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Original Research Article

ANTIMICROBIAL EFFICACY OF SIMAROUBA GLAUCA LEAF EXTRACT ON DENTAL PLAQUE MICROORGANISMS

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Abstract

Background & Methods: The aim of the study is to Antimicrobial efficacy of simarouba glauca leaf extract on dental plaque microorganisms. This research involved in-vitro studies to assess phytochemical constituents, antioxidant activity and antimicrobial efficacy of SG against dental plaque microorganisms and followed by formulation of mouthwash and in-vivo evaluation of antimicrobial efficacy by clinical assessment.

Results: TPC of ESG and ASG was found to be 22.37±0.65 and 7.71±0.09mg/g GAE respectively and TFC were found to be 51.28±1.59 and 27.33±0.93 mg/g for ESG and ASG respectively. The results show that ESG contained phenol, flavonoid, nearly twice the concentration as that of the ASG. Analysis for TPC shows there is a significant difference between TPC with ESG and ASG (p= 0.031) and also there is a significant difference between TFC with ESG and ASG (p= 0.047). Values are expressed Mean ± SD for triplicates

Conclusion: The increasing antibiotic resistance of many microorganisms has led to interest in finding of novel therapy for diseases of microbial origin. SG mouth wash is feasible to be used. It is effective against the most common oral microorganisms. Hence, this mouthwash might be well thought out as a simple and effective method for prevention and control of dental plaque and serve as an alternate to chlorhexidine.

Keywords: Antimicrobial, efficacy, simarouba, dental, plaque & microorganisms.
Study Design: Observational Study.

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1. Introduction

Mechanical oral cleanliness measures alongside proficient support and fluorides, a preventive material in various formulae are moderate practices to forestall oral biofilm. On a day today premise the degree of motivation and expertise required for ideal oral cleanliness upkeep might be out of the limit among everyday citizens at large. Assistant to mechanical plaque control strategy, antimicrobial mouth washes are recommended. Most usually and generally utilized antiplaque specialist is chlorhexidine gluconate. Thusly, microorganisms in the biofilm can be multiple times more impervious to pathogenic specialists on utilization of regular antimicrobial treatments or chlorhexidine (1). Taste sensation modification, teeth staining and furthermore advancement of protection from microorganisms are a few potential downsides which handicap its utilization for long haul (2). Headway of historic ways to deal with stay away from plaque arrangement are immediately obligatory. Home grown plants are abundantly existing in India which can be investigated as one such methodology.

In many nations, with developing urbanization and evolving ways of life, the event of oral illnesses stays to increment. This is basically owed to lack in evacuation of plaque by toothbrushing, deficient colleague to fluoride and denied admittance to oral medical services offices. Advancement and rising utilization of food and refreshments high in sugar, as well as tobacco and liquor likewise add to oral circumstances. Financial status, event and seriousness of oral illnesses are firmly related (3). This affiliation happens from youth to more established age, and across populaces in nations. Absence of proper wellbeing offices and furthermore inconsistent dissemination of oral wellbeing experts in many nations exist and also, even in big league salary nations, dental treatment is exorbitant, averaging 20% of personal wellbeing use and 5% of absolute wellbeing use (4). The monetary weight of treating dental caries alone can crush a country's medical services costs. Furthermore, simultaneously, the cost of carelessness of these infirmities is excessively high because of the individual, financial, social and local area influence.

SG is medium-size evergreen tree, growing in height of 15 m with mature root system and straight cylinder-shaped trunk of 40-50 cm in diameter. Its bark is grey in colour outside while inner bark is cream in colour (5). Pinnate compound leaves dark green above, lighter below are organized alternately growing up to 40 cm long, with 10-20 leaflets with an entire margin and rounded leaf tip. After reaching the age of 6-8 years the tree starts to induce flowers. Flowers with yellowish-white petals are arranged at branch-ends, in leaf-axils and panicles.

2. Material and Methods

Present study was conducted for 01 Year. This research involved in-vitro studies to assess phytochemical constituents, antioxidant activity and antimicrobial efficacy of SG against dental plaque microorganisms and followed by formulation of mouthwash and in-vivo evaluation of antimicrobial efficacy by clinical assessment.

One ml of 5 concentrations ranging from 100- 500 µg/ml of each extract dissolved in methanol was added to 0.16 mM 1 ml DPPH. 1ml DPPH in methanol with 1ml pure

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methanol was considered as a control. At room temperature the reaction mixtures were incubated for half an hour and at 517nm their absorbance.

Inclusion Criteria:

1. Adults aged between 22-25 years with minimum 20 natural permanent teeth.
2. Written informed consent and willing to comply with the appointment schedule.

