Basics of Dentistry from the Viewpoints of Rhazes, Ahwazi and Avicenna and Their Comparison with Contemporary Dental Science

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Abstract

Objective: The ancient Iranian medicine, before and after Islam, has a long and prolific history which has been emphasized by many famous historians like Andalsi (11th century AD). Dentistry was among the important fields related to medicine and ancient physicians were interested in it. This study aimed at reviewing the viewpoints of famous pioneer practitioners in Persia regarding various fields of dentistry.

Methods: Accredited text books of the Persian Empire especially the Al-Hawiby Rhazes (865-925 AD), Kamel al-Sana by Ali Ibn Abbas Ahwazi (930- 994), and Avicenna’s Al-Qanun (980-1037) all authored in Arabic which was the scientific language of the time were thoroughly evaluated and topics related to dentistry were extracted from them and compared with contemporary dental science. Also, several dictionaries, encyclopedias and reference books were used for correct understanding of the meaning of ancient medical terms and idioms.

Results: The findings demonstrated that many of the topics mentioned in the ancient Iranian textbooks had a scientific foundation and are compatible and comparable with the contemporary dental science.

Conclusion: Based on the results of the present study and similar previous researches, we can state that the ancient Iranian medicine is not at all distant from the contemporary science. It is the foundation of the contemporary medicine and further researches on the medical history of ancient Persia can reveal many valuable findings that can be used for educational, therapeutic and research purposes.

Key words: Ancient dentistry, Rhazes, Ali Ibn Abbas Ahwazi, Avicenna, Ancient medicine

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Introduction:

The legacy of the Ancient Persia, before and after Islam, is among the richest in terms of science, culture, art and human civilization. According to historians (1, 2), medicine and related fields have a special position in this valuable legacy. In our previously published articles, we introduced the achievements of Rhazes in specific fields like human anatomy (3), ophthalmology(4), Bell ‘s palsy(5) and diagnosis and treatment of cancer (6). In the present study, we review the viewpoints of three prominent physicians in ancient Persian Empire namely Rhazes (865-925 AD), Ali Ibn Abbas Ahwazi (930-994), and Avicenna (980-1037) about some major dental subjects.

Methods:

Several ancient textbooks were evaluated. Those containing repetitive or unaccredited topics were excluded and three accredited textbooks by
Rhazes (865-925 AD), Ali Ibn Abbas Ahwazi (930 - 994), and Avicenna (980-1037) written in Arabic which was the scientific language of the time were selected. Several dictionaries and encyclopedias (7-15) were used for better understanding of the terms. Some acceptable translations of these books were also reviewed (16,17). The obtained results were then compared with the principles of contemporary dentistry.

1- Some of the statements of Rhazes about dentistry and oral and dental health (18-20)
A. When a patient presents to us complaining of toothache, he/she may be suffering from acute or chronic gingival inflammation or bleeding, decayed teeth, exposure of teeth to extreme hot or cold, xerostomia or injury of the tooth nerve because injury of the tooth nerve is the most common cause of dental pain.
B. The most important harmful factors for oral and dental health include indigestion, recurrent vomiting, esophageal reflux, chewing hard food like chestnuts or walnuts or gluey substances like resins (some chewing gums), eating sweet and pastries, eating sour grapes or very sour citron or frozen fruits especially after very hot food.
C. Some points about the oral and dental health and physiology: The teeth always have the ability to grow because after losing or extracting a tooth the neighboring teeth can slightly grow and move towards the empty space.

Malnutrition can also compromise the teeth. The sensation of teeth is greater than that of bones because the nerve fibers innervating the teeth originate from the brain and are more sensitive and flexible than other nerve fibers. Attrition of teeth in the elderly has no definitive treatment. In order to prevent tooth mobility or tooth loss in the elderly, special dental and gingival care must be taken and their gingiva must be reinforced. For splinting a mobile tooth, a thin gold chain should be used to attach the mobile tooth to its neighboring teeth (similar to bracket bonding and splinting in modern dentistry). Pharmaceutical treatment is also required. Some of the reasons for tooth mobility include old age, trauma and harmful secretions. Do not overdo tooth brushing. Teeth should be kept clean; do not let food particles get impacted in between your teeth. Over-cleaning the gingival embrasure can also compromise gingival health. Do not overindulge yourself with consumption of milk, salty fish, pastries, sweets and hot spices.

