

## ORIGINAL ARTICLE

### Indications and Contraindications of Phlebotomy According to Avicenna in *Al-Qanun fi al-Tibb (The Canon of Medicine)*

#### Abstract

Today, phlebotomy has a limited application in modern medicine and is prescribed for only a few specific conditions. However, recent studies have explored its potential effectiveness in treating a broader range of diseases. As phlebotomy has historically been one of the most widely used therapeutic methods in traditional medicine, examining the works of ancient physicians may provide valuable insights and inspire new research on its efficacy. In his seminal work *Al-Qanun fi al-Tibb (The Canon of Medicine)*, Avicenna—known as the prince of physicians and one of the most renowned Iranian scholars of the 10<sup>th</sup>-11<sup>th</sup> centuries AD—discussed phlebotomy in detail, including its indications for treating various disorders. Conditions such as sciatica, gout, arthralgia caused by excess blood, hemoptysis, epilepsy, cardiac arrest, melancholia, dyspnea, visceral tumors, conjunctivitis, hemorrhoids, and oligo/amenorrhea were among those for which phlebotomy was recommended. Avicenna emphasized several factors to consider before performing phlebotomy, including the patient's age, weight, season, anemia status, satiety or hunger, stomach weakness, and pregnancy. He identified 13 major veins in the head and neck, 6 in the upper limbs, and 3 in the lower limbs as primary sites for bloodletting. This book provides a comprehensive account of the indications and contraindications of phlebotomy, reflecting its significance in traditional medical practice.

**Key words:** Traditional Persian Medicine, History of Medicine, Bloodletting, Venesection, Avicenna

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## Introduction

In modern medicine, phlebotomy, i.e., the withdrawal of blood from a vein using a needle, has narrow medical indications. Hemochromatosis, polycythemia, and porphyria are diseases for which phlebotomy is part of their treatment (DePalma, Hayes, and Zacharski, 2007; Kim, and Oh, 2016). However, research suggests that phlebotomy may also be effective in managing other diseases, particularly those involving iron accumulation in their pathophysiology. These include sickle cell disease, Alzheimer's disease, malignancies, fatty liver disease, metabolic syndrome, and chronic hepatitis C (Assi, and Baz, 2014; Jaruvongvanich et al., 2016).

Studying the historical background of this medical approach can be inspiring for finding other diseases, in which phlebotomy may be effective. Historical records indicate that physicians once employed phlebotomy to treat a wide range of ailments, though it no longer plays a role in their management today (Dutton, 1916; Post, 1968). Avicenna, one of the most influential figures in this practice, explained phlebotomy (bloodletting) and the effects of this medical approach for the management of many diseases in his seminal work, *Al-Qanun fi l-Tib (The Canon of Medicine)*. Benefiting from the knowledge of his predecessors, such as Aristotle, Hippocrates, and Galen, in the book "*Al-Qanun fi l-Tib*", he explained the procedure of phlebotomy with its indications and contraindications (Avicenna, 2013). Drawing from the knowledge of predecessors such as Aristotle, Hippocrates, and Galen, Avicenna's *Qanun* became a foundational medical text in universities worldwide (Avicenna, 2013; Weisser, 1987). William Osler famously referred to it as a "medical bible" and regarded it as the most significant medical textbook ever written (Osler, 1921). However, today it is often overlooked, creating a gap in understanding how ancient practices can inform modern therapeutic strategies. While contemporary research has validated phlebotomy's efficacy for certain conditions (e.g., hemochromatosis and polycythemia), comprehensive studies on its broader applications remain scarce as suggested by historical texts. This article aims to bridge that gap by reviewing Avicenna's perspectives on phlebotomy's indications and contraindications in *Al-Qanun fi l-Tib*, encouraging further exploration of its potential clinical uses.