Exclusion Criteria:

1. Antibiotics usage in the last three months.
2. History of any deleterious and parafunctional habits.

3. Result

Table 1: Proximate analysis of SG leaf

Particular	Moisture content (%) w/w	Ash (%) w/w
SG dried leaves (mean±SD)	7.41±0.13	2.36±0.21

Shade dried leaves were subjected to proximate analysis. Moisture content, and ash content of leaves were studied. Leaves contained 7.41 ± 0.13 % moisture and the ash content was 2.36 ± 0.21%.

Table 2: Yield of SG extract

Solvent used	Weight of drug taken	Weight of dried extract	Yield (%) w/w	Color of the extract
Ethyl alcohol	25g	7.8g	32.1	Dark Green
Water	25g	6.7g	27.6	Brown

The yield was 31.2% and 26.8% for ethanol and water extract respectively. ESG extract was dark green in colour whereas ASG extract was brown.

Table 3: Total Phenolic and flavonoid Content of SG extracts.

Extract	TPC expressed as GAE	TFC expressed as RE
ESG	22.37±0.65	51.28±1.59
ASG	7.71±0.12	27.33±0.93
P Value	0.031	0.047

TPC of ESG and ASG was found to be 22.37±0.65 and 7.71±0.09mg/g GAE respectively and TFC were found to be 51.28±1.59 and 27.33±0.93 mg/g for ESG and ASG respectively. The results show that ESG contained phenol, flavonoid, nearly twice the concentration as that of the ASG. Analysis for TPC shows there is a significant difference between TPC with ESG and ASG (p= 0.031) and also there is a significant difference between TFC with ESG and ASG (p= 0.047). Values are expressed Mean ± SD for triplicates

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Table 4: Antimicrobial activity of ESG extract on oral microorganisms showing the ZOI in mm

			ESG extract			
Microorganisms	**Streptomycin**	**CHX 0.2%**	**1.5 mg/ml**	**1 mg/ml**	**0.5 mg/ml**	**0.25 mg/ml**
S. mutans	20±0.05	19±0.03	26±0.03	25±0.03	-	-
L. acidophilus	25±0.03	18±0.04	25±0.07	23±0.07	-	-
S. aureus	24±0.07	20 ±0.04	-	-	-	-
E. coli	21±0.02	21±0.00	-	-	-	-
P. gingivalis	20±0.05	17±0.03	-	-	-	-

The mean diameter of ZOI with ESG on S. mutans was 25±0.03mm at 1 mg/ml, on L. acidophilus it was 23±0.07mm. ESG on S. aureus, E. coli, P. gingivalis did not exhibit ZOI at tested concentrations. The mean ZOI produced by 0.2% CHX (positive control) ranged from17±0.03 to 21±0.00mm for tested microorganisms. While for Streptomycin (Drug control) mean ZOI ranged from 20±0.05 to 25±0.03mm.

4. Discussion

Joshi S and Joshi S 2002 (6) estimated that SG have restorative properties like antidiarrheal, antimicrobial, astringent, pain relieving, antiviral, antihelmintic and antimalarial due to the bioactive dynamic constituents present in leaf, mash, organic product, and its seeds.

The subjective examination of phytochemicals in ESG and ASG showed presence of sugars, phenols, flavonoids, tannins, glycosides and sterols. As a general rule, these optional metabolites of plants make them significant and have demonstrated their restorative qualities which plays vide scope of exercises in home grown cures. In contrast with ASG, ESG showed solid presence of the phenols, flavonoids tannins. Different phytochemicals like proteins, alkaloids, terpenoid and saponin were missing in both the concentrates. In the ongoing review both ESG and ASG didn't show the presence of Alkaloids. The outcomes concur with the reports of Santhosh et al. (2016) (7). In opposition to this, the consequences of the ongoing review struggle the report of Umesh (2015) (8). ostensibly because of the use of various plant parts and extraction solvents.

Transitional metabolite intensifies like phenols are combined by a few plants and lay out forerunners for the blend of other essential mixtures like flavonoids. The exploration showed that phenolics were available more grounded in ESG than the ASG. These outcomes compare with information of Umesh (2015) (8).

Tannins were identified in concentrates of SG. The examination introduced that among the two concentrates tannin was more grounded in ESG. Totally goes against the review where ethyl acetic acid derivation and petrol ether leaf separates were utilized while in the current review water and ethanol extricates were utilized. Gulcin et al. (2010) (9) expressed tannins with the counter oxidative property utilized for against cancer-causing possibilities is significant in safeguard to counter cell oxidative harms and lipid peroxidation.

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The current review didn't show the presence of saponin and terpenoids. The presence of saponins in of oilseed feast of SG which is ascribed to antibacterial, mitigating and antitumor exercises.

5. Conclusion

The increasing antibiotic resistance of many microorganisms has led to interest in finding of novel therapy for diseases of microbial origin. SG mouth wash is feasible to be used. It is effective against the most common oral microorganisms. Hence, this mouthwash might be well thought out as a simple and effective method for prevention and control of dental plaque and serve as an alternate to chlorhexidine.

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