

Death of a medical colossus: The course, cause and fatal outcome of Avicenna's colic

ABSTRACT

Abu-'Ali al-Husayn ibn Abdallah ibn-Sina (known in the West as Avicenna) is revered in much of Asia as one of history's greatest physicians. And yet, few westerners know of him, his iconic *Canon of Medicine* or the role he played in preserving ancient Greek medical knowledge following the sack of Rome. We briefly review Avicenna's impressive legacy and provide what to our knowledge is the first critical examination of the illness responsible for his death at age 58 years. [Am J Med Sci 2023; ■(■):1–4.]

INTRODUCTION

A little more than a thousand years ago Abu-'Ali al-Husayn ibn Abdallah ibn-Sina, known in the West as Avicenna (Fig. 1), became one of the towering figures in the history of medicine and philosophy. He was a Persian polymath who lived and worked in an area known as Greater Iran (Fig. 2). Much is known of his life, due to a combined autobiography/biography (the latter written by his student Jurjani), but until now there has not been a critical examination of the illness responsible for his death at age 58 years.

LIFE AND LEGACY

Avicenna was born c.980 C.E. in a village near Bukhara (in present day Uzbekistan), which was then the capital of the Samanid dynasty. Approximately 300 years had passed since the fall of Sassanid Persia to the armies of the Arab Muslims, 130 years since the heyday of the House of Wisdom in Bagdad, where Greek, Syriac, Persian and Hindi manuscripts were translated into Arabic.^{1–3}

The Samanid dynasty was one of the first indigenous Persian political entities to arise after the dissolution of the Persian Empire by Arab Muslims, one which actively supported the sciences and arts, and revitalization of the Persian language. In Bukhara, where Avicenna studied, there was an impressive library containing a host of manuscripts reflecting the city's central role in the political, cultural, linguistic and scientific reawakening of Persia.^{2–4}

Avicenna's father, a Samanid governor, provided his son with a series of tutors during his formative years. They saw to it that the boy was well versed in Greek philosophy and Islamic theology and prepared for the practice of medicine by the age of 17 years. When the Samanids were defeated in 999 C.E., Avicenna was forced to leave Bukhara and travel with the armies of various patrons from Gurganj to Gorgan to Rey to Isfahan and finally to Hamadan, where he died in 1037 C.E.^{2–4}

Although in the West, Avicenna is little remembered, in present day Iran, Afghanistan, Tajikistan and

Uzbekistan, he is considered a national icon. In Iran his birthday is celebrated annually as "Physicians' Day." Afghanistan, Bangladesh, Hungary, India, Iran, Iraq, Pakistan, Turkey, the Philippines, Tajikistan, Saudi Arabia and Uzbekistan have medical schools or universities named in his honor; his portrait hangs in the Hall of the Avicenna Faculty of Medicine in the University of Paris; and a crater on the moon is named for him.⁵ Given these, one might ask, what did he do to deserve so many honorifics?

Avicenna was one of the greatest scientists of the Islamic Golden Age. Among other things, he is credited with having written the earliest known treatise on the clinical trial.⁶ However, in the medical community, he is remembered and revered most for his *Canon of Medicine*, a collection of some 30 volumes containing his own observations and recommendations, and distilling a thousand years of medical tradition that began in ancient Greece, was reformed by the Romans and then further modified by Arab and Persian scholars. The work not only classified and systematized the bulk of Greek medical knowledge that survived the sacking of Rome, it played no small part in preserving that knowledge for later generations. In its Latin translation, it was one of the earliest works produced once the European printers began their operation.⁵ While not a modern work, the *Canon* is exceedingly well-organized, and did, for the first time, distinguish pleurisy from infections of the mediastinum, rightly attribute ancylostomiasis (hookworm) to an intestinal worm, note the contagiousness of phthisis (tuberculosis), and call attention to the capacity of certain diseases to be transmitted by water and soil. Avicenna's *Canon* was the most widely used work on medicine during the Middle Ages, and one from which, even today, physicians in India continue to derive valuable advice.³ Sir William Osler rated the work as the most famous medical textbook ever written, one which served as a medical bible for more years than any other work.⁷ Interestingly, one of Avicenna's treatises written while he was imprisoned in a castle outside of Hamadan when 44 years old concerned colic.⁸ Unfortunately, that treatise has not been translated into English.



