

ORIGINAL ARTICLE

Rabies: A Comprehensive Review of Traditional Persian Medicine Literature

Abstract

Persian scholars greatly influenced the advancement of medical sciences during the Middle Ages. As a review of the books surviving from that time shows, infectious diseases was one main field of interest for these scientists. Among this group of health problems, rabies was specifically described by Persian physicians, particularly by Avicenna (980 – 1037 A.D.) in his famous “Canon of Medicine.” The current study aimed to examine these physicians’ brilliant views and innovations on the manifestations, diagnosis, and management of rabies, a subject not comprehensively assessed until now.

Key words: Persia, Rabies, Traditional Medicine

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Introduction

Rabies is an acute, progressive, fatal, and potentially preventable disease that involves the nervous system of mammals. The viral etiology of this disease belongs to the Rhabdoviridae family. It is most often transmitted through the bite of a rabid animal¹. It is known that the rabies virus replicates primarily in muscle cells at the site of inoculation; then, it invades the peripheral (PNS) and central nervous system (CNS), respectively².

Depending upon the level of body systems involved, patients will present with various clinical manifestations during the course of the disease. The early manifestations of rabies are mostly non-specific, such as general weakness, headache, and fever. However, as the disease progresses from the PNS towards the CNS and involves the brain, more specific clinical presentations appear. Among these are excitation and anxiety, insomnia, paralysis, hallucinations, hypersalivation, hydrophobia, and difficulty in swallowing. When these manifestations appear, death is unavoidable^{3,4}.

The Early Reports of Rabies

Humans have been familiar with rabies since ancient times. Ancient tablets surviving from Mesopotamia (about 4000 years ago) reveal that society had some punishments for those whom they called "the owner of the evil dog." According to these documents, when an "evil dog" bit a human and the person died, the owner of the dog had to pay some silver. This seems to be the oldest document discussing human death following an animal bite that can be related to rabies^{5,6}.

Another document pointing to rabies is the "Torah", a book which clearly explains the features of a rabid dog and generally relates the transmission route of this disease. According to the "Torah", a rabid dog shows itself with silent barking, a continuously open mouth, an overflow of saliva from its mouth, drooping ears, and by placing its tail between its legs. Interestingly, the "Torah" notes the transmission of the disease through physical contact with a rabid dog. For disease management, the "Torah" recommends placing a hyena or leopard skin on the wound (animal bite) site or giving water to patients through a copper pipe^{7,8}.

Ancient Chinese physicians were also familiar with rabies. In their opinion, this disease was untreatable. These scholars believed that rabies could be transmitted through the saliva of a rabid dog. They used black bamboo wood to control rabid dogs, because this type of wood was believed not to

- 1- Hatami, 2012: 593.
- 2- Longo et al, 2012.
- 3- Ibid.
- 4- Manning et al, 2008: 1-28.
- 5- Goetze, 1965 : 133.
- 6- Rosner, 1995.
- 7- Ibid.
- 8- Preuss, 1923.



transmit rabies. Nevertheless, ancient Chinese resources did not describe the important manifestations of rabies, including hydrophobia⁹.

It seems that Ancient Greeks also knew of rabies. For instance, Democritus (460 – 370 B.C.) alluded to this disease^{10,11}. For another example, Aristotle (322 – 384 B.C.) explained that rabies is transmitted through the bite of a rabid dog and that it is ultimately fatal for the dog¹². After him, Celsus (2nd century) introduced fear of water as one of the manifestations of this disease. He also believed that the saliva of a rabid dog contains a toxin. For the management of rabies, Celsus suggested cleaning the bite area and then removing the toxins with methods like sucking the wound or burning it^{13, 14}.