## Avicenna's *Qanun*

Abū 'Alī al-Ḥusayn ibn 'Abdullāh ibn Sīnā (980-1037 AD), known as Ibn Sīnā among Iranians and Avicenna worldwide, is one of the most famous physicians and philosophers of the 10<sup>th</sup>-11<sup>th</sup> centuries. He was born in Khormaithan village near Bukhara, and in his early childhood, he started learning logic, mathematics, jurisprudence, and medicine (Najmabadi, 1996). Abū 'Ubayd Jawzjānī, one of Avicenna's students, quoted his speech about learning medicine: "I found medicine as an easy knowledge, I read the books of this field, and I became proficient in it in the shortest time, so some accomplished physicians learned this science from me, I cared the patients and practiced indescribable treatments" (Nafīsī, 1952). In historical references, a story of Avicenna's medical erudition was quoted as witnessing the burial of a dead person near Jorjan. When they put the corpse in the grave, he declared that he was not dead and asked the crowd to give it to him to cure. After a while, he could heal him by phlebotomy and withdrawing blood from that person's body (Najmabadi, 1996). (Figure 1)





Figure 1. A picture of Avicenna, drawn by Mohammad Javadipour at the request of the book lovers' association. (Nafīsī, 1952)

Some researchers, such as Zabīhullāh Safā, Ph.D., have listed the number of Persian and Arabic works, attributed to him as 238 (Najmabadi, 1996) of which the most famous is the Book “*Canon of Medicine*”, in 5 volumes. This book was taught in European universities until the 17<sup>th</sup> century, and as a medical reference, it was of interest to medical students and physicians in Europe and the East for centuries (Weisser, 1987).

#### **Indications and Contraindications of Phlebotomy in the book “*Qanun*”**

In the 20<sup>th</sup> chapter of the first book of “*Qanun*”, Avicenna demonstrated the indications and contraindications of phlebotomy and depicted his viewpoints and those of other past physicians, including Galen, regarding phlebotomizable veins, and clinical considerations related to phlebotomy (Figure 2). He defined phlebotomy as: “a general evacuation removing the excess amount of the four humors from the body, with the same ratio as they have in the vessels”. Avicenna identified several indications for phlebotomy, primarily in patients exhibiting symptoms of superabundant blood. He described the symptoms of blood abundance as, a sense of heaviness in the body, eyes, and head, drowsiness, yawning and stretching, nausea, decreased sensations and awareness, fatigue, feeling a

sweet taste in the mouth, redness of the tongue, furuncles, eruptions in the mouth, easy bleeding from the nose, gingiva and hemorrhoids, experiencing blood or red things in dreams (Avicenna, 2013, p. 488). These people are allowed to undergo phlebotomy with the onset of symptoms of abundant blood before they get ill (Avicenna, 2013). He emphasized that phlebotomy could be beneficial not only in preventing disease onset but also in treating existing conditions such as sciatica, gout, and arthralgia. Conversely, certain conditions contraindicated phlebotomy. For instance, individuals suffering from anemia or those who are excessively weak should avoid this procedure due to the risk of worsening their condition. Additionally, considerations such as age, pregnancy status, and seasonal factors were essential in determining whether phlebotomy was appropriate. (Avicenna, 2013, pp.916-22). (Table1)

**Table 1:** Indications and contraindications of phlebotomy from Avicenna's Viewpoint in the Book "*Al-Qanun fi l-Tib*"

| Indications                                                                           | contraindications                             |
|---------------------------------------------------------------------------------------|-----------------------------------------------|
| sanguinary sciatic pain, gout, and arthralgia,                                        | -Very cold temperament                        |
| -Hemoptysis,                                                                          | -Very cold weather                            |
| -Epilepsy,                                                                            | -Severe pain                                  |
| -Cardiac arrest,                                                                      | -After a long hot water bath                  |
| -Melancholia,                                                                         | -After sexual intercourse                     |
| -Congestion and inflammation of the throat,                                           | -Age under 14                                 |
| -Visceral tumors,                                                                     | -Age above 60                                 |
| -Hot conjunctivitis,                                                                  | -Very thin body                               |
| -When hemorrhoids stop bleeding,                                                      | -Very obese body                              |
| -Oligo/amenorrhea,                                                                    | -White body with loose tissue                 |
| -Traumas, due to concern about limb edema,                                            | -Yellow anemic body                           |
| -Heaviness and malaise in the winter, due to not being phlebotomized for a long time, | -Chronic disease                              |
| -Excessive bleeding,                                                                  | -Overeating                                   |
| -Heavy sweating, due to the accumulation of humors in the body                        | -Fullness of the intestines from excrement,   |
|                                                                                       | -The sensitivity of cardia                    |
|                                                                                       | -The weakness of cardia*                      |
|                                                                                       | -Bilious stomach**                            |
|                                                                                       | -Pregnancy                                    |
|                                                                                       | -Menstruation                                 |
|                                                                                       | -Liver failure and ascites                    |
|                                                                                       | -pleurisy                                     |
|                                                                                       | -febrile seizure                              |
|                                                                                       | -High grade fever or fever with severe chills |
|                                                                                       | -Bowel obstructions                           |
|                                                                                       | -Leprosy                                      |
|                                                                                       | -Cataract                                     |
|                                                                                       | -Vitiligo                                     |

