Review Article

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ISSN: 1735-0344 *Tanaffos 2025; 24(3): 206-212*

TANAFFOS

Definition of Asthma in the Middle Ages

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Received: 3 March 2024
Accepted: 9 December 2024

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In the Middle Ages, asthma had a legacy from antiquity. The most accurate one was Galen (129-216 AD). In the Middle Ages, Ali ibn Rabban Tabari (838-870 AD) first introduced asthma and explained its different types. After him, many physicians devoted a significant part of their work to this disease. We searched the original versions of historical books and used a narrative approach to report the history of asthma. Pneumonia, inflammation of the spleen, and softness and stiffness of the chest muscles are some of the factors that have been suggested as the causes of asthma. However, the most accurate cause was given by Ibn Sina (980-1037), and he gave many detailed reasons for it. In addition to the previous reasons, which he listed according to a much more accurate classification than his predecessors, he cited other problems such as the presence of sputum, dry lungs, dry cough, sputum caused by neurological diseases, diseases of the organs adjacent to the respiratory organs, and congenital injuries as causes. Of course, other factors have been added by other physicians, the most notable of which are hereditary problems and diseases such as nosebleeds and pneumonia. The accurate observations of physicians in the Middle Ages provide a detailed and comprehensive description of asthma. The definitions and classification of different types of asthma were an important element in designing the treatment plan.

Keywords: History of Medicine; Avicenna; Rhazes; Pulmonary Medicine; Asthma

INTRODUCTION

Despite the various studies concerning the history of asthma, very little has been written about the history of this disease in medieval Persia. Studying the medical traditions of ancient Persia may supplement current knowledge of asthma, as well as provide interesting facts about the etiology of asthma. It is axiomatic that the legacy of these ancient physicians, regarding respiratory conditions, was passed on to the physicians of the Medieval Age (1-3). The latter first complemented their predecessors' ideas and then made their observations about the symptoms and etiology of the respiratory conditions. The ancient scholars Galen (129-216 AD), Hippocrates (460-370 AD), and Aretaeus (flourished 2nd century AD) were the medieval physicians who contributed the most to the understanding of respiratory diseases during this era. However, in contrast to their contribution to many other medical conditions, none of these ancient physicians provided an illuminating clinical account of asthma. Hippocrates was the only one to mention asthma in his work (4). Galen wrote extensively on respiratory conditions, and perhaps his greatest feat in this respect was dissecting animals to unearth the symptoms and causes of these conditions (3). Given this knowledge, which was transferred onto later generations,

these types of diseases attracted the attention of all Muslim medieval physicians, who opined in a variety of areas, including diagnosis, etiology, and treatment. The present article seeks to shed light on the etiology of asthma, as expounded by physicians of the medieval age.

METHODS

As the original versions of the historical books were not available in any online databases, we independently reviewed the chapter titles from all relevant books. The books were sourced from the Central Library of the History of Medicine at the School of Traditional Medicine, Tabriz University of Medical Sciences, Tabriz, Iran, and all relevant chapters covering the period from the fourth century BC to the 18th century were selected. Any disagreements about chapter selection were resolved by consulting. We then carefully reviewed the main texts of all selected chapters, and the relevant sections of the chapters were selected for inclusion in this article. In cases of disagreement, we again resolved them through consultation. The search was conducted from February to July 2022 without any language or time filters. The reference lists of all relevant books were also manually checked to identify any additional qualified books.

