

Natural remedies in the Canon of Medicine for dentistry and oral biology

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Abstract

Ibn Sina is one of the most well know scholars in middle ages. This Persian physician wrote different books in medical filed which his great encyclopedia remained as one the most successful medical encyclopedia during the history. Ibn Sina discussed diseases of oral cavity and dentistry in the 3rd book of The Canon of Medicine. He discussed different conditions such as different types of trauma to the motor nerves, taste sensation, different limitations of tongue movements, Ranula, halitosis, tooth sensation, different types of tooth pain, Bruxism, attrition, loss of

enamel, gingival bleeding, recession and hyperplasia. For management of these diseases he introduced more than 80 herbal remedies. Most of this plant species are from essential oil reach families. Generally, Ibn Sina has a deep view in case of dental diseases and his ideas and methods for treatment of this category of disease could be studied for finding new treatment in dental ailments.

Keywords: Ibn Sina, Oral biology, Dentistry, The Canon of Medicine, Traditional Iranian medicine.

1. Ibn Sina and Medical Sciences

The Persian scientist and physician Abu Ali al-Husain ibn Abd-allah ibn hasan ibn Ali ibn Sina, was born in August 980 during the dying days of Samanid dynasty (1). His name is Europeanized into Avicenna. When he was only ten years old he had memorized Quran and by his teens, mastered various sciences such as medicine, physics, mathematics, logic, and metaphysics (2). By curing Nuh ibn Mansur the Samanid prince at 18, special permission gave him access to the library of the Samanid rulers (3). Regarding learning medicine, Ibn Sina says "then I desired to study medicine, and took to reading the books written on this subject. Medicine is not one of the difficult sciences, so naturally I became proficient in it in the short time, until the excellent scholars of medicine began to study under me. I began to treat patients, and through my experience, I acquired an amazing practical knowledge and ability in methods

of treatment" (4). Because of political reasons, Ibn Sina had to experience dangerous life that lead to several travels to different cities which provided him with an opportunity to access libraries, such as the Khawarizmi library of Gorganji, the Buwayhid libraries of Ray, Hamadan and the Kakuyid library of Isfahan (2, 5). He died in 1037 AD in Hamadan, Iran, where he is buried. He wrote almost 450 treatises on a wide range of subjects mostly included philosophy and medicine. Some of them are small treatises like book on drugs for cardiovascular diseases (in Arabic) (6), a treatise on Pulsology (in Persian) (7) and others are works extending through several volumes like the Canon of Medicine.

Ibn Sina's most famous work, the Canon of Medicine, which was written over 20 years comprehended Aristotelian, Galenic, Persian, Jewish, and Indian medicine. Its Latin translation was the main textbook in many medical schools in Europe during the 14th and 16th centuries. Even in 19th century, it was taught in some areas of Europe (8).

The Canon is divided into five large books. Each book is divided into treatises each of which in its turn

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Table 1. Herbal medicine mentioned by Ibn Sina for dentistry and their related pharmacological activities