Rabies and Culture

Man's views about rabies have been influenced by cultural beliefs throughout the ages. For instance, Greeks attributed rabies to the curse of Artemis, their ancient goddess¹⁵. Such cultural beliefs also influenced people's ideas about the prevention and treatment of this disease, many of which existed. For example, during the Renaissance Era, Europeans of that time used the Mad Stone to prevent rabies¹⁶; American frontiersmen used agents like the gallstones of deer or cow to break the spell and confront rabies; a stone was placed in milk until its color changes, and then it is applied to the site of the rabid animal's bite; rabies patients were dipped under water to treat their fear of water; the site of the bite of the rabid animal was burned; agents like donkey's milk and babies' urine were used to cleanse the bite site; and there are others¹⁷.

Early Steps towards Modern Knowledge of Rabies

With the advancement of medicine, rabies was examined under a scientific lens. In 1546, Girolamo Fracastoro (1478 - 1553), an Italian scholar, called rabies "an incurable wound" and suggested that this disease occurs in humans only when their skin is broken by an animal bite⁹. A few centuries later, John Morgagni (1735 – 1789) theorized that rabies spreads through the body along nerve fibers, not through the blood¹⁸. After him, Georg Gottfried Zinke (1771 – 1813), a German physician, showed for the first time in the history of medicine that rabies has an infectious nature. Zinke proved this idea by injecting the saliva of a rabid dog into a healthy dog¹⁹.

In 1879, Pierre Victor Galtier (1846 – 1908), a veterinarian and professor of infectious diseases, evaluated the manifesta-

- 9- Reed, 1915: 901.
- 10- Ibid.
- 11- Fisher, 1995: 306.
- 12- Wilkinson, 1988: 1-23.
- 13- Ibid.
- 14- Rupprecht et al, 2002: 327-343.
- 15- Schneider et al, 1994: 454.
- 16- Milton et al, 1951:139-154.
- 17- Vu, 2007.
- 18- Jarcho, 1948: 503.
- 19- Pearce, 2002.



tions of rabies in rabbits and showed that this disease has an incubation period of 18 days in animals shorter than dogs. This scientist also took the initial steps to create a vaccine for rabies in animals prior to the efforts made by Louis Pasteur (1822 - 1895)^{20, 21}.

After Galtier in 1881, Pasteur used his animal experiments to prove that rabies has a short incubation period of 6 to 7 days. Another important contribution made by Pasteur was the introduction of a vaccine against rabies for use by humans. This vaccine was created in 18859.

Rabies in Ancient Persia

Unfortunately, the lack of complete access to ancient Persian medical resources prevented the presentation of a comprehensive review of the ancient Persians' knowledge on rabies. Meanwhile, an assessment of the surviving non-medical texts from that era shows that Old Persians were familiar with this disease. For instance, the "Vendidad" (a Zoroastrian book) points to some features of rabid dogs, calling them "feeble-minded," and recommends they be medically treated like humans. According to this text, if treatment were not possible, the rabid dogs should be restrained using wooden collars to prevent further probable risks (for humans). However, this book did not directly state the possibility of disease transmission between animals and humans²².

Rabies in Traditional Persian Medicine

Persian scholars contributed significantly to the evolution of medical sciences. The peak of their influence occurred in an era known as the "Islamic Medicine Golden Age" which began around the 9th century A.D. and lasted until the 12th century. A number of great physicians, including Rhazes (865 – 925 AD), Avicenna (980 – 1037 AD), Akhawayni (? - 983 AD), Haly Abbas (949 - 982 AD), Hakim Esmail Jorjani (1042 – 1137), and others, lived during this time period and influenced medicine significantly²³.

One main field of interest to Persian scientists was infectious diseases, particularly rabies. These physicians expressed different ideas about rabies. For instance, Rhazes described different features of a rabid dog and recommended treatment methods like leaving the wound site open, using cupping tools to remove the toxin from the wound site, using herbal medicines orally or as a topical ointment, etc^{24, 25}. Another great figure of this era, Akhawayni, described noted that the incubation period of rabies lasted 40 days and that

20- Wilkinson, 1988: 1-23.

21- Geison, 2014.

22- Hatami, 2012.

23- Wilkinson, 1988: 1-23.

24- Tadjbakhsh, 1994: 498.