2- Some of the statements of Ali Ibn Abbas Ahwazi (930 - 994) about dentistry and oral and dental health (17, 21)
Ali Ibn Abbas Ahwazi was a well-known physician living in the time period between Rhazes and Avicenna (22). His most important statements about dentistry include:
A. Anatomy of the teeth: Human beings have 32 teeth, 16 in each jaw.

Incisal teeth are responsible for cutting the food. They have sharp incisal edges and cut the food in pieces like a knife.

Canine teeth have a wide body and a pointy tip and are used for cutting the hard food into pieces. These teeth are named canines because they look like dog’s teeth.

The molar teeth have a flat uneven occlusal surface and are used for chewing and crunching the food. The root parts of the teeth are located and fixed in teeth sockets inside the bone. Number of roots is different. Some teeth have 4 roots, some have three, some have 2 and some have one root. The incisors and canines each have one root.

Maxillary molars each have three and some may have four roots. The mandibular molars each have two or sometimes three roots.

B. Some points regarding clinical examination: In order to evaluate a patient’s teeth status, first you have to see if the patient has lost any tooth. If any incisors or canines are lost, patient’s speech will be impaired. If the molars are lost, mastication will be impaired.
However, if the teeth are lost before the eruption of permanent teeth there would be no problem and permanent teeth will erupt normally. However, if the permanent teeth are lost there will be no new teeth to erupt.

Attention should be paid to the color of teeth as well. If the teeth have turned yellow or black, it would be no problem if they are deciduous teeth. They will fall and be replaced by the eruption of permanent teeth. But if they are permanent teeth, they will create an unpleasant appearance for the patient.

Gums should also be examined and evaluated for any wound, inflammation, bleeding or softness.

The breath odor should also be noticed. If the patient has bad breath, it may be due to gingival infection, tooth decay or gastrointestinal disorders especially stomach disorder.

3- Some of the statements of Avicenna about dentistry and oral and dental health (16, 23)

Avicenna in his book, Qanun has allocated separate chapters to the anatomy of the mouth, tongue, sense of taste, dental health and diseases, diseases of the lips and gingiva and miscellaneous factors related to them. Some of his statements are as follows:

A. Regarding dental health: Do not overindulge yourself with consumption of milk, salty fish, sweets and fruits like fig. Do not bite hard stuff with your teeth. Do not consume extremely cold or very hot food immediately after each other. Do not overdo tooth brushing or tooth picking; it damages the gingiva. Do not vomit repeatedly.

B. Some of the causes of toothache: Trauma to the tooth or its nerve, trauma or injury of the gingiva in the form of inflammation, infection, or softness, stomach disorders, and general underlying diseases like severe fevers are among the causes of toothache.

C. How to examine a patient complaining of toothache: Pay attention and see if pressing on the tooth creates pain in the gingiva. Is the gingiva inflamed? If gingival inflammation is not present, is the tooth nerve injured?

D. Some therapeutic procedures for patients with toothache:

If gingival injury is causing pain, there is no need to extract the tooth and the gingiva has to be treated. But, if the tooth structure is injured, extraction can be the treatment of choice. If the tooth nerve is injured, tooth extraction may or may not relieve the pain. It should be mentioned that Avicenna has explained several techniques, indications and contraindications for tooth extraction.