FIG. 1. Portrait of Avicenna on a 1950 Iranian stamp (https://en.wikipedia.org/wiki/File:1950_%22Avicenna%22_stamp_of_Iran.jpg) by Iran post, January 1, 1950. Public domain.

AVICENNA'S COLIC⁹

Except for Avicenna's final illness, we know little of his medical history. Other than a serious illness of unknown character in his early 20s, he appears to have enjoyed excellent health until age 55, when he began suffering with recurrent "colic" (i.e., "abdominal pain" as per

personal communication of Professor Lutz Richter-Bernberg, Department of Oriental and Islamic Studies, U. of Tübingen, Germany), which eventually took his life. Regarding his family, we know he had a brother 5 years younger than he and a father who died when Avicenna was 22. Nothing more is known of their medical histories or that of his mother.

Avicenna never married and had no known offspring, though he was renowned for having exercised his "concupiscent [lustful] facilities" with uncommon regularity. Though a practicing Muslim, he was no paragon of traditional Islamic piety. Wine, which he consumed in large amounts, helped to inspire him when confronted with some new problem or working on one of his numerous compositions.

The early stage of Avicenna's terminal illness began three years before his death with recurrent attacks of colic. Whether these attacks were accompanied by other signs or symptoms (such as fever, diarrhea or vomiting) is not known. Two decades prior to the illness one of Avicenna's patrons (Shams al Dawla) died following recurrent episodes of colic similar to Avicenna's. Shams al Dawla's son, another of Avicenna's patrons, also suffered with recurrent episodes of colic.

The terminal phase of the Avicenna's final illness began in 1034 C.E. with recurrence of his colic, while trying to escape enemy troops attacking Isfahan. Fearful that the illness would cause him to fall into the hands of the invaders, Avicenna tried to accelerate his recovery by administering "an enema to himself eight times in one day, to the point that some of his intestines ulcerated and an abrasion [indicated by the Arabic word "sahl," which

