

# Journal of the International Society for the History of Islamic Medicine (JISHIM)



# JISHIM

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## EDITORIAL

It is our pleasure to publish October 2023 Issue of the **Journal of International Society for the History of Islamic Medicine (Journal of ISHIM)**. We know that Journal of ISHIM is a scientific journal devoted to the **History of Islamic Medicine and Ethics** research and scholarship. Also, this issue like the earlier ones represents important studies in the **History of Islamic Medicine and Medical Ethics** which activate thinking and raise certain questions. So, it also tries to provide solutions to thorny and sensitive problems and the ensuing understanding helps in enlarging one's perception and intellectual horizon. The views of papers are always those of the authors, and it is important in a field like bioethics which encourages interaction and dialogue over scientific topics.

This issue contains some important scientific articles, in which, we can see and valuable original studies on **History of Islamic Medicine and Medical Ethics**. These articles are from famous scientists of many countries of the world. So, this journal helps to the development of researches on **the History of Islamic Medicine and Medical Ethics**. After papers and news of some scientific meetings are present.

Wishing October 2023, Issue of the **Journal of ISHIM**, to be beneficial to all readers and colleagues.

### **Editors in Chief**

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# Anatolian Legends About Pools of Sacred Fish

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## Summary

Legends generally come from more recent stories and even though they also have sacred characteristics and mythical parts, they are pretty much the modern version of myths. There are legends belonging to numerous regions in Anatolia. The lakes and pools where fish are considered to be sacred and found 18 legends surrounding this subject. Five of the lakes, where fish are considered sacred, and the legends of Urfa and four nearby cities about these lakes will be introduced below. Legends about pools of sacred fish still exist in Şanlıurfa as well as in nearby and distant Anatolian cities, and continue to draw the attention of faith tourism to the region.

**Key Words:** Sacred fish, Anatolian legends, the legendary pool of sacred fish in Urfa

## Introduction

Myths, sagas, legends or epic stories that have been brought down from archaic society into today reflect the emotions, thoughts and experiences specific to that society. The Greek word ‘mythology’ is the combination of the words *mythos* ‘story’ and *logos* ‘reason’.<sup>1</sup> Mythological stories always involve superhuman and supernatural events. Even though mythology is considered to be specific to Ancient Greek because of the Greek origin of the word, ethnographic studies by anthropologists on Sumerian Babylon, Hittite and Assyria found that all ancient cultures had myths. Myths differentiate from other literary works such as legends and tales with its magical, mysterious and religious characteristics.<sup>2</sup> The heroes in these myths that have been brought down from the past into today, are mostly gods or semi-gods who originate from ancient cultures.<sup>3</sup> Legends generally come from more recent stories and even though they also have sacred characteristics and mythical parts, they are pretty much the modern version of myths.<sup>4</sup> There are legends

belonging to numerous regions in Anatolia.<sup>5</sup> Legends provide meaning to the place from which they emerge from and draw attention to it. If a place has a legend, it gains potency. For example, legends about hot springs strengthen the hot spring’s healing effects.<sup>6</sup>

Throughout human history, various cultures have had fish symbolism. In traditional African cultures, certain animals, especially catfish, are praised. They believe that these fish carry the souls of their ancestors and cannot be eaten.<sup>7</sup> In Hindu mythology, the god Vishnu turned into a fish to rescue Manu, the ancestor of humanity. In ancient Chinese culture, it is told that when a carp succeeded in swimming the opposite way of the water flow, it turned into a dragon as a divine reward. This mythology also affected the Japanese culture, and it is believed that the carp symbolized the strength and energy of youth.<sup>8</sup>

The Sumerian god of water, Enki, is said to reside in the ocean and is often depicted as a tail of a fish, and is also associated with the fish-man Oannes. Oannes is de-

<sup>1</sup> Erhat, A.: Mitoloji Sözlüğü. İstanbul 2012, pp.5-6.

<sup>2</sup> Etöz, Z.: Mitos ve İktidar, Ankara Üniversitesi SBF Dergisi 2011; 66(3): 165-166.

<sup>3</sup> Kirk, G.S.: Myth: Its Meaning and Functions in Ancient and Other Cultures. Berkeley 1973, p.3.

<sup>4</sup> Nar, M.Ş.: Günümüz toplumunda mitler: Anadolu halk efsaneleri üzerine genel bir değerlendirme. Cyprus International University Folklor/Edebiyat 2014; (20) 79: 63.

<sup>5</sup> Nar, M.Ş.: op.cit., 55-77.

<sup>6</sup> Seyidoğlu, B.: Erzurum Efsaneleri. İstanbul: Erzurum Kitaplığı 2005, pp.271-273.

<sup>7</sup> Akbulut Özpınar, G.: Türkiye’de İnanç Turizmine Yeni Bir Örnek: Kutsal Balıklı Göl (Malatya). Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi 2017 21(3): 939.

<sup>8</sup> (anonymous): Tiergötter und Götterboten, Teil 1. Imaginäre Tiere. In: Scheid, B.: Religion in Japan Ein web-Handbuch. Universität Wien 2011. URL: [https://www.univie.ac.at/rel\\_jap/an/Mythen/Imaginäre\\_Tiere](https://www.univie.ac.at/rel_jap/an/Mythen/Imaginäre_Tiere) (accessed 13.08.2023)



**Fig. 1.** “Oannes” relief from Khorsabad. Illustration from Brockhaus and Efron Jewish Encyclopedia (1906-1913) [https://en.wikipedia.org/wiki/Dagon#/media/File:Brockhaus\\_and\\_Efron\\_Jewish\\_Encyclopedia\\_e6\\_915-0.jpg](https://en.wikipedia.org/wiki/Dagon#/media/File:Brockhaus_and_Efron_Jewish_Encyclopedia_e6_915-0.jpg) (accessed 11.08.2023).

scribed as a fish-goat or fish-aries. The Oannes are said to have lived on earth as wise creatures in ancient times. The Assyrian god Dagan was also described as a half-fish half-human creature. The figures of this fish god can be seen in different forms at the entrance of ruined palaces in Ninova, on the ruins of temples in Ninova, and on Babylonian seals (see Figure 1).<sup>9</sup>

### Anatolian legends about the pool of sacred fish

Numerous civilizations have existed in Anatolia, a region that is connected to Europe on the westernmost part of Asia, and countless beliefs have emerged with the impact of different cultures.<sup>10</sup> After Turkish people came to Anatolia in 1071, they spread and settled throughout the region. The myths and legends of Anatolia, which was then a new living space for Turkish people, gained a place in Turkish culture and many of these legends con-



**Fig. 2.** Halil-ür Rahman and Ayn Zilha Lakes in Urfa.

<sup>9</sup> (anonymous): Dagan Semitic God. Encyclopedia Britannica. <https://www.britannica.com/topic/Dagan> (accessed 11.08.2023)

<sup>10</sup> Kalafat, Y. : Doğu Anadolu’da Eski Türk İnançlarının İzleri. Türk Kültürü Araştırma Enstitüsü Yayınları 112, (A-17), Ankara 1990, p. 20.