25- Razi, 1984.



patient death is unavoidable when clinical manifestations of the disease appear. Jorjani noted the possibility of disease transmission from wolves, foxes, and jackals²⁶.

Features of a Rabid Dog

Traditional Persian medicine texts describe some features of rabid dogs, including redness of the eyes, fear of water, sleeplessness, placing the tail between the legs, a dangling tongue, extreme salivation, the production of abnormal sounds and the inability to produce their sounds normally, fear of the rabid dog exhibited by healthy dogs, a lack of balance when walking, and biting other animals (even its owner) without any specific reason²⁷⁻²⁹.

Traditional Persian physicians made some experiments to differentiate a rabid dog from a healthy one. For example, they applied an amount of blood or saliva from the dog suspected of having rabies on a piece of bread and then placed that bread in front of a healthy dog or hen. They believed that if the healthy animal did not eat from this food, the suspected animal did in fact suffer from rabies^{30, 31}.

The Etiology of Rabies

Persian scholars, similar to their predecessors, believed that rabies was transmitted through the bite of a rabid dog. Remarkably, Avicenna explained the possibility of rabies transmission through food or water infected with the saliva of a rabid patient³².

Some Persian physicians believed that changes in dogs' tempers would result in rabies. For example, Avicenna believed that "soda" temper was responsible for this disease. However, some centuries after Avicenna, Baha' al-Dawla described rabies, saying that dogs get the disease only through the bite of a rabid dog. He also noted the possibility of rabies transmission between humans through a bite³³⁻³⁵.

The Incubation Period of Rabies

Persian physicians believed that, after a rabid dogs' bite, the affected animal (or human) would remain asymptomatic for a period of time; then, in the case of inappropriate management, the manifestations would appear. However, different physicians identified different incubation periods for this disease. Akhawayni believed that rabies has an incubation period of about 40 days while Avicenna and Jorjani explained that the incubation period of this disease could vary from 1 week to 6 months³⁶⁻³⁸.

- 26- Matini, 1965.
- 27- Avicenna, 1988.
- 28- Meysari, 1366.
- 29- Tadjbakhsh, 1994: 331.
- 30- Matini, 1965.
- 31- Meysari, 1366.
- 32- Avicenna, 1988.
- 33- Tadjbakhsh, 1994: 498.
- 34- Avicenna, 1988.
- 35- Bahā' al-Dawlah Razi, 2011: 555.
- 36- Matini, 1965.
- 37- Avicenna, 1988.
- 38- Baer, 2010: 1-22.



Clinical Presentations and Disease Prognosis in Humans

According to traditional Persian medical texts, rabid humans present some specific clinical features. According to them, when a bite occurs, similar to other ulcer types, the patient will experience pain only in the wound area³⁹. When the disease incubation period ends, patients will first exhibit some neurological manifestations, like distracted thoughts and dreams⁴⁰. After this, they will experience a fear of water and aggressiveness⁴¹. In addition, some affected cases may suffer from tremors in their fingers. In the next step, as the disease progresses, patients will present features, including fear of light, hiccups, fear of crowded places and a desire to be alone, redness of the face and even the extremities, and wounds with a purulent discharge (in some cases)⁴². In this step of the disease, the rabid patient develops a great desire to bite other people, a feature that results in the possibility of disease transmission⁴³. Next, patients will suffer severe pain at the wound site and fear of everything; some may even experience spontaneous ejaculation. Finally, patients will show a decreased level of consciousness, cold sweating, and ultimately death^{44, 45}.

Traditional Persian scholars believed that the prognosis of rabies was unavoidable death when clinical manifestations presented^{46, 47}. Avicenna specifically points to fear of water, saying that when this feature is seen, the patient will die; however, before this manifestation appears, treatment is probably feasible⁴⁸.

