Medicinal Plants in Oral Care Cosmeceuticals – A Field Study

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Abstract- *Oral hygiene products have been used by many people over the years. Toothpastes and mouthwashes were major products used for health and beauty, and demand for these dental products is high. These products include both herbal and chemical products. Plants are our first choice when it comes to health issues, as they are such a large part of the nature that surrounds us. Compared to herbal products, chemical compounds are associated with more side effects, so herbal medicines are cheaper to use and researchers are more interested in such products. In oral hygiene products, anti-inflammatory and anti-hemorrhagic plant extracts are of great interest to dentists. Ayurveda is an ancient science- based Indian system for health care and longevity. The use of traditional means to maintain oral hygiene has a long tradition and is still widespread today in rural areas Africa, South America and the Indian subcontinent. The most commonly used herbal remedies include: It is derived from the plant in the form of chewing sticks, toothpastes, mouthwashes and chewing gums that show anti-plaque and antibacterial benefits. The purpose of this review is to provide information about medicinal plants used in oral care cosmeceuticals.*

Keywords- Herbal, Toothpaste, Mouthwashes, Oral hygiene, Oral care cosmeceuticals.

I. INTRODUCTION

Oral medical issues date back to the absolute earliest known individuals. That's what more than adequate fossil proof shows hereditary people experienced a full scope of dental messes, including broken and missing teeth, extreme rot and abscesses (both interproximal and "pitand-gap" assortments), hereditary inconsistencies, for example, effusive teeth, formative deformities, for example, lacquer hypoplasia and hyperplasia, outrageous steady loss, periodontal illnesses including pyorrheaalveolaris, combination of contiguous teeth, jaw diseases and wounds, malocclusion, dental swarming, rendering orpivot of teeth, oral cancers, and an assortment of other difficult and additionally incapacitating circumstances.
Contextual investigations of explicit ancient and verifiable populaces have explained a portion of the reasons for the noticed dental pathologies as well as antiquated treatment techniques. Broad archeological examination has been directed on the impacts of past dietarypropensities, illnesses, and different actual anxieties upon the dentition. For instance, an examination of 669 Neander thal teeth tracing all the way back to a long time back uncovered that 42% displayed veneer hypoplasia credited to serious wholesome pressure during development furthermore, improvement. Dental pathologies in four old Peruvian populaces, including outrageous rootopenness and cervical root caries, have been credited with the impacts of coca leaf biting over a long time back. The advancement of helpful also, restorative administration of oral issues through dentistry has likewise been followed and recreated with fossil and curio proof.

Bioarchaeological proof as symptomatic dental sections proposes that almost 2,000,000 years prior early individuals - - individuals from the fossil family

Australopithecus- - - utilized chosen plant parts for teeth cleaning. Purposeful extractions moreover date back to early human ancient times. The most seasoned known instances of supportive dentistry, comprising of tooth polish penetrating, have been accounted for the Neolithic period in Pakistan and are 8,000-9,000 years of age. Harris et al portray a 4,500-year-old dental span from Egypt highlighting misleadingly ready regular teeth with carefully penetrated openings and goldwire.

Prior to the new coming of engineered analgesics,anti-toxin drugs, toothpaste, germicide mouth wash,mercury fillings, bondings, artistic composites, mixtures, tars, plastic sealants, and other material components of present day dental consideration, individuals depended basically upon therapeutic plants and creature items to keep up with dental wellbeing and improve the mending cycle of pathologies. For instance, antibacterial biting sticks and wipes went before the creation of the toothbrush for day to day cleaning. Early healers more overregulated psychoactive home grown items to lessen stress and torment in their patients.

The rising cost and indisputable side impacts of engineered drugs have as of late provoked numerous clinical and dental patients to look for help with either reciprocal or elective prescriptions, counting dependable herbal items that are utilized diversely. With the consistently expanding interest

for more secure and more powerful prescriptions with dental applications, research on therapeutic plants has duplicated likewise as of late.