Asthma at the beginning of the Middle Ages

Many scientific works from the great civilizations, such as Greek, Indian, and Persian, were extensively translated and, having been imported into Muslim lands, took the form of new science (5-7). Ali ibn Rabban Tabari penned *Firdaws al-Hikmah* (Paradise of wisdom) – the first comprehensive book on medicine in the Arabic language – in which he integrates, for the first time, knowledge from the three major medical schools (i.e., Persian, Greek, and Indian) (8). As a physician, Tabari practiced medicine in Baghdad and took a special interest in asthma, in addition to the general description of lung diseases, defining asthma as: "weak muscles cause short, loud breaths; the inflation of the diaphragm makes muscles take the cold air into the body, causing continuous breaths". He also described the last stages of obstructive diseases, such as asthma and bronchitis, as follows: the relaxation of muscles makes breathing possible when standing or with the neck upright, because the muscles engaged in breathing are stiff when the person lies back or sits up. As a result, the patient stands up to ease breathing. If the patient lies on the bed, the upper muscles will fall over the lower parts, obstructing the airways. Tabari seems to have benefited from Galen's account when he referred to breathing in the standing and sitting positions (1). Tabari's fourth definition of asthma, which most closely resembles that used in modern medicine, is "trouble breathing is due to hard and adhesive materials being drawn towards the respiratory tracts and their obstruction thereof. Alternatively, it may be due to compressed air obstructed in the chest and sides". At this stage, as Tabari describes it, the patient is slowly dying (9).

Rhazes (854–925 AD), the renowned Persian physician (10), defined asthma as rapid breathing in the absence of fever, which may progress to orthopnea (Arabic: intisab-i nafas), a condition that worsens during sleep. Carbuncle formation, thick sputum, lung dryness, and a congenitally small chest and lungs were also described as causes of asthma (Figures 1 and 2) (11).

Ibn Jazzar Qirwani (9th century) (12,13), another well-known scholar, described asthma as being due to tightness of the air tracts or sputum accumulated in the trachea, which causes the patient to have difficulty breathing, feeling that the air tracts have become thinner and tighter. Therefore, the patient has to breathe rapidly, about twice as often as usual. This is what he called asthma (14).

A physician from the tenth century, Yaqub Kashkari, wrote in his book *Kunnash fil Tib* (Collection of medical notes) that the air inhaled and exhaled with difficulty can be divided into two types. Deep breaths are inhaled with the help of muscles between the ribs when there is an injury to the chest, lungs, or heart. The second type involves much bigger breaths than those of the first type. It involves the use of six-part muscles, which extend from the neck to the chest, as well as those between the diaphragm

and intercostal muscles. These big breaths may be due to problems occurring in the chest and lungs, or in the heart.

Kashkari believed there to be several causes of asthma. Firstly, material accumulates between the chest and lungs, causing difficulty breathing. Infection of the lungs may take place in those suffering from pneumonia. Secondly, a thick, sticky liquid appears in various parts of the bronchopulmonary area. Thirdly, a carbuncle-type swelling may occur in the lungs. Any large inflation with a hole inside it that absorbs rotten material is called a carbuncle, and if it is hot, an abscess (15).