Family	Scientific name	Persian name	Parts used/route of administration	Disorder(s)/administration
Acoraceae	<i>Acorus calamus</i> L.	Vaj	Root (Keeping in mouth)	Relieves toothache
Alliaceae	<i>Allium ampeloprasum</i> L.	Korras	Leaf (Applying the smoke on carious teeth)	Has antiseptic effect
Alliaceae	<i>Allium sativum</i> L.	Soom	Root (chewing the cooked root)	Relieves toothache
Anacardiaceae	<i>Pistacia lentiscus</i> L.	Mastaki	Latex (Mouthwash)	Improves gingival health
Anacardiaceae	<i>Rhus coriaria</i> L.	Somaagh	Latex (Fixing on carious teeth)	Relieves toothache
Apiaceae	<i>Prangos ferulacea</i> Lindl.	Javsheer	Latex (Fixing on carious teeth)	Relieves toothache
Apiaceae	<i>Ferula assa-foetida</i> L.	Helteet	Latex (Fixing on carious teeth)	Relieves toothache
Apiaceae	<i>Coriandrum sativum</i> L.	Geshneez	Leaf (Dental powder of dried leaves) (Mouthwash of leaves extraction)	Heals oral sores
Arecaceae	<i>Areca catechu</i> L.	Foofal	Fruit (Chewing)	Decreases halitosis
Aristolochiaceae	<i>Aristolochia Longa</i> L.	Zaraavand	Root (Dental powder)	Improves gingival health
Asparagaceae	<i>Asparagus officinalis</i> L.	Helyoon	Seed, Root (Chewing)	Relieves toothache
Asphodelaceae	<i>Asphodelus ramosus</i> L.	Khonsaa	Aerial parts (As an ear drop into parasite ear of affected tooth)	Relieves toothache
Asphodelaceae	<i>Eremurus persicus</i> Boiss.	Sereesh	Leaf (As an ear drop into parasite ear of affected tooth)	Relieves toothache
Asteraceae	<i>Cnicus benedictus</i> L.	Baadaavard	Aerial parts (chewing)	Relieves toothache
Asteraceae	<i>Artemisia dracunculus</i> L.	Tarkhoon	Leaf (chewing)	Heals aphthous and oral sores
Asteraceae	<i>Carthamus tinctorius</i> L.	Osfor	Aerial parts (Topical, associated with honey)	Pediatric oral sores
Asteraceae	<i>Anthemis pyrethrum</i> L.	Aaghergharha	Root (Mouthwash)	Relieves toothache Fixes loose teeth
Asteraceae	<i>Onopordum acanthium</i> L.	Shokaee	Aerial parts (chewing)	Relieves toothache
Boraginaceae	<i>Alkanna tinctoria</i> (L.) Tausch.	Khas ol hemaar	Aerial parts (Mouthwash)	Heals oral sores
Brassicaceae	<i>Brassica oleracea</i> L.	Koronob	Fruit (Mouthwash)	Reduces saliva
Burseraceae	<i>Commiphora myrrha</i> (Nees) Engl.	Morr	Latex (Mouthwash)	Fixes loose teeth and Improves gingival health Has antiseptic effect
Caesalpiniaceae	<i>Ceratonia siliqua</i> L.	Kharmoob	Aerial parts (Mouthwash)	Relieves toothache
Capparaceae	<i>Capparis spinosa</i> L.	Kabar	Root (Keeping in mouth)	Relieves toothache
Cucurbitaceae	<i>Citrullus colocynthis</i> (L.) Schrad.	Hanzal	Root (Chewing)	Relieves toothache Helps extracting the teeth
Cupressaceae	<i>Cupressus sempervirens</i> L.	Sarv	Leaf (Mouthwash)	Relieves toothache
Cyperaceae	<i>Cyperus rotundus</i> L.	Soad	Root (Dental powder)	Improves gingival health Heals oral sores
Fagaceae	<i>Quercus brantii</i> Lindl.	Afs	Fruit (Mouthwash)	Heals tongue sores Prevents dental caries
Hyacinthaceae	<i>Urginea indica</i> Kunth	Esghil	Root (Mouthwash)	Improves gingival health Fixes loose teeth Decreases halitosis
Lamiaceae	<i>Melissa officinalis</i> L.	Baadransbooyeh	Leaf (Chewing)	Decreases halitosis
Lamiaceae	<i>Hyssopus officinalis</i> L.	Zoofaye khoshk	Aerial parts (Chewing)	Relieves toothache
Lamiaceae	<i>Mentha piperita</i> L.	Nanaa	Leaf (Mouthwash)	Relieves toothache
Lamiaceae	<i>Zataria multiflora</i> Boiss. Origanum spp.	Saatar	Leaf (Chewing)	Relieves toothache Improves gingival health
Lamiaceae	<i>Mentha pulegium</i> L.	Foodanaj	Leaf (Dental powder)	Improves gingival health
Lamiaceae	<i>Ocimum basilicum</i> L.	Zeymaraan	Leaf (Chewing)	Heals oral sores
Lauraceae	<i>Cinnamomum camphora</i> (L.) T.Nees & C.H.Eberm.	Kaafoor	Latex (Chewing)	Heals oral sores
Lauraceae	<i>Cinnamomum tamala</i> T.Nees & Eberm.	Saazaj	Leaf (Keeping in mouth)	Decreases halitosis Has antiseptic effect
Malvaceae	<i>Malva rotundifolia</i> L.	Khabbaazi	Aerial parts (Chewing)	Heals oral sores
Mimosaceae	<i>Acacia arabica</i> (Lam.) Muhl. ex Willd.	Aghaghia	Latex	Heals oral sores
Moraceae	<i>Ficus carica</i> L.	Tin	Latex (Fixing on affected teeth)	Relieves toothache
Moraceae	<i>Morus nigra</i> L.	Shaatoot	Leaf , Root (Mouthwash)	Relieves toothache Loosens teeth to extract more easy

Table 1. Continued.