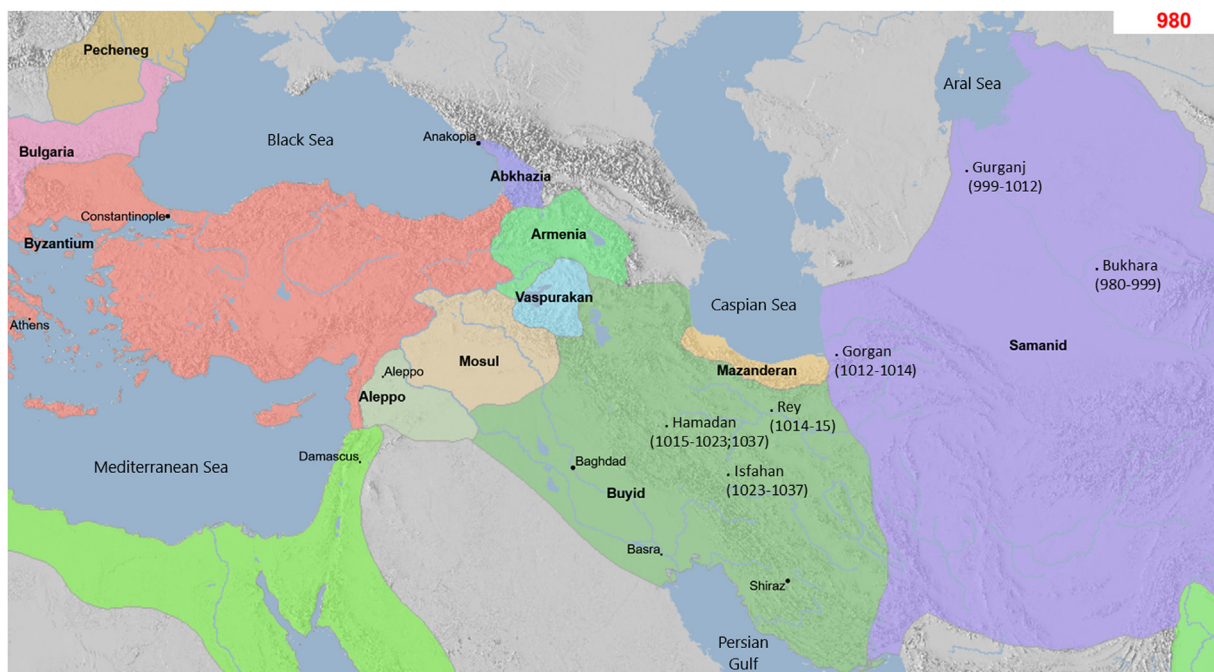


FIG. 2. Geographic and political map of Greater Iran at the time of Avicenna's birth (made with Geocron, www.geocron.com).

is more correctly translated as “bloody diarrhea”) *broke out on him*. . . [It was during this time that he was] *afflicted by seizures, which sometimes follow the colic. And in spite of that he treated himself and administered enemas to himself for the abrasion and for the resolution of the colic. Then one day, wishing to break the wind of the colic, he ordered that two [doses] of celery seed be included in the enema. But one of the doctors whom he ordered to treat him threw in five [doses] of celery seed – [It is not known] whether [the doctor] did it intentionally or by mistake. . . [in that] the abrasion was aggravated by the sharpness of the seed. In addition, [Avicenna] used to take mithridate [a paste named after Mithridates of Pontus, usually containing opium] on account of the seizures, but one of his slaves threw a great deal of opium into it. . . The reason for this was their stealing a great deal of money from [Avicenna’s] coffers; [the slaves] desired [Avicenna’s] death in order to be free from the consequences of their actions. . . [Avicenna] was [then] so weak he was unable to stand, so he continued to treat himself until he was able to walk. . . [though] he did not take care and frequently had sexual intercourse. . . intermittent relapses and recovery [followed]. His strength wasted away and. . . was not sufficient to repel the illness. So [Avicenna] ceased treating himself. . . He remained like this for a few days; then he passed away [at age 58] into the presence of his Lord and was buried in Hamadan in the year 1037 C.E.”*

DIFFERENTIAL DIAGNOSIS

Given the likelihood of the poor sanitary conditions to which Avicenna was exposed during numerous forced marches with the retreating armies of his patrons, a gastrointestinal infection, such as typhoid or amebiasis, has to be considered as the cause of his recurring colic. However, in the absence of reported fever, prostration or diarrhea (until terminally) and his apparent stable condition during three years of recurrent colic make these diagnoses unlikely.

His promiscuity also raises the possibility of a sexually-transmitted infection. However, to our knowledge, no such infection causes recurrent colic as its principal manifestation.

Avicenna might also have suffered with a more mundane abdominal disorder such as recurrent nephrolithiasis, cholelithiasis or pancreatitis. These also seem unlikely in that there is no record of Avicenna’s having been incapacitated by his attacks. Moreover, if Avicenna’s attacks of colic were related to those of his patrons, as they seem to have been, a common cause for his complaints and theirs, such as some shared toxic environmental exposure, would be more likely.

We believe the only diagnoses worth considering as the cause of Avicenna’s chronic illness and death, based on the character and course of the illness, are acute intermittent porphyria, chronic opium consumption, poisoning and chronic lead intoxication. In fact, we believe

that all of these, except for acute intermittent porphyria,¹⁰ had a role in Avicenna’s fatal disorder. Although his disorder had features of acute intermittent porphyria, though no psychiatric symptoms or report of passing dark urine, it is a rare disorder and would not explain the recurrent episodes of colic experienced by Avicenna’s two patrons.