**Fig. 3.** A Nabataean depiction of the goddess Atargatis dating from sometime around 100 AD, currently housed in the Jordan Archaeological Museum, [https://commons.wikimedia.org/wiki/File:Atargatis,\\_Nabatean,\\_c.100\\_AD,\\_Jordan\\_Archaeological\\_Museum.jpg#mw-jump-to-license](https://commons.wikimedia.org/wiki/File:Atargatis,_Nabatean,_c.100_AD,_Jordan_Archaeological_Museum.jpg#mw-jump-to-license) (accessed 08.08.2023).

cern lakes. Ayva<sup>11</sup> investigated the lakes and pools where fish are considered to be sacred and found 18 legends surrounding this subject. Five of the lakes, where fish are considered sacred, and the legends of Urfa and four nearby cities about these lakes will be introduced below.

### The legendary pool of sacred fish in Urfa

The most popular legends regarding sacred fish in Anatolia belong to Urfa, one of the eastern cities of Turkey. Urfa is located on a history of civilizations map in the north of Mesopotamia, Şanlıurfa in the southeast of modern day Turkey. It has been suggested that Urfa was Christian during the (Edessa) IX. Abgar period.<sup>12</sup> The sanctity attributed to the pool and its fish reminds us of the goddess Atargatis that was worshipped once upon a time in Syria. According to the mythology, Atargatis was born out of an egg that was thrown into the Euphrates river from the sky. She became a gorgeous women when she

grew up and gave birth to Semiramis whom she had from her young lover. She delivered Semiramis to the pigeons who fed and took care of the baby, and then turned into a mermaid after jumping into the water. The creation of the mermaid legends was based on the cult of Atargatis.<sup>13</sup> Many pools were built on behalf of Atargatis in North Mesopotamia and the pools were filled with fish that were brought from the Euphrates river. Other than the ancient Syrian city of Hierapolis, Manbij in present day Syria, there are also such pools in Ascalon and certain other cities. There is a pool in the Temple of Atargatis in Delos, one of the Aegean islands, where the fish are considered to be sacred and cannot be eaten.

It is possible that Urfa's legendary pool of sacred fish carries traces of the Atargatis cult that was popular in Urfa and nearby regions. Today, the pool of sacred fish in Urfa is associated with the Prophet Abraham. According to the Surah Anbiya from the Quran, Abraham was born and hidden in a cave to protect him from the cruelty of the brutish king Namrud. In King.

<sup>11</sup> Ayva, A.: Beyşehir Gölü üzerine anlatılan "göl üzerinden yürüyerek geçme" motifi üzerine/ On the Theme of "Walking Over the Lake" with reference to lake Beyşehir. Milli Folklor 2007, (19) 76: 191-201.

<sup>12</sup> Ekinci, A.: Urfa'da Yahudilik ve Hristiyanlık. In: Keskin, Y.Z. (Ed.): Geçmişten Günümüze Şanlıurfa'da Dini Hayat. Ankara 2011; p. 75.

<sup>13</sup> Mailahn, K.: Magdalenas Ahnen: Meeresjungfrauen. p. 334. <https://books.google.com.tr/books?id=5nbtDwAAQBAJ&pg=PA332&lp-g=PA332&dq=Mailahn,+K.:+Magdalenas+Ahnen:+Meerjungfrauen&source=> (accessed 12.07.2020)

Namrud's kingdom, the people worshipped idols. However, when Abraham grew up, he rejected idolatry and destroyed the idols in the sanctuary. King Namrud ordered him thrown into the fire, alive. A catapult was stretched out between two big columns on the hill of the city and a big fire was built on the hill to throw him in to. However, a miracle happened; Abraham was thrown into the fire, but the fire did not burn him. According to the stories, Abraham was catapulted into the fire but the fire that was expected to burn him turned into a garden with a pool, and the burning wood turned into fish. After Abraham was thrown into the fire, a woman named Züleyha, who believed in Abraham, threw herself into the fire and a pool which would be known as Ayn Zilha emerged where she landed<sup>14</sup> and fish began swimming in it. The people came to believe that these fish were the soldiers of Abraham (see Figure 2). Today, these fish in Urfa are considered to be sacred, and cannot be caught, eaten or harmed in any way.<sup>15</sup> There are tales that those who catch and eat the sacred fish experience misfortunes such as mental or physical illnesses and even death.<sup>16</sup> The women of Urfa, who have insufficient or no breastmilk after giving birth, go to the pool of sacred fish and throw chickpeas or wheat to the fish, and thereby, they believe this will help them to produce sufficient breastmilk.<sup>17</sup> A Nabataean depiction of the goddess Atargatis dating from sometime around 100 AD, currently housed in the Jordan Archaeological Museum (see Figure 3).