Treatment of Rabies

Overall, treatment strategies for rabies can be categorized into three groups, as below:

1. Care of the wound site: Persian physicians greatly emphasized washing the wound site using large quantities of lukewarm water and leaving the wound open^{49, 50}. According to these scholars, the importance of leaving the wound open was of such great importance that Avicenna believed closing the wound would push the patient toward death. He recommended leaving the wound site open for 40 days⁵¹. He also explained that those patients who experience a large amount of bleeding from the wound site would have a better outcome than those cases that had lower amounts of hemorrhage. According to him, the wound site should be cleaned after some days. Avicenna explained that if the patient was referred for treatment with a delay (not more than 7 days), opening the wound by knife and washing it would be helpful^{52, 53}. Sucking

39- Avicenna, 1988.

40- Ibid.

41- Ibid.

42- Ibid.

43- Ibid.

44- Matini, 1965.

45- Avicenna, 1988.

46- Matini, 1965.

47- Avicenna, 1988.

48- Ibid.

49- Matini, 1965.

50- Avicenna, 1988.

51- Ibid.

52- Ibid.

53- Meysari, 1366.



the wound site, burning the bite site, sitting in cold water, and cupping were his other recommendations⁵⁴⁻⁵⁶.

2. The use of topical drugs: Persian scientists recommended different topical ointments to be used at the wound site. They explained the various effects of these medications, including opening the bite site (a combination of agents like salt, scilla maritime, allium porrum, vitriolum, ruta graveolens) and keeping it open (using the agents like vinegar, cow's milk, garlic, bulb, lepidium sativum, ferulla assa-foetida, asphaltum, beta vulgaris, etc), absorption of the cause of rabies from the wound (using the old human's urine or peganum harmala), acting as an anti-toxin (the dried liver of a rabid dog), cleansing the wound, etc⁵⁷⁻⁵⁹. Selecting the ointment type was influenced by other factors, such as the patient's general condition, and the time elapsed between when the bite occurred and when treatment was started (some names were written according to modern literature)⁶⁰.

Probably for the 1st time in the history of medicine, Avicenna, in the 2nd volume of his Canon, explained that the blood of a rabid dog contains the antitoxin of this disease. In contrast to his predecessors who sometimes suggested eating the liver or the blood of a rabid dog, Avicenna recommended placing the liver of a rabid dog on the wound site^{61, 62}.

3. The use of oral medications: Traditional Persian physicians commonly believed that changes in body tempers (the domination of "soda" temper following the inoculation of the disease by rabid dogs) would cause rabies, particularly its neurological manifestations. Considering this belief, they used laxatives to excrete "soda" from the affected patient's body. For instance, they used terminalia chebula and cuscuta epithymum⁶³⁻⁶⁵.

In addition to the above-mentioned main treatments of rabies, traditional Persian physicians had recommendations about the use of some other adjuvant treatments. For example, Avicenna recommended eating some foods (as daily meals), like onion, garlic, crab meat, specific types of broth, etc. It was recommended that patients maintain a certain level of light activities and exercises (if the patient was able). Body massage was another recommendation⁶⁶.

To manage hydrophobia, Persian scholars recommended covering the water container with leather or a textile (to prevent seeing its content) or using metal containers with long pipes to give water to the patients⁶⁷.

- 54- Matini, 1965.
- 55- Avicenna, 1988.
- 56- Meysari, 1366.
- 57- Matini, 1965.
- 58- Avicenna, 1988.
- 59- Meysari, 1366.
- 60- Avicenna, 1988.
- 61- Ibid.
- 62- Tadjbakhsh, 1994: 310.
- 63- Matini, 1965.
- 64- Avicenna, 1988.
- 65- Meysari, 1366.
- 66- Avicenna, 1988.
- 67- Ibid.



Conclusion

The history of rabies dates back many centuries. Present-day knowledge of this disease results from the countless efforts made through the ages. Persian scientists, specifically Avicenna as probably the first manto use an early form of post-exposure passive immunization, made some important contributions to the progression of this field. The authors recommend future studies to precisely assess the recommended traditional medicines for rabies and specify their possible usages in modern medicine.

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Shapouri House or Shapouri Pavilion and Garden (Persian: خانه شاپوری) is an early 20th-century Persian building and garden in the city of Shiraz, Iran.

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