\* Symptoms are decreased appetite and heartburn

\*\* Symptoms are bitter mouth, excess nausea, and bile emesis

To prevent complications before phlebotomy in these two situations, they should soak a few bites of bread in a sour and fragrant juice, and eat it. If their stomach has a cold temperament, before phlebotomy, they should soak bread in sugar water, mixed with fragrant spices or mint syrup, mixed with musk, and eat it.





Figure 2. The first page of the chapter on phlebotomy in the exquisite manuscript “*Al-Qanun fi l-Tib*” (Tehran print). (Avicenna, 2004)

### Phlebotomy method

In the past, bloodletting was mainly performed on veins, and to prevent bleeding and aneurysms, arterial bloodletting was avoided. Avicenna believed that the best time for elective and non-urgent phlebotomy was a day with moderate temperature, full food digestion, and defecation. Before phlebotomy, the patient should not have taken a bath, because taking a bath would soften his or her skin and cause the scalpel to slip.

Before phlebotomy, the vein should be full of blood and swollen, so the knife would not slide on the skin or the vein would not move. First, a band was tied around the limb above the vein, so the vein would be filled and distended. The tightness of the band depended on the softness and stiffness of the skin and the amount of soft tissue around the vein. Afterwards, the vein was palpated by two fingers to be distinguished from an artery and nerve next to or below it. If the vein was not visible, they would open the band, pass their hands over the vein, and fasten its upper or lower part again.

Various knives were available, some with a tip and some without a tip; a proper knife was used for each vein. The knife should be sharp because a blunt knife leads to damage. To decrease pain, the tip of the knife should be dipped in oil, but this would cause the wound to heal more slowly. It was recommended to take hold of the knife between the thumb and middle finger and use the index finger to touch the vein. When the knife was placed on the vein, the pressure slowly increased until the tip of the knife passed into the vein.

Iranian physicians believed that phlebotomy, as a specialized treatment would require high skill, so professors always would advise their students to start phlebotomy firstly on cabbage leaves; after acquiring skills, they could practice on the veins of birds' wings and flowers' leaves. After full mastery, they could practice phlebotomy on a human under their teacher's supervision.

The incision can be made narrow, medium, or wide. From Avicenna's viewpoint, a narrow phlebotomy will hold much of the body's strength, but it may let out the bright thin blood and leave the thick and dark humor. While in wide phlebotomy, there is more effective blood purification, much possibility for fainting, and slower wound healing. Wide phlebotomy is recommended for obese people. He believed that in winter, wide phlebotomy should be performed, so the blood would not coagulate, while in summer, narrow phlebotomy is more effective.

Avicenna mentioned three criteria for arresting the blood flow and closing the wound: (a) sluggish blood flow, (b) the blood color turning into light red, and (c) weak pulse. Besides the three criteria, yawning, hiccups, or nausea also implied the necessity of bleeding cessation. Finally, they used rabbit wool and silk cloth to end the bleeding (Avicenna, 2013, pp. 932-936).

When cleansing the site, firstly, they pulled the skin by finger until the opening of the wound on the skin was moved away from the orifice in the vein and then the site was cleaned and dried, and a dressing covered with rose water or cold water was applied. Then, the skin was allowed to return to its natural position.

During phlebotomy, syncope rarely occurs. In case the loss of consciousness took a long time, it was recommended to stimulate the patient's throat with a piece of wood or a chicken's feather to induce emesis, and the scent of musk was put next to his nose. After the patient recovered, Dawā-ul-misk was ordered to strengthen the patient. (Avicenna,



2013, p. 943) (Figure 3).