### The pool of sacred fish in Erzurum

Erzurum is one of the cities of Turkey with the coldest winters. There is a lake where fish are considered to be sacred in the Söğütlü village of Aziziye county which is located 6 km from the city center of Erzurum. This lake never freezes because its temperature stays around 22 degrees even in times when the air temperature goes down to -30 degrees. In summer when the temperature rises, the temperature of the water actually reduces to 18 degrees. According to legend, during the conquest of Anatolia by the Turks, some Turkish soldiers were turned into fish by

Allah when they were shot in the back while drinking water from this lake. Therefore, the locals believe that the fish which have red dots on their back cannot be eaten. According to another tale, once upon a time, a man caught some of these fish and brought them home to his wife and while his wife was cooking them, they suddenly vanished. The man and his wife ran to the lake where the man had caught the fish, and saw fish in the lake that had burn marks on their back. The locals also believe that swimming in this lake has a healing effect on rheumatism.<sup>18</sup>

### The pool of sacred fish in Malatya

The fish in the two pools, which are a fresh water resource for drinking, in the Kızık village of Arguvan county in Malatya are also considered to be sacred. According to legend, one upon a time the village leader thought that the lake stank because of the fish and ordered the villagers to catch and throw the fish out of the water. A year later, his son, daughter, wife and himself died and no one was left of his family. After this incident, the fish were again seen in the lake. Since then, the locals have never caught or eaten these fish again. According to yet another tale, during the time when Turkey was sending soldiers to Cyprus, the villagers told that these fish vanished and returned the next day with scars on their back. The women in this village leave their dishes in these pools. By doing this, they both clean their dishes and feed the fish in the pools. The locals believe that drinking the water in which these sacred fish are swimming, or bathing with this water at home will heal many diseases, especially epilepsy, and will help those who cannot conceive a child. Women who have conceived a child, and patients who have recovered thanks to this water come again to these pools to sacrifice animals and hand out the meat of it to others. On Friday nights, which are of special importance in Islam, the villagers and people from nearby villages gather around the pools, light candles and pray. As they consider these fish to be sacred, they do not want them to be eaten by other animals. Therefore, when a fish dies they always bury it in the village graveyard with prayers. The villagers even make stone arrangements around the graves for the buried fish.<sup>19</sup>

<sup>14</sup> Pınarbaşı, G.: Anadolu'ya Adını Veren Kadınlar. 3. Baskı. İstanbul 2016, pp. 46-47.

<sup>15</sup> Kürkçüoğlu, C.: Şanlıurfa: Land of Faith. Şanlıurfa Valiliği Kültür Yayınları. Urfa 2000, pp. 20-23.

<sup>16</sup> Gündüz, Ş.: Anadolu'da Paganizm. Antik Dönemde Harran ve Urfa. Ankara 2014; pp. 109-111.

<sup>17</sup> Mollaibrahimoğlu, Ç.: Anadolu Halk Kültüründe Hayvanlar Etrafında Oluşan İnanç ve Pratikler (Unpublished Master Thesis), Trabzon: Karadeniz Teknik Üniversitesi Sosyal Bilimler Enstitüsü. 2008, p. 53.

<sup>18</sup> (anonymous): Erzurum'da Balıklı Göl iddiası. <https://www.sanliurfa63.com/erzurum-da-balikligol-iddiasi/29043/> (accessed 11.08.2020)

<sup>19</sup> Akbulut Özpınar, G.: Türkiye'de İnanç Turizmine Yeni Bir Örnek: Kutsal Balıklı Göl (Malatya). Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi 2017; 21: 937-951.

### The pool of sacred fish in Çankırı

In the Ilıpınar village of Atkaracalar county in Çankırı, there is another legend of a pool of sacred fish which is formed with the water coming from a depth of 600 m. The people passed down the story that these fish disappeared during times of war in distant regions and then returned after the war was over with scars on their back. Therefore, these fish are called “soldier fish”. The same tale as the one told for the pools of sacred fish in Erzurum and Kahramanmaraş is also told in Çankırı about those who want to catch and eat those fish without knowing that they are sacred. It is also said that a man became paralyzed when he tried to catch these fish and bring them to another pool. Villagers believe that whoever tries to harm these fish will experience misfortune. Therefore, dead fish are buried by the villagers as well. The villagers believe that the water from this pool has a healing effect on fungal infection and cutaneous condition.<sup>20</sup>

### Hot Spring with Sacred Fish in Sivas

The fish in the Sivas Hot Spring, which is the only natural treatment center for cutaneous condition in the world, live in 37 degree temperature water. The locals believe that these fish are sacred and that those who eat

these fish will be cursed, their stomach will be turned to iron and they will be blinded.<sup>21</sup> There are numerous fish in the spring water, the biggest of which is 10 cm long. The types of these fish are Cyprinide, Cyprinion Macrostramus and Garra rufa. The locals believe that these sacred fish eat the eschar of the scars and acnes of those who get into the pool, which is associated with the peeling effect of the spring water on the scars. The spring water has a healing effect on rheumatism, anger, fractures and dislocations, skin conditions such as eczema and cutaneous, and renal disorders.<sup>22</sup>

### Conclusion

Cultural components can be passed down to other cultures due to migration, travel, etc.<sup>23</sup> Many components from pre-Islamic periods have continued to exist within Islam. Şanlıurfa’s Legendary Pool of Sacred Fish is one of those components. The Atargatis cult in Mesopotamia, which was also influential in the pagan history of Urfa<sup>24</sup>, still continued as Christianity and Islam spread and the stories about lakes with sacred fish<sup>25</sup> in the Quran and the Gospel of Barnabas are almost the same.<sup>26</sup> Legends about pools of sacred fish still exist in Şanlıurfa as well as in nearby and distant Anatolian cities, and continue to draw the attention of faith tourism to the region.

<sup>20</sup> Ayhan, B.: Çankırı Camileri-Türbeleri-Şifalı Suları. Çankırı 2012, p.95.

<sup>21</sup> Özçelik, S., Polat, H. H., Akyol, M., Yalçın, A. N. ve Marufihah, M.: Kangal Hot Spring With Fish and Psoriasis Treatment. The Journal of Dermatology 2000: 27: 386-390.

<sup>22</sup> Özçelik, S., Polat, H. H., Akyol, M., Yalçın, A. N. ve Marufihah, M.: op.cit., pp. 386-390.

<sup>23</sup> Nar, M. Ş.: op.cit., p. 69.

<sup>24</sup> Batuk, C.: Bu coğrafyanın paganistleri. MİLEL VE NİHAL İnanç, Kültür ve Mitoloji Araştırmaları Dergisi 2009; (6) 1: 289-293.

<sup>25</sup> Karakurt, D.: Türk Söylence Sözlüğü: Açıklamalı Ansiklopedik Mitoloji Sözlüğü. 2011, p. 354.

<sup>26</sup> Güler, S.E.: Hz. İbrahim’in Hayatı. Nemrud ve Balıklıgöl Efsanesi. Şanlı Urfa 2009, p. 11.