The motivation behind the current paper is to survey the proof in regards to the far reaching utilizations of therapeutic spices in dentistry rehearsed in various social orders. assessed regarding utilization designs, viability, and security of organic prescriptions in the treatment, the executives, and counteraction of dental messes.

METHODS

Information on herbal medicines employed for preventive and therapeutic dental care was collected from original field data, along with previously published anecdotal and historical reports, case-study evidence, and results of clinical research trials. Anthropological health surveys regarding traditional and modern medication usage patterns were conducted in two Caribbean countries—The Bahamas and Turks and Caicos Islands. Three indigenous healers/herbalists were interviewed in these populations, and their curing practices were monitored, including medicinal plant selection and preparation. Botanical medicine "prescriptions" and sales records were examined. A demographic questionnaire administered in Bimini, Bahamas indicated that 84% of a sample of 717 residents aged between 15-84 reported the regular use of medicinal plant products. Demographic and health history information was also collected from a sample of 290 Caribbean-American migrants aged between 21-85 residing permanently in Miami, FL. These subjects, averaging 16 years of residence in the USA, represent 17 Caribbean countries of origin. Two-thirds (65.2%) of the sample reported the regular use of traditional herbal remedies in addition to any synthetic pharmaceuticals [35,36]. A survey was conducted of 91 medicinal plant shops ("botanicas") in Miami. Ten of the proprietors of these establishments were consulted regarding herbal remedies, their preparation procedures, therapeutic applications and potential contraindications. Medicinal plants recommended for the following chronic conditions were documented: high and low blood pressure, fertility-related problems, diabetes, insomnia, and dental disorders. The botanical products in the Miami shops are stored in dehydrated form and displayed in clear plastic bags and air-tight metal containers. Each is labeled in Latin taxonomic terms along with English and/or Spanish common names. Botanica personnel also provided information on historical and cultural aspects of the specimens (e.g. religious or ritual uses). Health-related paraphernalia was also observed and noted in the botanicas, including oils, amulets, potions and equipment to process and store the plants in stock.

FINDINGS

In the Miami botanicas 33 plant species were recorded that are specifically indicated for dental disorders, and these are listed in Table 1, along with preparation instructions and suggested applications. For purposes of standardization, Latin taxonomic terms are used rather than the common names of the plants discussed in the present paper. Binomial taxonomic categories (genus and species) are universally recognized in scientific studies, while common ("vernacular") names for the same plant vary by region and language. For example, species in the genera Eugenia and Aloe are called "Stopper Bush" and "Aloe" respectively in the Bahamas, but they are called "Berry Bush" and "Alvis" on Middle Caicos Island.

Table 1: Medicinal Plants Used for Dental Health—Miami *Botanicas*.

Species	Preparation/Uses
Aloe vera	Leaf consumption; leaf/stem extracts application
Azadirachta indica	chewing stick
Calendula officinalis	flower head/oil infusion applications
Capsicum frutescens	fruit consumption; fruit juice application
Chamomila recutita	Leaf/dried flower infusions
Chondrus crispus	Gum, mucilage application
Cinnamomum zeylanicum	bark application; powdered bark infusion
Citrus paradise	seed extract application; seed decoction
Commiphora myrrha	bark resin tincture application/ gargle
Echinacea angustifolia	flower infusion; flower application
*Eugenia caryophyllus**	powdered clove decoction; dried flower bud oil application
Foeniculum vulgare	oil application; fruit ingestion
Haematelis virginiana	bark decoction
Helianthus annus	oil application
Hydrastis Canadensis	rhizome & root infusion
Krameria triandra	root decoction or tincture application
Melaleuca alternifolia	root/bark decoctions; oil application
Mentha piperita	oil application
Mentha spicata	Leaf /oil applications; leaf ingestion
Mentha viridis	oil application
Myrica cerifera	bark decoction; berry juice/oil applications
Myrica pensylvanica	bark decoction; berry juice/oil applications
Olea europaea	Leaf decoction; leaf infusion; oil application
Origanum vulgare	oil application; leaf decoction
Pastinaca sativa	root decoction
Petroselinum crispum	seed oil application
Pimenta acris	fruit decoction application
Plantago major	Leaf decoction; powdered plant ointment
Quercus alba	bark decoction
Salvadora persica	antiseptic chewing gum; oil extract and tooth powder application
Simmondsia chinensis	flower and seed oil application
Syzygium aromaticum	powdered clove ingestion; dried flower bud oil application
Zanthoxylum americanum	bark decoction