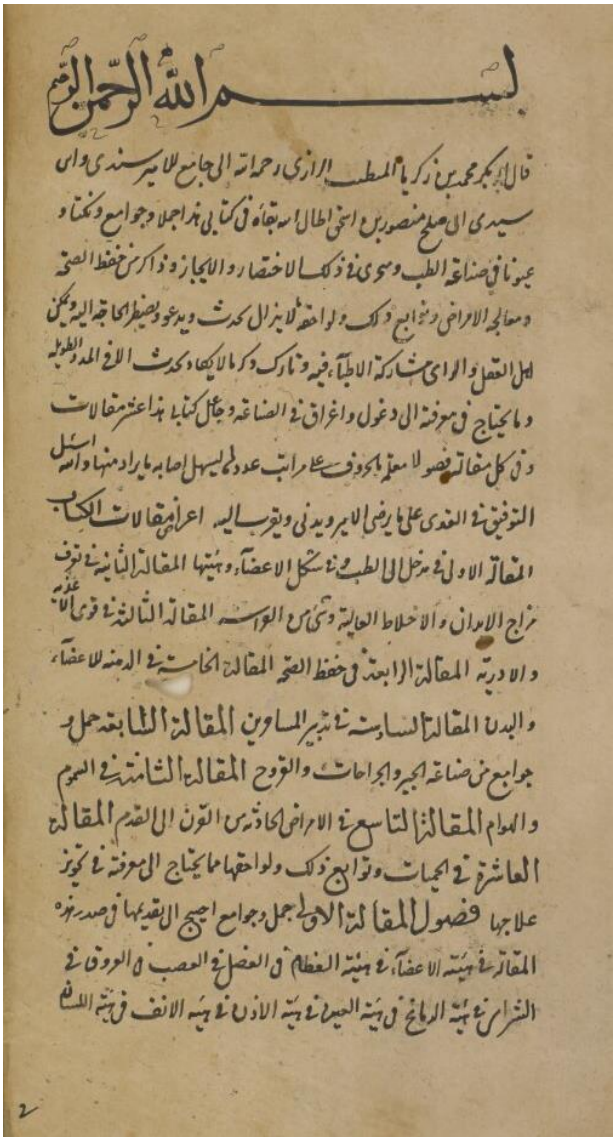

Figure 1. The first page of the book Al-Mansouri Fi Al-Tib written by the famous Iranian physician, Razi. At the beginning of his book, he states his intention to write a book and the things that a doctor needs to know

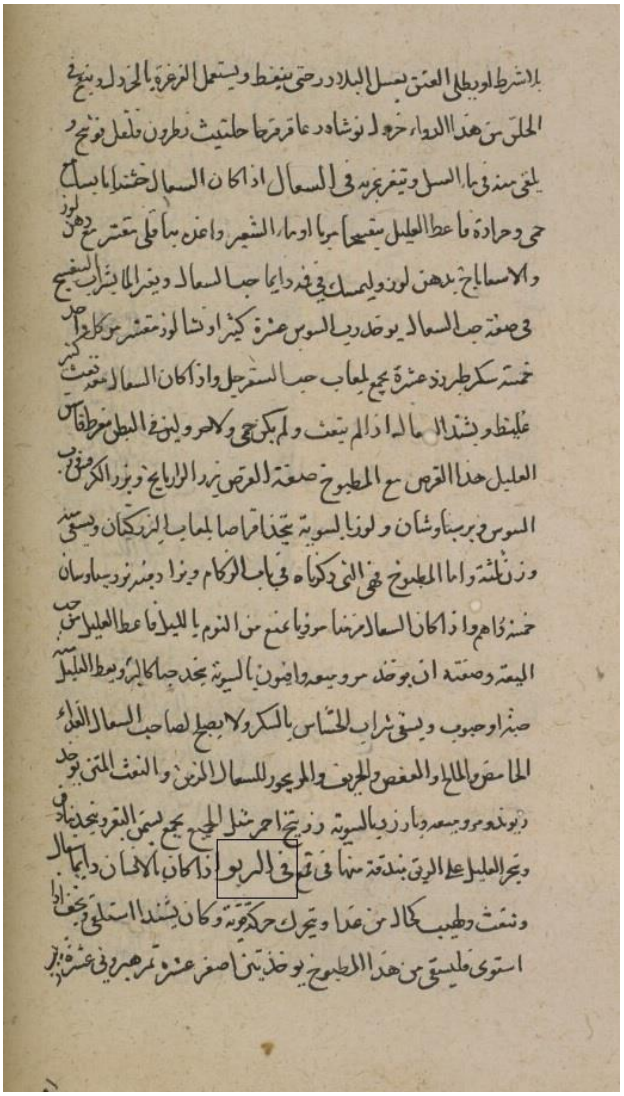

Figure 2. The first part related to asthma from the book Al-Mansouri Fi Al-Tib written by Razi.