# Al-Zahrawi (Albucasis) and his Significant Contributions to Plastic Surgery

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## Summary

Medicine has a great many “fathers” of the profession; Hippocrates in Ancient Greece, Sushruta in Ancient India, Hua Tuo in Ancient China, Guy de Chauliac and AmbroiseParé in France, Scotsman John Hunter, American William Stewart Halsted, and many, many others in between. One of those “in-between” was Abu al-Qasim Al-Zahrawi, who is also known in the west as “Albucasis. Al-Zahrawi has a great contribution in many surgical fields, including plastic surgery. He described many procedures and invented good number of surgical instruments.

**Key Words:** Al-Zahrawi, Albucasis, Plastic Surgery, History of Medicine, Surgery

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## Introduction

Al-Zahrawi, the Muslim physician is considered one of the great fathers and pioneers of surgery in Europe. We will focus here on his contributions into plastic surgery in particular as he was an innovator in this field.

He was born in Al-Zahraa, a little village near Cordoba in the Andalusia region (modern day Spain) in 936 AD. There is very little that remains from that old city which became ruins (Figure 1). Al-Zahrawi lived most of his life in Cordoba. It is also where he studied, taught and practiced medicine and surgery until shortly before his death in about 1013 AD (1). A remarkable lifespan and one that is not out of place in today’s era.

There is no doubt that Al-Zahrawi was a remarkable man, one whose achievements were well ahead of his times. However, it is worth reading a little into the background and context in which he flourished and succeeded in. It has often been stated that the Muslim period of Spain’s history (Al-Andalus) was part of the Golden Age of Islamic civilisation (2). Harmony existed between Muslims, Jews and Christians as people from different faiths lived in peace and tolerance (3); a situation almost unthinkable in various parts of Europe which suffered

from rabid anti-Semitism and subjected Jews to vicious pogroms. Great advancements were made in different sciences (4). This reached the extent to which kings of Europe would send their children to Al-Andalus to be educated.

Under the Caliphate of Córdoba, Al-Andalus was a beacon of learning, and the city of Cordoba, the larg-



**Fig. 1.** The ruins of Al-Zahraa city (MadinaAzhra) near Cordoba



est in Europe, became one of the leading cultural and economic centres throughout Mediterranean region, Europe, and the Islamic world. Al-Andalus became a major educational centre for Europe and the lands around the Mediterranean Sea as well as a conduit for culture and science between the Islamic and Christian worlds. This brought a degree of civilization to Europe that matched the heights of the Roman Empire and the Italian Renaissance. Al-Andalus became one of the great Muslim civilizations; reaching its summit with the Umayyad caliphate of Cordoba the tenth century; the era in which Al-Zahrawi lived (3).

Al-Zahrawi lived and served the Umayyad Caliph Al-Hakam II and the military ruler Al-Mansur (5). He ended up serving as a doctor for over 50 years. Unlike many doctors and hospitals in today's era, Al-Zahrawi insisted on seeing patients regardless of their financial status (5). By seeing a wide variety of patients every day and recording his treatment of them, he left behind a very valuable text of medical knowledge that he called Al-Tasrif. Its full name *At-Tasrifliman 'Ajiza 'an at-Ta'lif* (The Method of Medicine – for who cannot write a book) is a medical encyclopaedia consisting of 30 volumes compiled from medical data that Al-Zahrawi accumulated in a medical career that spanned five decades of teaching and medical practice. He apparently travelled very little but had wide experience in treating accident victims and war casualties. It was considered the first Text Book of Medicine with many illustrations (this was the standard text in European medical schools in the 12th century). It is remarkable that Al-Zahrawi wrote the book for his students and for those that would come after him – it wasn't a guide for the ruler, and he never expected financial benefits from it.

Al Tasrif's Last volume, number 30 (which consisted of over 188 chapters) was about surgery. It included over 200 illustrations of surgical instruments, most of which were invented by Al-Zahrawi himself, and explanations of their use. He was the first medical author to provide illustrations of instruments used in surgery; this act alone revolutionised the way in which surgery was taught. Al-Zahrawi was at odds to point out any good practitioner in surgery would have a strong understanding of anatomy which at the time was a controversial topic Islamically though a famous Muslim physician once said "He who is engaged in the science of anatomy, increases his belief in God" (6).

## Clinical examples of plastic surgery contributions

### *On wound management*

Al-Zahrawi promoted the use of antiseptics in wounds. In (chapter 26) he explained the differences between primary and secondary wound closure and also the importance of wound Debridement before closure. He described four techniques to close the abdominal wall; two of which were quoted from Galen. The ones which he described in great detail were the Ant's head technique and the Cat's gut technique using absorbable suture taken from the cat's intestines.

### *On Haemostasis*

This involves stopping the vessels from bleeding, and was done by compressing the artery, by cauterization or by ligation (using silk known as Harir in Arabic or using Cat Gut made from Cat intestines) (7). This was long before the French Surgeon Ambroise Parr in 1552 spoke of it. Al-Zahrawi also used both Ligation or Cauterization of the temporal artery for the Treatment of Migraines and severe chronic headaches too (8).

### *On Hand Surgery*

Al-Zahrawi described congenital hand deformities such as polydactyly and syndactyly. He reported the various presentations of polydactyly and the origin and composition (bone, flesh) of the extra finger. He also described the treatment for the various presentations of this anomaly: "A *superfluous finger, sometimes is all flesh, sometimes contains a bone, sometimes has a nail. That which is purely flesh is easily removed; you cut it off at the root with a broad scalpel. But the treatment of that which arises at the root of a finger is difficult; you should avoid amputating. In the case of one growing from the finger at a phalangeal joint, you should first cut through the flesh down to the bone with a circular incision; then saw the bone through, with one of the saws that suit the purpose; then dress it until it heals*" (9).

He identified syndactyly as a condition resulting from either a congenital disorder or a healing wound. He went to describe its treatment as: "You have to cut the web away until the fingers are brought back to their original form; then interpose between them a pad or piece of material soaked in oil of roses to prevent them

from rapidly joining together and to keep them apart” (9,10).

In the last section of his volume “On Surgery,” Al-Zahrawi described symptoms of fractures and dislocations of different bony parts along with treatment and complications. (9,11).

On dislocation of the wrist, he mentioned the following technique of reduction: “The carpus of the hand if often dislocated. The way of reducing the dislocation is to place the patient’s wrist upon a board while an assistant stretches the hand and the doctor applies pressure on it until it goes back”. To reduce the fingers’ dislocation, he recommended “When one of the fingers is dislocated dorsally or ventrally, then extend the finger and thrust the dislocation with your thumb until it goes back” (9).