Avicenna stated the benefits of phlebotomy for each vein. To phlebotomize, he mentioned 13 veins in the head and neck, 6 in the upper limbs, and 3 in the lower limbs. He also illustrated the technical considerations of phlebotomy for each vein (Avicenna, 2013, pp. 931-937). (Table2)

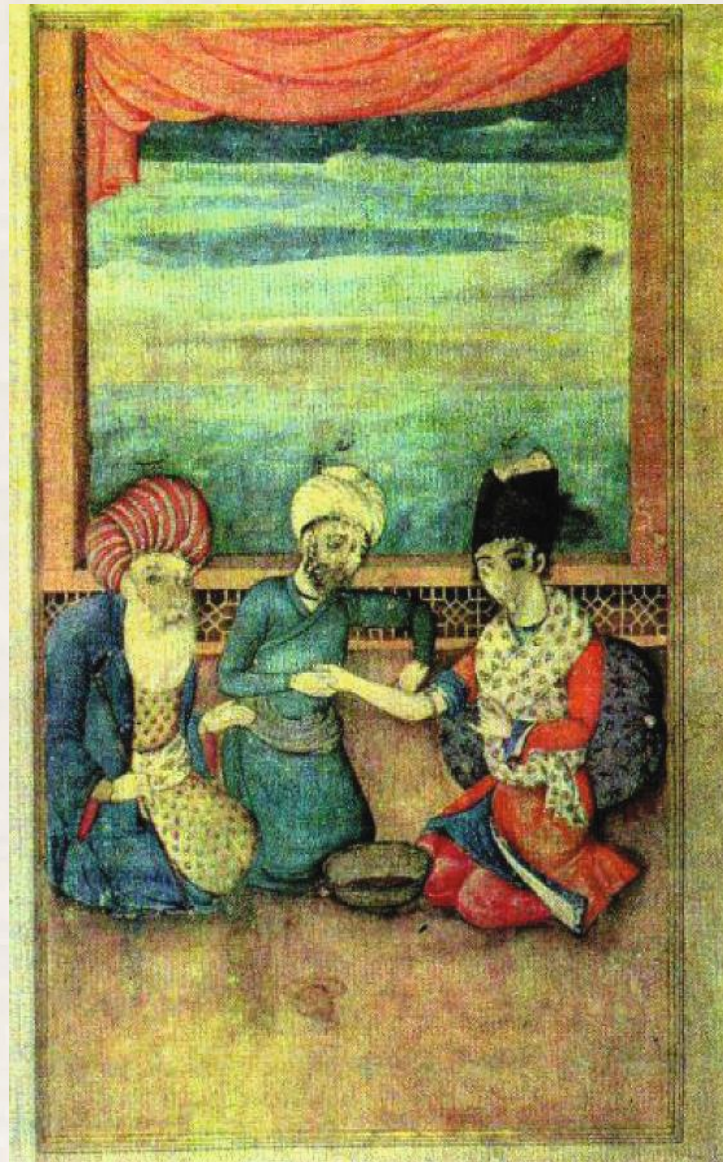


Figure 3. Miniature showing phlebotomy of the upper extremity veins. (Vaghebin, et al., 2022)



**Table 2:** Veins for phlebotomy; indications, and technical considerations from Avicenna's View-point in the Book "*Al-Qanun fi l-Tib*"