Majusi Ahwazi (930- 994 AD), also known as Haly Abbas, in his famous book Kamel-*al-Sanaat al-Tibbiah (The Perfect Art of Medicine)*, believed that the cause of asthma lay in the tightness of the lung canals. According to Ahwazi, if the tightness occurs in the veins of the lung, it will cause asthma and shortness of breath. If the tightness occurs in the trachea, orthopnea or asthma will occur. The difficulty breathing in these conditions stems from the cold, as well as the very sticky sputum in the canals. Its symptoms are painful coughs and deep, rapid breathing without any sign of fever. In his precise comments, which have since been shown to be correct, Ahwazi categorizes

the consequences of asthma for the patient into four groups, using their etiology: firstly, coughing, which is the body's attempt to drive the thick sputum out of the lungs; secondly, big deep breaths caused by the patient's need for such breaths; thirdly, continuous breaths caused by the tightening of the canals and obstruction of the air into the lungs, which makes the body need to continuously inhale to make up for the air the body would normally take in in a single breath; fourthly, the patient's stand up and sit down to ease the breathing process, because if the patient remains stationary, the falling of the chest muscles and covering the pleura's in the lungs would exert pressure on the canals (see *intisab al-nafas* above). Ahwazi also highlights the relationship between cardiac and lung diseases in an interesting and precise account. Respiratory conditions, he opines, are sometimes caused by the heat produced by the heart's vapor, which fills the chest and lung space; a phenomenon thought to be the accumulation of liquid in the lungs due to the pumping of the blood. The symptoms of this condition are the following: rapid, big breaths, a fast pulse, and extreme thirst. According to Ahwazi, tightness of the chest occurred due to inflammation of the spleen and, in some cases, because of the weakness and limpness of the chest muscles (16).

In the ninth century, Ahmad b. Yahya Baladi wrote in *Tadbir al-Habali* (17) (Treatment and health of children and pregnant mothers) that asthma was one of those diseases which Hippocrates believed children were exposed to when growing teeth, probably at six months of age (18). That the infant was prone to asthma when growing up was highlighted in Hippocrates' "Aphorism". Baladi also cites Galen, who states the word *rabw* (asthma) means rapid breathing in Greek, like the breathing of a man stranded in a small place (19,20). In "*Hidayat al-Muta'allimin fit-Tib*" *(A Student's Guide to Medicine)*, Akhaweni Bukhari (21) hypothesised that the cause of rabw (asthma) was the pouring of moist waste from the brain to the pharynx, making breathing like that of a person who had run a long distance (22).

Asthma in the eleventh century

Abul-Qasim Al-Zahrawi (known as Abulcasis in Western literature), one of the most famous physicians of the 11th century who particularly excelled in anatomy and surgery (23,24), has been considered one of the most prominent physicians and perhaps even the founder of surgical science (23-25). He identifies three causes of asthma in *Kitab al-Tasrif li man Ajz in la-Talif* (An Aid for Those Who Lack the Capacity to Read Big Books). The first is the presence of a viscous or thick secretion that blocks the respiratory tract; the second is an inflammation in the pleura that causes dyspnea; and the third is weakness of the respiratory muscles that restricts breathing. Zahrawi also considers asthma to be one of the diseases that children are prone to in their maturing years (26).

Asthma in Ibn Sina's Works and Its Influence on Subsequent Works

The most detailed and precise etiology for asthma (rabw) was presented by Avicenna, a renowned Persian physician, in the Canon of Medicine (Figure 3) (27). He reported that a patient with asthma (rabw) breathes rapidly, like someone who is suffocating or exacerbated by fatigue. Today, these symptoms are considered to be those of severe asthma. It is difficult to treat young people suffering from this disease, let alone the elderly. According to Avicenna, the disease, which usually lasts a long time and cannot be treated quickly, is exacerbated when lying supine. Avicenna cites a number of detailed causes of this disease: 1) that the lungs, or its associated organs, were damaged so that the thick sputum cannot move out of the bronchi; 2) the sputum that causes the disease to reside in trachea; 3) sputum in the porous part of the lungs and its cavities; 4) the pouring of sputum from the head to the lungs – which occurs in the Southern lands when there is a profusion of southern winds – similar to Hippocrates' opinion (1); 5) the sputum has fallen from other areas of the body into the lungs; 6) coldness of the lungs (i.e., the source of the sputum is the lungs); 7) the termination of breathing due to fatigue when the breath is taken in,