Avicenna’s recurrent colic, apparent infertility and copious consumption of wine all point to chronic lead intoxication as the most likely cause of his chronic illness. The enemas given to “break the wind of the colic,” especially those laced with celery seeds, almost certainly injured his rectum or colon and produced the intestinal ulceration responsible for his bloody diarrhea.¹¹ The constipating effect of the opium he used to alleviate his colic would only have aggravated his abdominal distress. And finally, Avicenna’s slaves, who reportedly wanted him dead, might well have taken advantage of their position as Avicenna’s caregivers to poison him.

Chronic lead intoxication (plumbism) has likely troubled humans for at least 5000 years following the introduction of industrial lead production. Hippocrates provided the first clinical description of the disorder in 370 B.C.E. Nicander (c.200 B.C.E.), Pliny (1st century C.E.) and Dioscorides (100 C.E.) also wrote early descriptions of the disorder.¹²

Colic, which can be severe enough to mimic an acute abdominal emergency, is a common symptom of plumbism, as are constipation, headache, neurocognitive deficit, irritability, paresthesia, weakness and seizures.¹² Avicenna had colic, constipation, headaches, and terminal weakness and seizures, but no apparent irritability, paresthesia or neurocognitive deficit.

The classic symptoms of plumbism begin to manifest when blood lead levels reach 40 µg/100ml. Interestingly, as blood levels increase further, the libido begins to wane (though apparently not in Avicenna’s case), sperm volume and sperm counts drop, sperm morphology degenerates and sperm motility decreases,¹² all of which might explain Avicenna’s lack of a known offspring in spite of an extraordinarily active sex life. This, of course, assumes that he was heterosexual, which is not known.

The cause of lead-induced colic is not fully understood. It is suspected to be due to either an alteration in visceral smooth muscle tone causing dysmotility and pain, to direct local oxidative stress leading to intestinal inflammation, or in certain cases, to lead-induced pancreatitis.^{13,14}

If Avicenna’s colic was due to chronic lead intoxication, the question remains, what was the source of the lead responsible for his intoxication? Today, most cases of lead poisoning arise from two sources: inhalation of lead fumes or ingestion of lead particles in the workplace, and ingestion of lead particles, usually lead-based paint, in the home. In Avicenna’s day, the principal source of lead in cases of plumbism is not known. One potential source could have been the pottery used as dishes and goblets by Avicenna and his patrons, as the

famous Samanid slip-painted pottery is known for its lead glaze.¹⁵ Another possible source was the wine Avicenna consumed. As far back as Roman times, wines were adulterated with lead as a preservative and flavor enhancer. That being the case, it's likely that the source of the lead responsible for Avicenna's colic was the wine he consumed with such regularity. Until governments throughout the world prohibited the addition of lead syrup to wine in the 19th century, cases of plumbism were rampant among the upper classes.¹⁶

If Avicenna's slaves poisoned him during his final illness, they would have resorted to a method of murder dating back to antiquity. In Medieval Europe, murder by poisoning was facilitated by local shops known as apothecaries, which sold a host of poisons,¹⁷ including vegetable poisons such as aconite, henbane, datura, deadly nightshade, mandrake, hemlock, yew extract and opium, along with colorless, odorless arsenic. Chronic poisoning with sub-lethal doses of arsenic might have caused Avicenna's intermittent abdominal pain but is usually accompanied by diarrhea, unless, perhaps, it is suppressed by concomitant dosing with opium.

CONCLUSIONS

Based on the limited clinical information available, it is not possible to know for certain what caused Avicenna's recurrent colic or what carried him "into the presence of his lord" at age 58 years. Even so, no disorder fits the character, course and epidemiological features of Avicenna's colic better than chronic lead intoxication. Avicenna's death, however, was not likely a direct result of lead intoxication but the consequence of an intestinal injury (possibly complicated by sepsis) induced by the enemas given to relieve his colic. It's also possible that Avicenna was a victim of poison given to him by his slaves. If his remains in Hamadan were tested for lead, perhaps an answer to the question of plumbism as the cause of Avicenna's colic might be answered. Then again, as is frequently the case in interpreting the results of historical forensic analyses, more questions than answers likely would be raised.

DECLARATION OF COMPETING INTEREST

The authors declare no competing interests.

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