| Body region   | Vein used for bloodletting                          | Anatomy of the vein                                            | Indications/Benefits                                                                                                                                                             | Technical considerations                                                                                                                                                                                                                                                                                                        |
|---------------|-----------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Head and Neck | <i>Jibhih</i> (Supra-trochlear & Supraorbital vein) | Between the two eyebrows                                       | Heaviness of the head and eyes, chronic headaches                                                                                                                                | The incision should be diagonal                                                                                                                                                                                                                                                                                                 |
|               | <i>hāmah</i> (Parietal)                             | On the top of the skull                                        | Hemicranias, scalp ulcers                                                                                                                                                        | The vein can only be made visible by compression of the neck in partial suffocation. Only a small amount of blood may flow                                                                                                                                                                                                      |
|               | <i>Sodghayn</i> (Superficial Temporal)              | On the temporal region                                         | Headaches, Hemicranias, Conjunctivitis, lacrimation, Glaucoma, eczema of the eyelids,                                                                                            | Same as for the Temporal vein                                                                                                                                                                                                                                                                                                   |
|               | <i>Māqayn</i> (Angular vein)                        | Two veins at the lacrimal angle of the eyes                    | Same as for the Temporal vein                                                                                                                                                    | Should not be cut deeply to avoid the formation of fistulas                                                                                                                                                                                                                                                                     |
|               | <i>Thalathah 'uruq</i> (Posterior auricular)        | Where the tip of the ear touches when pressed against the hair | Ulcers of the ears and neck, diseases of the head, avoiding the vapors from the stomach to reach the head                                                                        | It should be performed with a pointed lancet<br>The incision must be transverse<br>To fix the vein, draw the head to the opposite side until the vein is bulged. Consider in which direction the vein is likely to slip and then make the opening in the opposite direction.<br>Galen denies that it may result in infertility. |
|               | <i>widaj</i> (External Jugular)                     | Both sides of the neck                                         | at the onset of leprosy, swelling of the throat, Dyspnea and asthma, Pneumonia, hoarseness, diseases of the spleen and pleura, discoloring of the skin due to abundant hot blood | The vein may be made visible by pressing the finger upon the tip of the nose to make it groove into two.<br>Very little blood will flow.<br>May lead to the redness of the nose and the face. harms exceed benefits                                                                                                             |
|               | <i>Irnbah</i> (External nasal vein)                 | At the tip of the nose                                         | Melasma, dark skin color, pimples in the nostrils and nasal hemangiomas, itching of the nostrils,                                                                                | The incision should be diagonal                                                                                                                                                                                                                                                                                                 |
|               | <i>Tahtul-khusha</i> (Occipital)                    | Behind the ears below the occipital protuberance               | Dizziness due to thin blood, diseases of the frontal area,                                                                                                                       | The incision should be diagonal                                                                                                                                                                                                                                                                                                 |
|               | <i>Chaharag</i> (Labial veins)                      | Four veins around the lips, two on each lip                    | Ulcers of the mouth, aphthous, gingivitis, swelling, and ulcers of the gums, hemangiomas, and fissures on the lips                                                               | The incision should be diagonal                                                                                                                                                                                                                                                                                                 |
|               | <i>Tahtullisan</i> (Sublingual)                     | Inside the chin                                                | Swelling of the throat and tonsils                                                                                                                                               | The incision must be made longitudinal otherwise it would be difficult to stop the bleeding                                                                                                                                                                                                                                     |
|               | <i>Tahtullisan</i> (deep lingual)                   | Beneath the tongue                                             | Heaviness of the tongue due to abundant blood,                                                                                                                                   | The incision should be made diagonally                                                                                                                                                                                                                                                                                          |
|               | <i>'anfaqih</i> (Mental vein)                       | Between the chin and lower lip                                 | Halitosis                                                                                                                                                                        | The incision should be made diagonally                                                                                                                                                                                                                                                                                          |
|               | <i>Lathi</i> (Inferior alveolar)                    | On the gingival surface                                        | To treat epigastric disturbances                                                                                                                                                 | The incision should be diagonal                                                                                                                                                                                                                                                                                                 |