because the stomach presses on the diaphragm which disturbs the lungs; 8) hard, thick or cold lungs contributes to asthma; 9) asthma (rabw) also rarely results from dryness of the lungs; 10) asthma is due to the coldness of the lungs; 11) sputum affects the respiratory organs from the nerves and spinal cord; 12) sputum in the form of the secretions that originates from paranasal sinuses; 13) organs adjacent to the lungs have trouble functioning, disturbing the breathing process; 14) the accumulation of vapor or smoke in the chest; 15) the trapping of "wind" in the respiratory system disturbs breathing; 16) a small chest which makes it difficult for the patient to breathe smoothly; 17) a congenital disorder in the respiratory system. It should be borne in mind that modern medicine supports the second through the sixth proposed causes, as well as the ninth, fourteenth, and seventeenth causes described by Avicenna. The remaining causes should be interpreted in the context of the medical knowledge of Avicenna's era, as they are not supported by current medical evidence (28,29).

Abu Muhammad Abdullah (b. Muhammad Azudi), a philologist living in the tenth century, who learned from Avicenna and Abu Rayhan al-Biruni, erroneously believed asthma (rabw) was the same as shortness of breath and dyspnea. He believed that the cause of asthma (rabw) was thick phlegm, which formed in various parts of the lungs. The phlegm is sometimes formed in the lungs themselves, or is carried into the lungs from other organs. Ismail Jurjani (12th Century) presents his ideas about asthma in his famous books *Zakhiriy-i Kharazmshahi* (Treasures Dedicated to the King of *Kharazm*) and Al-Aghraz Teyyibah *(Medical Goals and Allai's Discussions)* (30). According to him, Asthma is a disease that causes the patient not to breathe or, if they can, they do so hastily, like a person who has been running. He also repeats Hippocrates' idea that it is more difficult to treat the elderly than the young.

Jurjani believed that the reason behind this difficulty was that the sources of the disease were in the lungs, which he divided into three types: heavy, thick, or thin secretions, whether it is large in size or it is thick and slimy, or diluted; the thick secretions cannot be removed from the lungs easily, but thin secretions can be removed by coughing. According to Jurjani's definition, which is quite accurate, the cause of *dyspnea* is that the respiratory tracts are so tight that it makes it difficult for the patient to breathe. Explaining the etiology of asthma, he mentioned the same causes as Avicenna had referred to in his Canon of Medicine. In explaining the coldness of the lung, for instance, he rightly refers to having cold food, drink, and drugs as the source (31).