He described the decreased grip strength as one of the symptoms of severed tendons, for which successful treatment was unfounded at the time: “If the hand is slackened so that he is not able to grip anything; then you may know that the tendons are either severed or bruised. In this situation there is no method but to strengthen it by cauterization; this sometimes helps but sometimes is of no use at all” (9).

**On Hypospadias and Genital Reconstruction**

The work of Al-Zahrawi had significant impact in this field. He elucidated the treatment of imperforate urinary meatus, which involved creating a small opening in the meatal region of the glans penis (9): “You should be quick and make a perforation with a fine scalpel, then put in the opening a lender leaden sound, tie it and keep it in for three or four days”. This was similar to Galen’s suggestion of using a lead tube to keep the new urethra open. However, Al-Zahrawi used a solid fine probe instead. Hypospadias management involved making a new orifice in the middle of the glans penis and was narrated as: “In those cases having a misplaced meatus, draw out his glans firmly and cut the end of the glans at the place of the meatus with a broad knife or sharp scalpel as if sharpening a pen, so that the middle of it protrudes like a glans penis and the opening falls in the middle as it should. And be aware of hemorrhage, which often happens; meet it with styptics and dress the wound until it heals” (9,10) (Figure 2).

In contrast to the currently recommended surgical approach for management of penile fractures, Al-Zahrawi recommended conservative treatment by stabilizing the penis with a goose’s neck (9,12): “When man’s organ is



Fig. 2. The knife Al-Zahrawi invented for the Hypospadias (Ref.18)

fractured, take a goose’s larynx (tube) and introduce the penis into it; then let it be wrapped and bandaged and left for about three days until it is healed”.

Al-Zahrawi also described the diagnosis and treatment of both a Hypospadias and an Imperforate anus. Circumcision was another surgical procedure that was mentioned by Al-Zahrawi and its description was apt as it was not practiced by non-Muslims before. He wrote also about surgical techniques for circumcision, the instruments used (Figure 3) and how it was not advisable to use sedation as well as briefly describing complications.

بدهن الورد الطرى الطيب وتتركه عليه اى يوم اخر ثم تعالجه بسائر العلاجر الى ان يبرأ ان شاء الله تعالى وهذه صورة المقص للتطهير ويكون لطيف قاطع

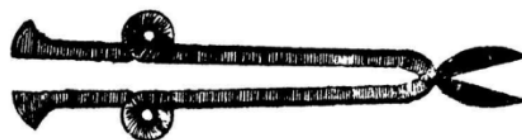


Fig. 3. The scissors Al-Zahrawi used for circumcision

**On Oculoplastic and eyelid surgery**

Al-Zahrawi was the first to introduce an eye speculum with 3 hooks and fine scissors to remove superfluous skin (Figure 4). He wrote about eyelid surgery and described the ectropion of both the upper and lower eye-

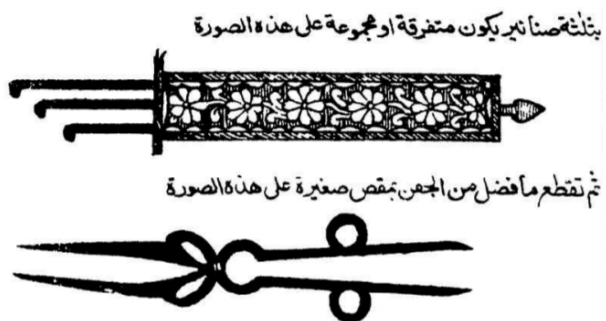


Fig. 4. The hooks and scissors Al-Zahrawi used in eyelid surgery

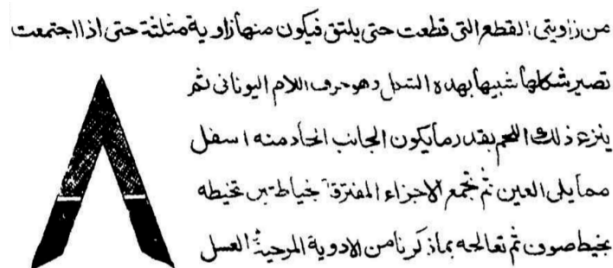


Fig. 5. The incision Al-Zahrawi used for lower eyelid ectropion

lids. In (chapter 11) of volume 30 of his book he noted various principles in that surgical field (1). He used ink to mark the incisions pre-operatively which became now as a routine standard procedure. Also he used the inverted V-shaped incision to treat the lower eyelid ectropion (9) (Figure 5).

#### On Gynecomastia and breast surgery

He explored this in Chapter 47 of his book Al-Tasrif and he described the surgical options to treat Gynecomastia and recommended the removal of the glandular tissue by a C-shaped incision for large breasts with excess skin and said “make two incisions so that the edges join each other, then remove the skin and glandular tissue in between and suture the edges of the defect”. Remarkably, this technique is still used for such Gynecomastia 1,000 years later (1).

#### On skin lesions and cancer conditions

Al-Zahrawi described the surgical option as the excision of benign warty skin lesions and dealing with planter warts. His work was unique and ahead of its time too. He recommended their wide excision and used breast cancer and thigh cancer as examples. He stated that if the tumour is large and at an advanced stage it would indicate that surgery is not a suitable option and once said “I could not cure any patient with advanced cancer” which underlined his wisdom and judgement that an “operate at all costs” mentality is not the right approach (13) and you should only try to perform surgery on operable cancers.

#### On Maxillofacial Surgery including congenital abnormalities

Al-Zahrawi described cleft lip as a fissure in the lip, more commonly identified in boys. For the treatment of

cleft lip, he suggested cauterization (*kai*), which would heal with fibrosis and scarring and close the defect: *heat a small edged cautery, then quickly place it on the fissure till the burning has reached the depth of the lip. Then treat with wax plaster till healed*” (9).

He also discussed the management of some facial fracture, including nasal and mandibular fractures. He acknowledged the bony and cartilaginous parts of the nose and suggested the following for the management of nasal fractures: “If one of the two upper parts is broken you should pass your little finger into the nostril and straighten out the fracture from inside, with your index and thumb of the other hand is outside. If the fracture is in the upper part of the nose and your finger does not reach, it should be evened by means of a probe with some thickness to it.

*You may pack the nose with fatty dressing and then apply externally a plaster of white flour and frank incense made in to a paste with egg-white; then put on top some soft towel, but do not bind up the nose at all*” (9).