E. Miscellaneous interesting points:

a. Lips cover the teeth and prevent the saliva from pouring out. They are also important for speech and esthetics.

b. Some of the gingival diseases include bleeding, fissuring, cracking, wounding, softening and recession

c. Some of the dental diseases include discoloration, mobility, decay, fracture, cracking and wear out of enamel

4- Some of the interpretations of Ibn Al Nafis for Avicenna’s statements on dentistry (22, 24):

Ibn Al Nafis in his review book on Avicenna’s Qanun has quoted Avicenna’s statements and has offered some explanations that the most interesting of which are as follows:

A. The most important advantages and benefits of teeth:

1. Cutting and crunching food into small pieces to enhance and facilitate their digestion in the stomach.

2. Preventing the saliva from pouring out of the mouth when speaking.

3. Helping with speaking. If the teeth are lost, the speech is impaired.

4. Making a beautiful appearance when smiling.

5. Using them for biting as an act of self-defense when necessary.

B. Some of the interesting characteristics of human teeth:

1. In most cases, the teeth appear after birth. In rare cases, a child is born with two or three teeth.
2. The teeth that appear first fall naturally and permanent teeth erupt in their place.

3. The teeth are made of a special tissue and have a specific structure, no other organ has this texture.

4. Despite their hardness, the teeth have sensory nerves and sensation for pain; thus, they can be anesthetized.

5. Despite being large, they are evident from every aspect.

6. The teeth have the ability to grow and move throughout life and thus part of the teeth neighboring a lost tooth will grow and move towards the empty space.

7. Dental attrition occurs in the elderly and the teeth become more sensitive. The reason is the fact that by advanced age, their attrition increases while their growth decreases. On the other hand, the flesh and tissue covering the roots become thinner as one gets older; thus, they become more sensitive.

8. The roots are located in the jaw bone in the form of a joint and this joint is fixed and stable. Such a fixed and stable joint is not seen anywhere else in the body. However, it should be noted that despite such firm joint, the teeth sometimes become loose and mobile. Such phenomenon is not seen in any other organ.

C. Some points about the animal teeth:
Some animals benefit from all the aforementioned advantages of teeth except for speech. For some animals, the teeth are the most important means of attacking the prey. Some animals like birds, lentic and non-meat eating animals do not have teeth.

Some other animals have one or two teeth. For instance, elephants have two teeth that are used as a weapon for defense. They also help in mating with female elephant. Rhinoceros has one tooth which is mostly used as a weapon. In some animals, number of teeth is different in males and females. For example, female vipers have four canines because they are physically weaker than male vipers while males have two canine teeth.

On the other hand, the teeth of female camel are weaker than those of males.

Except for the aforementioned facts, in the non-meat eating animals who have teeth, like sheep and cows, the incisors are close together and flat to crop and grind the grass. They do not have canines. Predators need canines for hunting and killing their prey.

Discussion:

Oral and dental health has been among the main domains of traditional ancient medicine. Considering the aforementioned quotes from three major textbooks of traditional medicine, we notice that they are highly compatible with the contemporary dental science. For instance:

A. Anatomy of the teeth, their number at birth and after puberty, and mentioning the tooth nerves in the ancient text books which have all been confirmed by the modern dentistry (25).

B. Role of incisal teeth in cutting the food like a knife, naming the canines as dog’s teeth that have been mentioned in old textbooks especially in the book by Ali Ibn Abbas have all been in accord with contemporary dental science (25).

C. Importance of teeth in terms of esthetics and appearance when one smiles that has been mentioned by Ali Ibn Abbas in his book has also been approved in contemporary dentistry (25).

D. Statements of Rhazes and Ali Ibn Abbas about the “ability of the teeth to grow throughout life” has also been discussed in contemporary dental science as “continuous tooth eruption”(26).

E. The effect of old age on gingival recession and teeth attrition which has been mentioned by Rhazes and Ali Ibn Abbas is also in accord with contemporary science (26, 27).

F. Causes of bad breath, especially the gastrointestinal causes, have been suggested in Rhazes, Ali Ibn Abbas and Avicenna’s books and are in accord with modern science (26, 28).
Conclusion:

Several valuable results were yielded from the evaluation of accredited old textbooks and many of them still have therapeutic, research and educational applications. This study showed that contemporary science follows the path of traditional medicine and the gap between them has been created by some ignorant people. The mentioned facts extracted from ancient textbooks have to be included in contemporary textbooks and journals to help scientists from all over the globe recognize the valuable Iranian legacy.

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