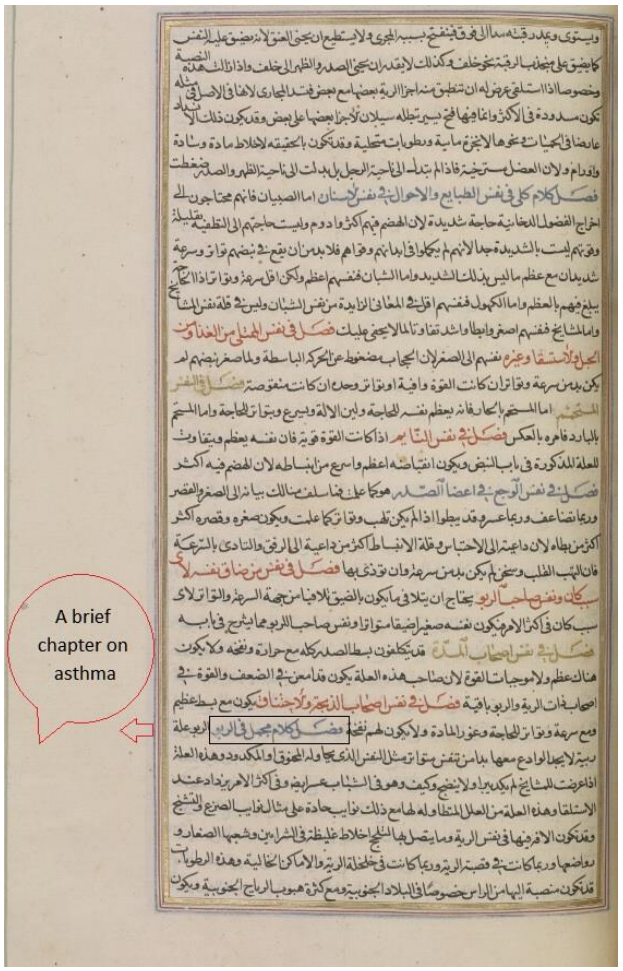

Figure 3. Chapter related to asthma from the book Law of Medicine written by Ibn Sina, a famous Iranian physician

In *Bayan al-Tibb (statement of medicine)*, Hobeish Tiflisi, a physician living in the 11th century, believed that asthma was caused by coldness and heat. For the latter, he believed that thick blood with Phlegm accumulated in the bronchus of the lungs or poured into the lungs from the

head or chest; as for the former, the cause, he believed, lies in the thick phlegm which pours into the bronchus or those which come down from the head into the chest (32). A century later, Ibn Hubal Baqdadi proclaimed, in *Mukhtarat fi al-Tibb (The selected or choice book in medicine),* that asthma is a hereditary disease that is transferred from fathers, grandfathers, and uncles on the mother's side (33). In the 12th century, the Andalusian philosopher and physician Averroes from the western Muslim lands wrote in *Al-Kulliyat fil Tibb* (Generalities on Medicine) that causes of inflammation near the heart, which leads to asthma. In his opinion, the causes of asthma are downpours or an impact on the chest (34).

Ibn Ilyas Shirazi, who comes from a lineage of eminent physicians and who was a well-known scholar in many areas, especially medicine, wrote in the 14th century (35) that asthma is a disease that would recur if the patient walked (36). The cause lay, as he opined, in the sputum which accumulated in the lungs or chest, and its symptoms were sniffing, cough, and expectoration (37). Three centuries later, Baha al-Doleh Razi wrote in Khulasat al-Tajarub (Summary of Experiences) that the cause of asthma is suffocation (khunnaq) and the inflation of the diaphragm and lungs, as well as the liver, spleen, and stomach. Not unlike the previous scholars, he believed that the downpours into the chest were among the causes of asthma (38).

Persian physicians also dealt with asthma in their body of work, a remarkable example of which is *Tuhfat Nasiriya,* penned by Hakim Abul-Qasim Naini Isfahani in the 19th century. Isfahani believed that the cause of asthma is a slimy liquid residing in the lungs. Contrary to modern medicine, which limits the occurrence of asthma to children, he believed that the disease also occurred in the elderly and that an important symptom of the disease was rapid breathing. The cause, he stated, is the disparate need for cold air because of the tightness of pores and their being filled with sputum, which led to a shortage of cold air reaching the heart (39).

CONCLUSION

This review presents the approaches that physicians during the Middle Ages used to diagnose, define, and classify asthma in their works. The accurate observations of physicians in the Middle Ages provide a detailed and comprehensive description of asthma. Based on clinical manifestations and their apparent causes, they have classified different types of asthma and provided definitions accordingly .

These definitions and classifications of different types of asthma were an important element in designing the treatment plan. However, most of them remain largely unexplored. Nevertheless, the abovementioned information helps us to understand the progress of the investigation and treatment of lung diseases, especially asthma, in the Middle Ages.

Funding

This study was supported by Shahid Beheshti University of Medical Sciences (Grant No. 43012360).

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