He placed emphasis on comminuted nasal fractures and internal wounds: “If the nasal bones are broken into small pieces or crushed, you should cut down upon them, remove them with a suitable instrument, and then suture the wound”. He continued “If there is an internal wound of the nose, you should dress it with pads and employ leaden tubes until it heals”.

The management of mandibular fractures was also described in his book (chapter 4/section 3) as: “If it is merely an external fracture, not broken in two but sunken in wards, you should from within, push the concavity of the fracture gently outwards.” He continued “If the break in the jaw is total, into two pieces, traction must be explored in a straight line on both sides, until it can be set, and if the alignment of the teeth is disturbed, you should tighten the teeth with golden or silver wires” (9).

His principles of wound management involved primary suturing for fresh wounds and debriding healed margins prior to attempting surgical closure: “If the wound is fresh and bleeding, bring the edges of the wound together with a suture, and dress it till it is healed. If the discontinuity has separated the edges, and both edges have healed, it is necessary to scrape both edges on the external skin till they bleed; then bring the edges together with a suture, and put over the powder a plaster of palm ointment, and leave it bandaged for two or three days” (9).

Interestingly, Al-Zahrawi also wrote about Dental Surgery too; the distinction between the fields of dentistry and medicine were not as well pronounced at the time as they

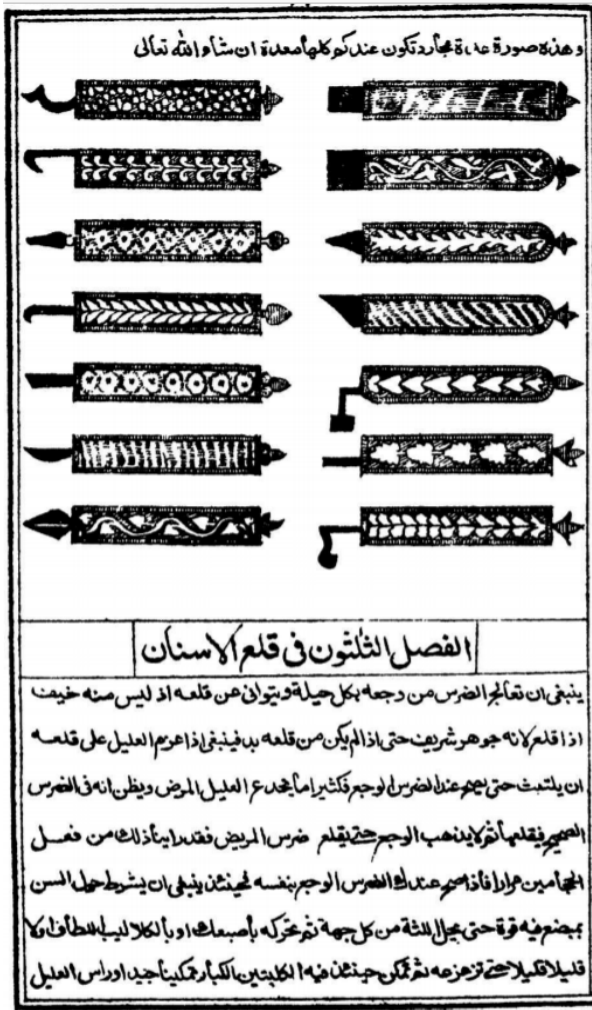


Fig. 6. A page from Al-Tasrif showing the dental instruments (Ref. 18)

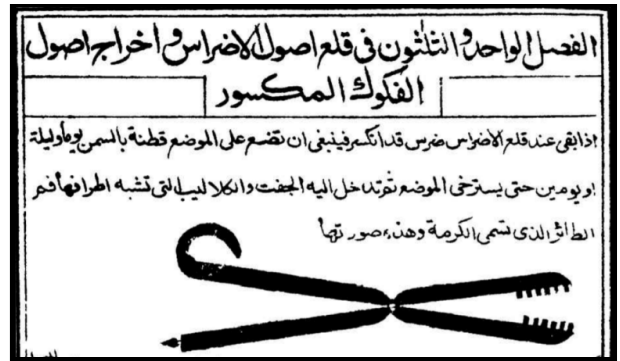


Fig. 7. Instrument to remove broken teeth

*On observation of malpractice and ethics*

It is important to touch on another field in which Al-Zahrawi excelled; the observation of malpractice and ethics. His observations were profound. Someone removed a tumour from the neck of a female patient which led to bleeding and her subsequent death. Another observation was the splintage of a leg with too tight plaster which led to compartment syndrome and then gangrene. The removal of a large bladder stone from a very elderly patient which led to complications due to his fragile state and subsequent death. The removal of advanced breast cancer which lead to bleeding and death bringing more harm than benefit. It was about knowing when not to operate as opposed to operating because “it is what was expected” and knowing the difference could prevent malpractice. Malpractice was not a concept understood at the time but the writings of Al-Zahrawi helped create a rudi-

clearly are today. His writings included topics such as the wiring of loose teeth, the roots of broken teeth extraction, dental arches, dental instruments of the day and the correction of irregularities of non-aligned or deformed teeth (14). Furthermore, he also wrote about the replacement of loose teeth (implants) using part of the bone of the cow to replace a missing tooth (to create a crown or bridge) . Al-Zahrawi also described the way to abrade and shave the prominent teeth in order to improve its appearance. He described in great detail many instruments he used in the field of dental and maxillofacial surgery (Figure 6,7).

All the instruments Al-Zahrawi used and described in his book (Al-Tasrif) have been replicated a few times by different museums, universities and people interested in Al-Zahrawi and his legacy (Figure 8).



Fig. 8. Replicate of Al-Zahrawi surgical instruments. Sidi Mohamed University Fes (Morocco)

mentary understanding of best practice that went past the Hippocratic Oath. Al-Zahrawi would tell his students and other junior doctors “*Keep away from anything which may negatively affect your reputation in this life and the hereafter, for it is better for you and increases your ranks and pleases your lord*”. He also wrote about the importance of positive doctor-patient relationships, referred to his medical students as his own children, and emphasized the importance of treating patients irrespective of social status. (9, 15).