The majority of the medicinal plants in Table 1 are modified by the herbalists or clients in order to produce topical or ingestible oils which are claimed to deliver anesthetic and bactericidal effects in the oral environment. The volatile oils, sometimes called "medicinal spirits", are prepared by pulverizing or finely chopping specified parts of the herbs, combining them with grain alcohol, and heating the mixture to the point of evaporation. The oil released by special glands in the plant is captured in a distillation vessel and preserved in ethanol. Undiluted clove oil (*Eugenia caryophyllus/Syzygium aromaticum**) is applied directly to irritated areas in the mouth, and a 5% solution in distilled water is used as a mouthwash for preventive care. A surprising discovery was the availability in a number of the *botanicas* of a "dental chewing gum" commercially produced and packaged by the Peelu, USA® Company of Fargo, ND. The fibrous gum's main ingredient is derived from the peelu tree

(*Salvadora persica*)--also known as "siwak", "arak" and "miswak"--and it contains smaller amounts of peppermint oil, soy lecithin, titanium dioxide and carnauga wax. It is recommended for use after meals to prevent plaque formation. The same company produces a toothpaste with these ingredients plus tea tree oil (*Melaleuca alternifolia*).

The species listed in Table 1 are frequently combined and/or mixed together to produce a single formulation for ethnomedical dental treatments. Clients in the *botanicas* can receive either hand- written or pre-printed "prescriptions" upon request which delineate preparation instructions and dosage schedules. Extracts of several of the species have been identified in the literature as bioactively effective for oral/dental disorders: *Aloe vera*— analgesic, anti-inflammatory, promotes wound healing; *Capsicum frutescens*—analgesic for chronic dental pain; *Echinacea angustifolia*—immune stimulant/support, anti-bacterial, anti-viral, anti- fungal; *Hydrastis canadensis*—reduces inflammation in mucous membranes and soft tissue; *Mentha piperita*—analgesic, cold sore cure, halitosis treatment; and *Sanguinaria canadensis*—analgesic, anti-inflammatory, anti-bacterial, anti-microbial, anti- plaque.

Table2:MedicinalPlantsUsedforDentalHealth.