Family	Scientific name	Persian name	Parts used/route of administration	Disorder(s)/administration
Moringaceae	<i>Moringa peregrina</i> C.Chr.	Baan	Root (Chewing)	Relieves toothache
Myricaceae	<i>Myrica nagi</i> Thunb.	Daarshishean	Bark (Chewing)	Fixes loose teeth heals Aphthous
Myristicaceae	<i>Myristica fragrans</i> Houtt.	Jowzbooa	Fruit (Chewing)	Decreases halitosis
Myrtaceae	<i>Eugenia caryophyllata</i> Thunb.	Gharanfol	Fruit (Chewing)	Decreases halitosis
Oleaceae	<i>Olea europaea</i> L.	Akar ol zeet	Oil (fruit) (Fixing on carious teeth)	Helps extracting carious teeth
Orchidaceae	<i>Orchis mascula</i> (L.) L.	Khasi ol kalb	Aerial part (Mouthwash)	Heals oral sores
Papaveraceae	<i>Chelidonium majus</i> L.	Maamiraan	Root (Chewing)	Relieves toothache
Papaveraceae	<i>Fumaria parviflora</i> Lam.	Shaahrtareh	Leaf (Mouthwash)	Improves gingival health
Papilionaceae	<i>Cicer arietinum</i> L.	Nokhod	Seed (Chewing)	Relieves toothache heals gingivitis
Pinaceae	<i>Cedrus libani</i> Barrel.	Sherbeen	Tar (Mouthwash)	Relieves toothache ex Loudon.
Piperaceae	<i>Piper cubeba</i> Vahl.	Kabaabeh	Fruit (chewing)	Heals oral sores
Piperaceae	<i>Piper nigrum</i> L.	Felfel	Fruit (Mouthwash)	Relieves toothache
Piperaceae	<i>Piper betle</i> L.	Tanbool	Leaf (Chewing)	Decreases halitosis Improves gingival health
Plantaginaceae	<i>Plantago major</i> L.	Lesaan ol haml	Root (Mouthwash)	Relieves toothache heals oral sores
Platanaceae	<i>Platanus orientalis</i> L.	Chenaar	Bark (Chewing)	Relieves toothache
Poaceae	<i>Cymbopogon olivieri</i> (Boiss.) Bor	Ezkher	Aerial parts (Mouthwash)	Improves gingival health
Poaceae	<i>Bambusa arundinacea</i> Willd.	Tabaasheer	Inner part of the stem (sonoon)	Heals aphthous and oral sores
Polygonaceae	<i>Rumex hydrolapathum</i> Huds.	bertaanigee	Leaf (oral)	Heals oral sores
Polygonaceae	<i>Rumex conglomeratus</i> Murray	Hommaaz	Fruit (Mouthwash)	Relieves toothache Relieves toothache
Punicaceae	<i>Punica granatum</i> L. var. pleniflora	Jolnaar	Fruit (Chewing)	Fixes loose teeth
Ranunculaceae	<i>Ranunculus asiaticus</i> L.	Kabiikaj	Root (Dental powder)	Relieves toothache and inflammation
Ranunculaceae	<i>Delphinium staphisagria</i> L.	Mavizaj	Fruit (Mouthwash) (Keeping in mouth)	Relieves toothache Reduces secretion Heals oral sores
Ranunculaceae	<i>Nigella sativa</i> L.	Shooneez	Seeds (Chewing)	Relieves toothache
Ranunculaceae	<i>Helleborus niger</i> L.	Kharbagh e asvad	Root (Mouthwash)	Relieves toothache
Rosaceae	<i>Prunus domestica</i> L.	Ejjes	Leaf (Mouthwash)	Reduces tonsil's secretion
Rosaceae	<i>Rosa damascena</i> Mill.	Vard	Seed, Flower (Chewing)	Relieves toothache
Rosaceae	<i>Rosa canina</i> L.	Nasreen	Flower (chewing)	Relieves toothache
Rosaceae	<i>Rubus fruticosus</i> L.	Aligh (Tameshk)	Fruit, Leaf (Mouthwash)	Heals oral sores Improves gingival health Relieves toothache
Rosaceae	<i>Potentilla reptans</i> L.	Ghantaafeloon	Root (Mouthwash)	Relieves toothache Heals oral sores
Rutaceae	<i>Citrus medica</i> L.	Baalang	Fruit (Chewing)	Decreases halitosis
Solanaceae	<i>Hyoscyamus niger</i> L.	Banj	Seed (Fixing on affected teeth)	Relieves toothache
Solanaceae	<i>Lycium afrum</i> L.	Hozaz	Aerial parts (Chewing)	Heals mouth and gingival sores
Solanaceae	<i>Solanum nigrum</i> L.	Enab ol salab	Fruit, Root (Mouthwash)(Keeping in mouth)	Decrease tongue inflammation Relieves toothache
Styracaceae	<i>Styrax benzoin</i> Dryand.	Zarv	Latex (Chewing)	Heals oral sores
Tamaricaceae	<i>Tamarix gallica</i> L.	Tarfaa	Leaf, Fruit (Chewing)	Improves gingival health Fixes the teeth Relieves toothache
Thymelaeaceae	<i>Aquilaria agallocha</i> Roxb.	Aghalooji	Aerial parts (Mouthwash)	Decreases halitosis
Thymelaeaceae	<i>Daphne mezereum</i> L.	Maazaryoon	Leaf (Mouthwash)	Relieves toothache
Urticaceae	<i>Urtica dioica</i> L.	Anjereh	Seed (Fixing on affected teeth)	Helps extracting the tooth