### Conclusion

Al-Zahrawi’s book *Al-Tasrif* was translated into Latin by Gerard of Cremona in 1187 and remained the main reference for surgery in the universities of Italy and France for centuries. The French Surgeon Guy de Chauliac in his book *Great Surgery* completed in 1363 quoted *Al-Tasrif* over 200 times. Pietro Argallata in a 1531 Latin translation of *Al-Tasrif* said “*Without doubt, Albucasis (Al-Zahrawi) is the chief of all surgeons*” (16). Al-Zahrawi was clearly a surgeon well ahead of his time. Although I tried to focus mainly on the field of plastic surgery, his surgical achievements go beyond plastic surgery (17) and include general surgery, orthopaedic surgery, vascular surgery, urology, neurosurgery, ophthalmology, as well as obstetrics. These are all well documented and may need to be expanded on in a future article. His descriptions of the almost 200 surgical instruments (18) which fit their respective purpose was significant. Al-Zahrawi’s findings and practices influenced healthcare practitioners in Europe for centuries to come and his impact is still felt in today’s world (19).

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# Protection of Patients' Rights in the Field of Neurology

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## Summary

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Neurology is a field in which many of the fundamental problems of general medical ethics are often experienced alongside the characteristic problems that surface in the context of neurology. The need for the implementation of ethics in daily medicine is quite evident. It also necessitates the development of counterpart elements that are normative and concrete. Although the correlation of these creates the ideal situation, there are various examples illustrating that some approaches in medicine sometimes create conflicting situations with medical law, and the failure to resolve these may possibly create situations where the physician's identity is challenged, and sometimes cultural differences are at the forefront.

The fact that neurological diseases are generally progressive and often incurable, has led to the emergence of various medical problems, particularly in the past. Patients' right to be informed is at the forefront today. The most important element of patient rights, which constitutes a crucial concept of human rights in medicine, that it can be applied and implemented in daily practice to ensure that "patients can receive information about their diseases in a clear and understandable way". In some area-specific disease conditions - for example, Prodromal Parkinson's - it is a topic that is currently discussed in the literature whether patients want to know about this condition in advance and if cultural differences have an impact on their concerning choice.

In this context, this study primarily outlines the ethical and legal problems experienced in clinical medicine practices in neurology and examines the global aspects of this to some extent. Protection of patients' rights in neurology will be the main focus of the study from medical law point of view.

\* This text has been based an oral presentation by the author in World Congress for Medical Law (WCML), Vilnius, 2-4 August 2023.

**Key Words:** Medical Ethics, Neuroethics, Medical Law, Patient Rights, Informed Consent, Research Ethics

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## Introduction

Medicine, being one of the oldest professions, is an occupation built on curativeness. Since around the mid-19<sup>th</sup> century, it has been a predominant production field of positivist and scientific knowledge. The reflections of the concept of human rights on medicine, the contribution of technology to its progression, and the possibilities created by scientific developments do not just illustrate the vivid expansion of medicine as a field of science but also highlight that there is also a need for normative developments. In this context, neurology is a field in which many of the fundamental problems of general medical ethics are often experienced alongside the characteristic problems that surface in the context of neurology. The need for the implementation of ethics in daily medicine is quite evident. It also necessitates the development of counterpart elements that are normative and concrete. Although

the correlation of these creates the ideal situation, there are various examples illustrating that some approaches in medicine sometimes create conflicting situations with medical law, and the failure to resolve these may possibly create situations where the physician's identity is challenged, and sometimes cultural differences are at the forefront. In this context, this text primarily outlines the ethical and legal problems experienced in clinical medicine practices in neurology and examines the global aspects of this to some extent.

## Ethical issues in clinical neurology

The fact that neurological diseases are generally progressive and often incurable, has led to the emergence of various medical problems, particularly in the past. Patients' right to be informed is at the forefront today. The most important element of patient rights, which consti-

tutes a crucial concept of human rights in medicine, that it can be applied and implemented in daily practice to ensure that "patients can receive information about their diseases in a clear and understandable way". In some area-specific disease conditions - for example, Prodromal Parkinson's - it is a topic that is currently discussed in the literature whether patients want to know about this condition in advance and if cultural differences have an impact on their concerning choice (Kayış, Yılmaz, Arda, Akbostancı 2023).

Prodromal Parkinson's Disease (PPD) refers to the early phase of Parkinson's disease where individuals may experience non-motor symptoms and subtle signs that precede that classic motor symptoms associated with the condition. Risk disclosure in PPD based on certain factors and markers identified through research and clinical studies. Some key points that might be included in a risk disclosure for PPD could be; "definition and explanation", "risk factors", "early symptoms", "predictive biomarkers", "uncertainty" and "follow up and monitoring". The disclosure would define and explain PPD, emphasizing that it is a preclinical phase of the condition and not the full-fledged Parkinson's disease. Risk factors would highlight the various factors associated with PPD; such as age, family history, genetic mutations, certain environmental exposures. Relevant to the early symptoms; the disclosure might outline the non-motor symptoms commonly observed in PPD, such as olfactory dysfunction, sleep disturbances, constipation, mood changes. Concerning with the predictive biomarkers; some research may have identified certain biomarkers that can help predict the risk of developing Parkinson's disease, and these might be mentioned in the disclosure. Relevant to uncertainty; it is possible to accept this is important to convey that while some individuals with prodromal features might progress to develop Parkinson's disease, others may not, and the exact trajectory is not fully predictable. Recommendations for regular follow-up and monitoring might be included, especially for individuals deemed at higher risk. In the context of all the factors PPD represents one of the priority issues that require high sensitivity in neurology.

According to a recently published research of Kayış et al; participated 222 neurologists, on PPD more than 90% of them were familiar with this subject. While 15% stated that risk should be disclosed in any case, 7% chose no disclosure. The remaining big part (78 %) found it right to disclose only under certain circumstances, the plurality of which was the individual's consent to know about the risk. After reminding the potential neuroprotective effect

of exercise and diet, neurologists who chose the option of "no disclosure" decreased to 3.2% ( $p=0.008$ ). There have not been significant differences among the neurologists regarding sex, academic title, or field of interest.

Most of the time patients with PD emphasized the time to diagnosis retrospectively as burdensome, the big part of the patients was skeptical regarding early disclosure of risk, especially with regard to the lack of pharmacologic options. Circumstances under which early detection and disclosure would have been approved by the majority of patients were advice on lifestyle changes (exercise, nutrition) as potentially disease course-modifying therapy; the establishment of an early diagnosis "culture," including early clarification of the patients' wish to know and regular support and follow-up of individuals after risk disclosure (Schaeffer E et al, 2020).