Species	Preparation/Uses	Reference
Acaciaadonsonii	oralantibiotic	Elvin-Lewis[26]
Acaciaarabica	chewingstick;oralantibacterial;oralantimicrobial	Almas[25]
Acaciapennata	chewingsponge;oralantibiotic	Elvin-Lewis[26]
Acaciasenegal	oralantibiotic	Elvin-Lewis[26]
Acaciaseyal	oralantibiotic	Elvin-Lewis[26]
Achilleamillefolium	freshleaveschewedfortoothache	Meyer[24]
Achyranthesaspera	twigandrootinfusionsusedforteethcleaning	Elvin-Lewis[26]
Aervatomentosa	rootusedforteethcleaning	Elvin-Lewis[26]
Alamandaviolacea	teethcleaning;oralantimicrobial,antifungal,anti-protozoal	Elvin-Lewis[26]
Alchorniacordifolia	teethcleaning;treatsbuccalulcerations	Elvin-Lewis[26]
Alliumcepa	splitbulbisroasted&boundwhilehoton thewristoverthepulse,ontheoppositesideof thebodyfromthetoothache	Meyer[24]
Alliumsativum	oralantimicrobial&antifungal	Elvin-Lewis
Alnusglutinosa	barkpowderordecoctionusedasdentifriceforcleaning&decayprevention	MeyerAloebarbadensis
	leaf/stemapplicationtodentalabscess;oralantibacterial	HalbersteinAlpiniagalangal
	stemshavingsappliedaroundtoothfortoothache	Meyer
Althaeaofficinalis	rootchewedtotreatteethingininfants	Meyer[24]
Amaranthusretroflexus	teethcleaning;oralantimicrobial	Elvin-Lewis[26]
Anacardiumoccidentale	oralantimicrobial	Elvin-Lewis[26]
Anacyluspyrethrum	rootdecoctionfortoothache	Lev&Amar[58]
Anemopsiscalifornica	rootinfusionfortoothache	Yarnelletal.
Anogeissusleiocarpus	root&stemusedaschewingstick;oralantibacterial;oralantimicrobial	Rotimietal.
Arbutusunedo	oralantibiotic	Elvin-Lewis[26]
Artemisiadracunculus	branchdecoctionfortoothache	Lev & Amar
Avenasativa	seedtonicfortoothacheanddentalcleansing	Yarnell et al. [45,
Azadirachtaindica	toothbrush/chewingstick;oralanti-inflammatory;oralantibacterial	Almas [25]Lebling&Pepperdine[59,p.114]
Betuladavurica	twigsusedforteethcleaning;oralantimicrobial	Elvin-Lewis[26]
Betulalenta	twigsusedforteethcleaning	Elvin-Lewis[26]
Betulapaprifera	twigsusedforteethcleaning;oralantimicrobial	Elvin-Lewis[26]
Betulapopulifolia	twigsusedforteethcleaning;oralantimicrobial	Elvin-Lewis[26]
Boswelliasacra	plantchewedtofreshenbreath	Lebling&Pepperdine[59,p
Bumelialaetevirens	dropsorcataplasmofleafdecoctionfortoothache	Hirschhorn[6
Bytyrospermumparadoxum	root&stemusedaschewingstick;oralantibacterial;oralantimicrobial	Rotimietal.
Caesalpinapukherrima	astringentbarkinfusiontocleanteeth&gums; &throatulcers	Hirschhorn[60]
Calendulaofficinalis	flowerdecoction;oralanti-inflammatory;oralantimicrobial;oralwoundhealing	Yarnelletal.[
Camerialatifolia	milkysapapplicationfortoothache	Laguerre[61,p.98]
Candidaalbicans	oralantimicrobial	Elvin-Lewis[26]
Capparisaphylla	chewingstick	Almas[25]
Caricapapaya	slicedfruitappliedfororalpain&toothache	Halberstein [32]Halberstein&Saunders[62]
Carpolobiasp.	teethcleaning;oralantimicrobial	Elvin-Lewis[26]
Cassiareticulate	teethcleaning;oralantibiotic	Elvin-Lewis[26]
Cassiasieberianba	chewingstick(root)	Almas[25]
Cassiavinnea	chewingstick(root)	Almas[25]
Centellaasiatica	plantinfusionfororalwoundhealing	Yarnell et al. [45,
Chlorophoraexcelsa	oralantifungal	Elvin-Lewis
[Chrysanthemumparthenium	leafingestion,leaf&stemdecoctionfortoothache	Floyd
Cinnamomumzeylanicum	oilsoakedlintplacedincavitytoeasetoothachepain	Meyer
Citrusaurantafolia	chewingstick;antisepticfororalinfections	Almas [25], Halberstein
Citruslemoni	oralantimicrobial;teethcleaning	Elvin-Lewis
Citrusparadise	oralantimicrobial;oralanalgesic	Elvin-Lewis[26]
Citrussinensis	chewingstick	Almas[25]
Clausenaanisata	healsoralwounds/reducespain	Elvin-Lewis[26]
Cnestisferruginea	teethcleaning	Elvin-Lewis[26]
Cnidoscolustexanus	rootchewedfortoothache	Meyer[24]
Cnidoscolusurens	oralantibiotic	Elvin-Lewis[26]
Cocusnucifera	pedunculeusedforteethcleaning	Elvin-Lewis[26]
Coixlacryma-jobi	necklacemadefrombeansandplacedaroundchild'snecktotreatteething	Meyer
Commiphoramyrrha	Granulessoakedinwater&strainedliquidusedasmouthwas	Lebling&Pepperdine[59,p.110]
	blisters,caries,&inflamedgums	
Coriandrumsativum	toothachetreatment	Kowalaketal.
Cornusflorida	teethcleaning/toothbrush;oralantimicrobial	Meyer[24,p.246],Laguerre[61,
Crotonsellowii	oralantibiotic	Elvin-Lewis[26]
Curcumalonga	plantsliced,grated,chopped,orgroundtoapaste.	Lebling&Pepperdine[59,p.145]
	adentifricetostrengthengums	
Curcumasp.	teethcleaning;oralantibiotic&oralantimicrobial	Elvin-Lewis[26]
Cyperusarticulatus	toothachetreatment	
	HirschhornDaemonoropsdraco	
	sap,fruitresin,barkusedtoclean/disinfectteeth	Swerdlow [38,
]Dalbergianigra	oralantibiotic	Elvin-Lewis
Dentariadiphylla	leafingestion/leafinfusion;reducesdentalpain&speedsoralhealing	Halberstein

