13].

ANTIPLAQUE PROPERTIES

Dental plaque formation on the surfaces of teeth and gingiva hampers the normal healthy stature and maintenance of oral tissues. To prevent this aggressive accumulation of dental plaque numerous adjunct oral rinses and tooth pastes have been introduced commercially claiming the beneficial effects on reduction of plaque formation [14]. The flavonoids present causes inhibition of cytoplasmic membrane thereby dissolving it resulting in lack of formation of bacterial plaque [15]. Studies conducted by Ruban *et al.*, validated the fact that 4% *Hibiscus sabdariffa* extract inhibits *Staphylococcus aureus* growth thereby preventing dental plaque formation [16]. Imran H *et al.*, in his research has very clearly defined the fact that Rosella flower petals possess different amino acids along with vitamins and polyphenols which when added along with starfruit juice shows significant inhibition of primary colonizers of dental plaque formation [17]. Samaranayake LP *et al.*, have stated that *Hibiscus sabdariffa* is capable of inhibiting bacteria namely *Porphyromonas gingivalis* (P.917), *Prevotella intermedia* (P.

intermedia), *Fusobacterium nucleatum* (*F. nucleatum*), and *Aggregatibacter actinomycetemcomitans* (*A. actinomycetemcomitans*) which is capable of inducing periodontitis [18, 19].

DICLOSING AGENT

Dental plaque appears to be highly transparent and hence it remains hidden from direct vision when visualizing the oral cavity. The ideal method for visualizing these transparent dental plaque is by the application of any contrast material in the form of gel or liquid which are termed as disclosing solutions [20]. However almost all available synthetically commercialized disclosing agents do contain side effects of mucosal irritation and unwarranted taste. However since then researchers have conducted an array of experiments of introducing herbal products as disclosing agents due to its beneficial effects of easy availability, cost effective, acceptable taste and non irritant to contact tissues. *Hibiscus sabdariffa* contains anthocyanin which induce dark red color. Nurilawaty V et al., in this study hence clarified that Rosella extract has to be made available as the ideal disclosing agent in gel form due to its superior properties [21].

ACRYLIC DENTURE BASE STRENGTHENER

Polymethyl methacrylate (PMMA) denture base resins is constitutes of very low or negligible fatigue resistance and comparatively very much declined impact strength. However in order to overcome these demerits, addition of natural fibres to these polymeric materials have been evaluated to provide with better strength properties [22]. *H. sabdariffa* fibers have high strength, high toughness and stiffness, low density and good tensile modulus. These natural fibres of *H. sabdariffa* therefore have been incorporated into these polymeric materials [23]. Okeke KN et al., conducted research studies to analyse the above fact and hence proved and explained that on utilization of *H. sabdariffa* fiber of 3mm in lengths and 7.5 wt% considerably increases the impact strength and fatigue resistance improves the flexural and impact strengths when added to PMMA acrylic resins [24]. Xu J et al., in his research explained in detail that the persistent interfacial bonding between the *H. sabdariffa* fibers and the acrylics fibers resulted in reduction of voids thereby preventing crack propagation and hence enhancing strength of denture base resins [25].

INHIBITOR OF Tissue inhibitor metalloproteinase-1 (TIMP-1)

Tissue inhibitor metalloproteinase-1 (TIMP-1) possess various cellular response including

proliferation of cells, cellular migration and proapoptosis resulting in gingival irritation inflammation post placement of acrylic crown. Hatta LI *et al.*, established the findings that The *Hibiscus sabdariffa* extract cause advanced activation of TIMP-1, thereby increasing the gingival crevicular fluid. The presence of flavonoids may be involved in the inhibition of some of these substances, resulting also in an anti-inflammatory effect [26]. Thus it was hence concluded that on application of 10% of Rosella extract gel on the demarcated area of gingival inflammation post crown placement area after acrylic crown placement evidently could enhance TIMP-1 thereby resulting in no further gingivitis of the specific region [27].

MORPHOLOGICAL PATTERN ANALYSIS

Lip print analysis or Cheiloscopy is been variedly used for anthropometrical evaluation as well as for forensic identification. The lip prints vary for each and every individual and the persistent groove patterns are developed during 6th week of intrauterine life. The process of obtaining an ideal quality of lip print pattern requires a very sensitive dye. However the existing synthetic dyes including Aluminum powder, silver metallic etc inspite of providing a good quality tends to be irritant to the underlying tissue

with aberrant cytotoxic effects. Naturally obtained dyes are human as well as environment friendly. Meebuathong T *etal* hence on his analysis hence concluded that Hibiscus Sabdariff can be used as an ideal naturally available dye for staining of lip prints without any adverse side effects [28].

DISINFECTING AGENT

Ideally washing aliginate impression in normal water is estimated to reduce only 48% of the surface microbes .Hence there arises the need for environment friendly and non toxic disinfecting agents for the same. Hibiscus Sabdariff is assumed to act as an ideal disinfectant for algininate impressions as it possess advanced antiviral, antibacterial and antioxidant properties. Hence Utama MD *et al* in his research work clearly defined that 10% rosella extract mouthwash can be utilized as an ideal disinfectant for jaw impressions irrespective of any material used [29].

BLEACHING AGENT

Tooth whitening has become the current trend of esthetic concern in today's clinical scenario. Staining on tooth surfaces not only causes an esthetic concern but is accompanied by psychological influence of the patient as well. However taking into considerations the presently available bleaching agents appear and continue to be toxic to the surrounding oral tissues. However taking into

consideration these facts Sugianti N *et al.*, stated that Rosella (*Hibiscus sabdariffa*) contains saponins that can bind colourants. Hence due to this existent property Rosella can be therefore utilized as an adjunct natural tooth bleaching agent [30].

CONCLUSION

In today's global scenario dental diseases have always been a major concern, though there exists large number of synthetically synthesized products these still possess side effects of toxicity to surrounding tissues. However with the advent of herbal extracts these concerns seems to find a validated solution which appears to be non-toxic to both surrounding tissues as well as environment. *Hibiscus sabdariffa* is a common tropical herb found in Indian sub-continent which has already expressed its validity in medicine due to its highly variable beneficial health effects. However due to its inherent antibacterial potential, non-toxic characteristics, high medicinal value and its high biocompatibility defines the need for commercialization of more dental products with *Hibiscus sabdariffa* extract.

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