Table 1. Continued.

Family	Scientific name	Persian name	Parts used/route of administration	Disorder(s)/administration
Vitaceae	<i>Vitis vinifera</i> L.	Enab	Fruit (Keeping in mouth)	Improves gingival health Fixes loose teeth
Zingiberaceae	<i>Curcuma longa</i> L.	Zardchoobe	Root (Chewing)	Relieves toothache
Zygophyllaceae	<i>Tribulus terrestris</i> L.	Khasak	Fruit, leaf (Chewing)	Heals gingival sores

is subdivided into chapters and sections, systematically. The first book concerns basic medical and physiological principles as well as anatomy, regimen and general therapeutic procedures. The second book is on the pharmacology of medical substances, arranged alphabetically, following an essay on their general properties. The third book concerns the diagnosis and treatment of diseases specific to one part of the body, while the fourth covers conditions not specific to one bodily part, such as poisonous bites and obesity. The final, fifth, book is a formulary of compound remedies (9).

The Canon of Medicine is regarded as “the most famous single book in the history of medicine both East and West”. It was such an influential treasure in the history of medicine that Sir William Osler credited it as a “medical bible” and “the most famous medical textbook ever”. The book was translated into Latin, Hebrew, French, English, German and Chinese (9).

2. Dentistry in the Canon of Medicine

In book 3, sections 6, 7 and 8 of Canon of Medicine, Ibn Sina deals with the description of anatomy and diseases of the oral structures including tongue, teeth, gingiva, and their treatments. It consists of three main sections of mouth and tongue, tooth and gingiva and lips. In each section, related diseases including description, etiology, and treatment are collected as separate chapters. Many of these are still common issues in modern communities, and their diagnosis and treatment are routine and even might be challenging for today's dentistry. "...Mouth is an organ, which is necessary to transmit food to the environs of the inferior parts of the body and provide air to the upper part of the body. Moreover, it is a pervasive tube for the human speech organs. "and "... Tongue is one of the organs of the mouth which has duties such as; chewing, speech, taste detection..."

Ibn Sina describes tongue's anatomy and introduces its diseases. Different types of trauma to the motor nerves, taste sensation, and different limitations of tongue movements were discussed. Ankyloglossia is introduced as "the tendon underneath the tongue joins to the tip and peripheries of the tongue and prevents it from widening". For this reason, some surgery methods are described and are followed by the extent of the incision and guidelines for preventing bleeding. In modern dentistry, ankyloglossia is categorized as a developmental abnormality, which limits tongue movements. Frenotomy surgeries

are suggested when problems exist with this limited motion (10).