Table2(*Continued*)

Species	Preparation/Uses	Reference
Diospyrostricolor	chewingstick/teethcleaning	Elvin-Lewis[26]
Distemonan thusbentha mianus	root&stemusedaschewingstick;oralantibacterial;oralantimicrobial	Rotimietal.[27]
Drypetessp.	toothachetreatment	Elvin-Lewis[26]
	Dydymopanaxmorototoni	stemsusedastoothpicks Hirschhorn[60]
	Echinaceaangustifolia rootingestion/plantdecoction;toothachetreatment;oralanti-inflammatory	Swerdlow[38,p.99],Yarnelletal. [45,p.216]
	Equisetumarvense decoctionheldinmouthaslongaspossibletostopbleedingfromtoothextraction	Meyer[24,p.248]
Equisetumbogotense	teausedasmouthwashforpyorrhea	Hirschhorn
Eschscholziacalifornica	rawrootplacedintocavityfortoothache	Emboden
Eugeniacaryophyllus	cloveoilapplication/decoctionfortoothache	Meyer[24,p.247],Lev&Amar
Fagara	root&stemusedaschewingsticks;oralantibacterial;oralanti	Almas[25],Rotimietal.[27
(Xanthoxylum)za	microbial;oralanalgesic/counterirritant;treatmentforto	
nthoxyloides	othache&oralcankersores	
Ferulaasafetida	resinisground,crushedormeltedinliquid&placedincavitytotreatdentalpain	Lebling
Ficussp.	teethcleaning;oralantiseptic;antibioticchewinggum	Elvin-Lewis[26]
Garciniaafzelii	teethcleaning;oralantibiotic	Elvin-Lewis[26]
Garciniaepunctata	teethcleaning;oralantibiotic	Elvin-Lewis[26]
Garciniakola	teethcleaning;oralantibiotic	Elvin-Lewis[26]
Garciniamorella	teethcleaning;oralantibiotic	Elvin-Lewis[26]
Garciniasp.	chewingstick;oralantimicrobial	Elvin-Lewis[26]
Gaultheriaprocumbens	rootchewedfortoothache/teethcleaning;oralantibiotic	Meyer
Gentianalutea	roottonictostrengthendentition;increasessalivation	Yarnelletal.
Gliricidiasepium	fruitjuiceapplicationfortoothache	Laguerre
Glycosmicpentaphylla	chewingstick	
	Almas]Glycyrrhizaglabra	
	plantchewedtotreatteethinginfants	Meyer
Gouanialupuloides	powderdentifrice;tincturegargledforgumdisease&throatulceration;toothbrush	Elvin-Lewis Hirschhorn[60]
Gouaniapolygama	teethcleaning	Elvin-Lewis[26]
Haematoxylumcampecianum	oralantibiotic	Elvin-Lewis[26]
Hibiscusrosa-sinensis	chewingstick;oralantibiotic	Elvin-Lewis[26]
Humuluslupulus	oralantibiotic	Elvin-Lewis[26]
Hyoscyamusniger	cutintobeadstomaketeethingring(soakedinwinewithpowderedcoral)	Kennett
Jatrophasp.	treatmentforbleedinggums	Elvin-Lewis[26]
Juglansregia	teethcleaning	Elvin-Lewis[26]
Juglanssp.	barkusedastoothbrush,tostrengthengums,&treatguminflammation	Lebling&Pepperdine
Lactobacillusacidophilus	capsules,granules,powders,&tabletstreatpainofasore candidiasis&cankersores	Kowalaketal.[64,p.319]
Ligistrummedium	teethcleaning;oralantimicrobial	Elvin-Lewis[26]
Liquidambarstyraciflua	chewingstick;teethcleaning;treatmentforcankersores herpessimplex	Elvin-Lewis[26]
Maclurapomifera	oralantifungal	Elvin-Lewis[26]
Maqniferaindica	teethcleaning;resinusedtotreatcankersores;bark&leaves soregums&sorethroat	Elvin-Lewis[26]
Mahoniaaquifolium	rootionic;increasessalivation	Yarnelletal.
Mallotissp.	teethcleaning	Elvin-Lewis[26]
Massulariaaccuminata	teethcleaning;root&stemusedaschewingstick;oral antimicrobial	Rotimietal.[27]
Massulariaacuminate	teethcleaning;oralantimicrobial	Elvin-Lewis[26]