|                   |                                         |                                                                                                         |                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                              |
|-------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Upper extremities | <i>qīfal</i> (Cephalic)                 | The lateral side of the arm                                                                             | Evacuation of the head and neck, diseases of the Brain, Head, eyes, nose, mouth and teeth                                                                                                                                                  | Should be carried out above the elbow crease to minimize the risk of injuring nearby nerves or arteries<br>Avoid harming the adjacent muscle<br>The incision should be longitudinal                                                                          |
|                   | <i>akḥal</i> (Median cubital)           | Between the cephalic and Basilic vein<br>(where blood from the cephalic and Basilic veins mix together) | Evacuates the region intermediate between those drained by the cephalic and basilic, Plethora, leanness, epistaxis                                                                                                                         | Cut lengthwise to make sure not injuring the nerve underneath it<br>Sometimes a thin nerve crosses over the vein. Damage to this nerve may lead to chronic paresthesia                                                                                       |
|                   | <i>basalīq</i> (Basilic)                | The medial side of the arm                                                                              | Evacuation from the abdomen and parts below, especially the liver and spleen, pleuritis, headaches, calf pain                                                                                                                              | It is safer to cut the vein below the crease of the elbow so that the artery and nerve underneath it may not be damaged                                                                                                                                      |
|                   | <i>ḥabludhira</i> (Cephalic)            | The lateral side of the forearm                                                                         | the same as for the cephalic vein                                                                                                                                                                                                          | It is better to be cut diagonally                                                                                                                                                                                                                            |
|                   | <i>ibḥī</i> (Basilic)                   | The medial side of the forearm                                                                          | the same as for the basilic vein                                                                                                                                                                                                           | It is better to be cut diagonally                                                                                                                                                                                                                            |
|                   | <i>usaylim</i> (Dorsal metacarpal vein) | The vein between the ring and the little finger                                                         | Diseases of the liver, spleen, lungs hemorrhoids                                                                                                                                                                                           | The patient should put his hand into hot water to keep the blood flowing longer and avoid clotting.<br>The incision should be longitudinal                                                                                                                   |
|                   | <i>qīfal</i> (Cephalic)                 | The lateral side of the arm                                                                             | Evacuation of the head and neck, diseases of the Brain, Head, eyes, nose, mouth and teeth                                                                                                                                                  | Should be carried out above the elbow crease to minimize the risk of injuring nearby nerves or arteries<br>Avoid harming the adjacent muscle<br>The incision should be longitudinal                                                                          |
|                   | <i>akḥal</i> (Median cubital)           | Between the cephalic and Basilic vein<br>(where blood from the cephalic and Basilic veins mix together) | Evacuates the region intermediate between those drained by the cephalic and basilic, Plethora, leanness, epistaxis                                                                                                                         | Cut lengthwise to make sure not injuring the nerve underneath it<br>Sometimes a thin nerve crosses over the vein. Damage to this nerve may lead to chronic paresthesia                                                                                       |
|                   | <i>basalīq</i> (Basilic)                | The medial side of the arm                                                                              | Evacuation from the abdomen and parts below, especially the liver and spleen, pleuritis, headaches, calf pain                                                                                                                              | It is safer to cut the vein below the crease of the elbow so that the artery and nerve underneath it may not be damaged                                                                                                                                      |
|                   | <i>ḥabludhira</i> (Cephalic)            | The lateral side of the forearm                                                                         | the same as for the cephalic vein                                                                                                                                                                                                          | It is better to be cut diagonally                                                                                                                                                                                                                            |
|                   | <i>ibḥī</i> (Basilic)                   | The medial side of the forearm                                                                          | the same as for the basilic vein                                                                                                                                                                                                           | It is better to be cut diagonally                                                                                                                                                                                                                            |
|                   | <i>usaylim</i> (Dorsal metacarpal vein) | The vein between the ring and the little finger                                                         | Diseases of the liver, spleen, lungs hemorrhoids                                                                                                                                                                                           | The patient should put his hand into hot water to keep the blood flowing longer and avoid clotting.<br>The incision should be longitudinal                                                                                                                   |
|                   | <i>Irqunnasa</i> (Lesser saphenous)     | Underneath or above the external malleolus                                                              | Sciatic pains, gout, Varicoses, elephantiasis                                                                                                                                                                                              | The limb should be bathed in hot water first.<br>Bandage is applied above tightly<br>The incision must be longitudinal.<br>If the vein is difficult to find, the branch between the little and the fourth toe (lateral dorsal digital vein) is used instead. |
|                   | <i>Safin</i> (Saphenous vein)           | Over the internal malleolus                                                                             | Evacuation of the organs below the liver, causes the blood to descend from upper parts to lower ones, causes menstruation, makes hemorrhoids bleed, amenorrhea, itching and ulcers of thigh, diseases of the uterus, ulcers of the scrotum | It is more visible than Lesser saphenous vein<br>It is suggested to be cut diagonally                                                                                                                                                                        |
|                   | <i>Mabīd</i> (Popliteal)                | Behind the bend of the knee                                                                             | Same benefits as saphenous, stronger than the saphenous vein in causing menstruation and benefiting anal disorders and hemorrhoids.                                                                                                        | As effective as opening the saphenous                                                                                                                                                                                                                        |



## Conclusions

As a preventive and therapeutic approach, phlebotomy has been practiced in many communities since the earliest times. Avicenna, the Iranian scientist, compiled and systematized the past medical science, refined and reordered it through his own brilliance. The medical framework he founded endured for centuries, serving as a foundation for later scholars and students. Avicenna turned phlebotomy into a systematic medical method by introducing specific guidelines and rules. Studying his viewpoints and the effects that he attributed to the phlebotomy in various veins could inspire clinical trials to investigate the effectiveness of phlebotomy in managing several disorders.

## Authors' Contribution

Majid Talafi Noghani made substantial contributions to the conception and design of the work, as well as to data interpretation and critical review of the draft. Shahram Homayounkeshi contributed substantially to data acquisition and analysis and drafted the manuscript. All authors read and approved the final version of the work.

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## Conflict of Interest

None.

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