Ranula is also mentioned by Ibn Sina which today is considered as a salivary glands' lesion caused by trauma or other etiologic factors (11). He said: It is a tumor-like mass, which is developed under the tongue, and its color is a mixture of surface of the tongue and it is inside vessels, which resembles the color of a frog. Therefore, he named this lesion as frog.

For halitosis, Ibn Sina prescribes holding some herbs in the mouth for a while and advises some tips (Table 1).

Concerning the teeth, Ibn Sina describes tooth sensation, different types of tooth pain, and probable "tooth increase" in case of extraction of antagonist tooth. It is in fact supraeruption of the teeth which is mentioned diversely in occlusion concepts of dentistry and is one of the challenging issues in way of establishing a perfect occlusion and periodontal health.

It is interesting that Ibn Sina has written a separate chapter as "tooth health" and advises "If you want to have healthy teeth, you should follow eight tips..." which is followed by "many different guidelines in this field including recede acidic and sugar containing diets; prevent vomiting; do not break hard things with teeth; using toothpick; not having very cold and very hot foods, especially after each other, using toothbrush and toothpaste". He has introduced more than ten toothpastes for healthy and ill teeth.

About the tooth pain, Ibn Sina classification is based on the causative factors and he has separated dental pain from periodontal pain and said: "Most of the people who have toothache, do not know the difference between the causes". Ibn Sina mentions an interesting method for discriminating the origin of the pain: press a finger on the gingival tissues: "If the pain is felt only at the end of the tooth, the cause is the nerve of the root end".

He described tooth mobility and made a wise classification based on etiologic factors: "...may be it is because of trauma...or is from shortness of the tissue between the teeth..."

In the field of pediatric dentistry, Ibn Sina noticed: "Whenever a milking mother feels that her baby is in pain, she should put her finger into the baby's mouth and rapidly massage the gingiva."

In chapter 12, tooth extraction methods and effective drugs for pain and bleeding control has been

discussed. He has mentioned flap surgery, as the flesh and gingiva should be removed from tooth periphery. He considers the tooth extraction as the last choice of treatment, if the origin of pain is within the tooth.

Bruxism is also described: "Tooth grinding during sleep is because of weakness in the jaw muscles and is like convulsion". Bruxism, the parafunctional grinding of the teeth, with the prevalence of about 20% in adult population is one of the common disorders in modern societies and there is controversy about its exact etiology. It is considered to have multifactorial etiologic factors with consequences such as tooth wear, tooth cracks and temporomandibular joint disorders (12).

This section also includes descriptions regarding supraeruption, attrition, loss of enamel and their treatments which have many points to be considered in contemporary dental practice. For example, he believed that a tooth without enamel is more sensitive to temperature changes. He also recommended to grind a tooth which is longer than normal.

In "Gingiva and Lip" section, Ibn Sina describes topics such as periodontal diseases and treatments for gingival bleeding, gingival recession, and gingival hyperplasia.

Gingival bleeding which is described in this chapter is a common early symptom in most of the periodontal diseases; also gingival hyperplasia is considered, which is caused by local inflammatory conditions, mouth breathing, leukemia, Kaposi's sarcoma, acromegaly, lymphoma, and other factors (11).

3. Herbal drugs for oral and dental diseases in the Canon of Medicine

In the second book of the Canon, 81 herbal medicines were mentioned for oral and dental diseases. Among the plant families, Lamiaceae, Asteraceae and Rosaceae (6, 5 and 5, respectively) were the most strongly represented families (Table 1). Thirty species have similar pharmacological activities which have been mentioned by Ibn Sina, and 21 species have some pharmacological activities, which could be beneficial for oral, and teeth diseases.

These herbal drugs were used for healing twelve different diseases. Forty-two species were used for relieving toothache, twenty-one to heal oral sores or aphthous, eleven for improving gingival health and nine for decreasing halitosis. Eight different routes of administration and dosage forms were mentioned. These herbal drugs were using mainly by chewing or as a mouthwash.