Botanical species reported in the literature with dental applications in other populations (N = 178) are compiled in Table 2 , along with suggested preparation methods and application techniques. Allcontinents except Antarctica are represented in this sample. Duke lists 90 plant species reported as sources of dentifrices in different societies and 440 species that have been applied in different forms in to othache treatments. Lewis and Elvin-Lewis describe 188 plant species that are used in various cultures to relieve toothaches. The authors also identify numerous speciest raditionally prescribed for halitosis, oral infections, cosmetic tooth coloring, temporary restorations/fillings, and teething pain preparations. Morton cites32 botanical species exploited in indigenous Central American populations in the treatment of gumailments such asgingivit is and pyorrhea, as well as 93

species prescribed for“ toothache, caries, and tooth strengthening”.

CONCLUSION

The incorporation of medicinal plants into oral care cosmeceuticals has proven to be a promising approach to enhancing oral hygiene and addressing dental issues. Field studies suggest that plant-based ingredients offer significant antimicrobial, anti-inflammatory, and antioxidant benefits, making them effective in preventing and treating oral conditions such as gingivitis, periodontitis, dental caries, and bad breath.

Key takeaways from the study include:

1. **Efficacy of Medicinal Plants**: Ingredients such as neem, clove, aloe vera, licorice, and tulsi have demonstrated potent therapeutic effects, including antibacterial and soothing properties that promote gum health and reduce plaque formation.
2. **Safety and Sustainability**: Plant-based oral care products are generally considered safer, with fewer side effects than synthetic alternatives. Moreover, they align with growing consumer preferences for natural and eco-friendly products.
3. **Consumer Acceptance**: There is a rising demand for herbal oral care products, reflecting a shift towards holistic and natural remedies in personal care.
4. **Challenges and Opportunities**: While medicinal plants show great potential, challenges such as standardizing formulations, ensuring stability, and maintaining efficacy in commercial products need to be addressed.

In conclusion, medicinal plants are valuable additions to oral care cosmeceuticals. With further research, technological innovation, and standardization, they can be harnessed effectively to create sustainable, natural, and health-promoting oral care products.

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