4. Discussion and Conclusion

Ibn Sina's emphasis on having special diets for improving dental health and describing a wide spectrum of oral diseases, shows his knowledge and deep concepts for today's dentistry. Chapters in Canon

on oral anatomy, physiology, and disease present rather detailed knowledge concerning ankyloglossia, ranula, tooth wear, supraeruption and infectious diseases such as periodontal problems and differentiating it from odontogenic problems, halitosis, and even bruxism and tooth discoloration in the eleventh century and the medical paradigm of that era. Ibn Sina provided highly systematic knowledge along with cut his observations and experiences and citations from the writings of the previous physicians.

Modern investigations confirmed the efficacy of some drugs mentioned by Ibn Sina, like Piper betle (Table 1). Ibn Sina used herbs with good odor essential oil for halitosis and using different herbal gums for dental restorations. It is interesting that most of these herbal gums have also antimicrobial activity, which could prevent possible infections. In one case (*Allium ampeloprasum*), Ibn Sina used smoke of plant as a medicine. Using medicinal smokes for toothache and mouth diseases is a usual method in different folklore and traditional medicine system. We have previously reported 25 medicinal smokes for oral and dental diseases (13). Thus, using this form of treatment could be a potential for future herbal drugs in dentistry.

In the 11th century, dentistry was an important branch of medical sciences. Deep observations of Ibn Sina in different categories of medicine helped physicians for 6 centuries. Some of Ibn Sina's opinions are currently usable and can be practiced in modern medicine. This is the first work about Ibn Sina's opinions and methods in dentistry. Ibn Sina recorded these materials by collecting and developing his predecessor's treatises and adding his own experiences. Moreover, we have indicated scientific botanical names of medicinal plants in this section of the Canon of Medicine to facilitate future works on these plants. It is obvious that Ibn Sina have used widely previous physicians books like Hippocrates and Galen as he has mentioned in different parts of his book. For example, Galen previously described ankyloglossia and Ranula. However, it seems that Bruxim description, flap surgery and method for finding the origin of pain are Ibn Sina's inventions. The importance of Ibn Sina's medical encyclopedia "The Canon of Medicine" can be understood by noting the fact that it was used as a major medical reference in east and west over 700 years.

This article can promote cutfuture studies on herbal drugs with historical background, as candidates for future medicines in dentistry.

References

1. Sajadi MM, Mansouri D, Sajadi MR. Ibn Sina and the clinical trial. *Ann Intern Med* 2009;150:640-3.
2. Shoja MM, Tubbs RS, Loukas M, Khalili M, Alakbarli F, Cohen-Gadol AA. Vasovagal syncope in the Canon of Avicenna: the first mention of carotid artery hypersensitivity. *Int J Cardiol.* 2009;134:297-301.

3. Afnan SM. *Avicenna: His Life and Works*: George Allen And Unwin Limited Press; 2009.
4. Modanlou HD. Avicenna (AD 980 to 1037) and the care of the newborn infant and breastfeeding. *J Perinatol*. 2008;28:3-6.
5. Meri JW, Bacharach JL. *Medieval Islamic Civilization: L-Z, index*: Routledge; 2006.
6. Faridi P, Zarshenas MM. Ibn Sina's book on drugs for cardiovascular diseases. *Int J Cardiol*. 2010;145:223.
7. Zarshenas MM, Abolhassanzadeh Z, Faridi P, Mohagheghzadeh A. Ibn Sina's treatise on pulsology. *Int J Cardiol*. 2011;146:243-4.
8. Levy R. Avicenna; his life and times. *Med Hist*. 1957;1:249-61.
9. Faridi P, Zarshenas MM, Abolhassanzadeh Z, Mohagheghzadeh A. Collection and storage of medicinal plants in The Canon of Medicine. *Phcog J*. 2010;2:216-8.
10. Neville BW, Damm DD, Allen CM, Bouquot JE. *Oral and Maxillofacial Pathology*, 3rd ed. St Louis: Saunders Elsevier; 2009.
11. Burket LW, Greenberg MS, Glick M, Ship JA. *Burket's Oral Medicine*, 11th ed. BC Decker; 2008.
12. *Prosthodontics Ao. The Glossary of Prosthodontic Terms*, 8th ed. Mosby; 2005.
13. Mohagheghzadeh A, Faridi P, Shams-Ardakani M, Ghasemi Y. Medicinal smokes. *J Ethnopharmacol*. 2006;108:161-84.