The results show that the attitudes of Turkish people towards risk disclosure are similar as in Western societies. The majority of the participants with and without PD agreed that individuals at risk for future PD should be informed of their risk, especially when the influences of the lifestyle factors are considered. Risk disclosure of future PD may encourage early lifestyle changes and reduce the burden of late or misdiagnosis in individuals with prodromal PD.

The majority of the neurologists found it right to disclose the risk of future PD only if the individual expresses a desire to know. Recognition of the impact of lifestyle factors on PD is important in prognostic counseling.

New possibilities provided by the development of technology in clinical medicine are implemented in daily practices and are widely used. Deep brain stimulation (DBS) is one of such new possibilities in neurology that has been developed in recent years. This method is considered a proven tool in terms of reversibility and tunability (Williams NR, Okun MS 2013) It was used only in movement disorders such as Parkinson's disease and essential tremor; followed by epilepsy, dystonias, some types of headaches; in the symptomatic treatment of some psychiatric disorders such as obsessive-compulsive disorder and major depression. Although DBS is an effective treatment that is widely accepted pertaining to the treatment of some diseases, it is an invasive and expensive process (Lozano AM, Lipsman N, Bergman H, et al 2019) In this context, it is a topic that requires further evaluation concerning its ethical impacts. Accordingly, the patient selection criteria, related informed consent, and resource allocation in health care and reimbursement systems need to be examined.

The field of neuroimaging is also one of the issues that require ethical consideration. Professional competence in this area is important. The absence of adequate technical equipment for neuroimaging may cause irreversible harm to patients.

In this context, professional competence consists of the following: the ability to collect data from patients requires skills such as knowledge of clinical situations, the ability to analyze data, and clinical problem-solving for diagnosis and interpretation. Competence conditions in neuropsychological assessment have been discussed in detail in the literature (Bornstein 1985, Bornstein 1986, Binder and Thompson, 1995). It is known that demographic variables are effective in neuropsychology research. Thus, it is necessary to consider individual variables such as age, gender, race, and socio-economic level. In this context, evaluating the suitability of the tests to be used on individuals with psychiatric disorders such as schizophrenia and depression and are frequently involved in neuroimaging studies, as well as the interpretation of the results of such tests constitute important ethical problems. The possibility of various information such as diagnosis, education level and treatment regimens to be presumably obtained from individuals with neurological conditions such as Parkinson's, epilepsy, and Alzheimer's disease, may also create ethical concerns (Shrivastava and Behari (2014). It is important to have the knowledge and skills to evaluate and interpret relevant tests.

The fact that practitioners do not have sufficient technical equipment regarding the use of neuroimaging may cause irreversible harm to patients. A researcher who does not have this information may give incomplete information to the person in the informed consent form and/or may cause some damage by collecting incomplete information from the person. In order to protect participants from harm, the competence of professionals in neuroimaging studies is very important. The potential harmful consequences that may arise during the imaging protocol should be assessed and the relevant measures for such should be identified. (Kulynych, 2002).

The discovery of incidental findings seen in Magnetic Resonance Imaging (MRI) scans in participants who were included in the studies as healthy controls have recently attracted a lot of attention (Illes et al., 2003, Illes et al. 2004). Incidental findings appear either in the form of unexpected possible clinical relevance in healthy participants or as clinical significance unrelated to the objectives and variables of the neuroimaging study observed in patients (Illes et al., 2006; Wolf et al., 2008). Inciden-

tal findings may also be found in clinical studies (Hoffmann, 2013). When the literature is examined, it is seen that these incidental findings were evaluated only in the context of MRI studies. Incidental findings create various ethical problems (Anderson et al., 2013; Illes et al., 2004). One of them is the necessity of specifying the probability of incidental findings in the informed consent (Hoffman 2013). On the other hand, Illes et al. (2007, 2008) mention that there are 5 different options that may be made in case of accidental findings: 1) stating in the informed consent that if there are incidental findings, they will not be discussed, 2) possible anomalies will be communicated to the participants but as stated in the informed consent, these will not be examined by experts, 3) it is stated in the informed consent that possible anomalies will be evaluated by the specialist before they are communicated to the participants, 4) it is stated in the informed consent that the scans taken for research purposes will be routinely examined by an expert and that incidental findings that may be considered clinically meaningful will be communicated to the participants, 5) routine informing in the informed consent that both research and clinical images will be obtained and incidental findings that may be significant will be communicated to the participants. In this context, Illes mentions informing the participants about which path the researchers will choose in case of possible random findings (Illes et al. 2007, 2008). For this reason, it may be the best way to inform the participants about possible anomalies without seeking expert opinion. In this case, one may face the risk and responsibility of researchers to decide how and when to refer a participant with a possible medical problem to the health system (Ross, 2005). The ethical issue in question highlights the necessity of interdisciplinary work in neuroimaging studies as it is particularly related to the problem of competence. The last three options proposed by Illes et al. (2007, 2008) require the presence of a medical doctor in the research team or as a consultant.

Another important problem posed by incidental findings is the moral conflict between the benefit of the participant and the provision of valid and generalizable information that will enhance health care for future patients (Hoffman, 2013). The ethical dilemma here is the decision between disclosing the finding for the benefit of the participant and not disclosing the finding by intervening with the participant, monitoring the course of the disease, and obtaining valid and generalizable data about the disease for the future. Schmidt, Hadsakis, Downie, and Marshall (2015) talk about the distinction between



coincidental findings that are related to the participant's health and those that are not. According to the researchers, when there is a finding that does not affect the health of the participants, disclosure of this is optional whereas the disclosure of a finding related to the health of the participants is mandatory. Studies in the literature show that participants also attach importance to random findings.

Incidental findings also raise a methodological problem: will the data of a participant with the incidental finding be included in the analysis within the scope of the research? In the literature, no ethical problem related to this issue has been mentioned. However, since the data obtained from such participants may not be truly accurate, it would be more appropriate not to evaluate them within the scope of research findings. For example; in a study conducted with healthy participants, the inclusion of data obtained from a participant who had a tumor incidentally in the data collected from a healthy sample may create problems pertaining to the accuracy and possible generalization of research findings.

DNR (Do Not Resuscitate) decisions constitute another ethically important issue in the field of neurology (Alexandrov et al 1995). Some fundamental questions pertaining to this issue may be posed: Should a decision be made to "do not resuscitate"? What is the role of futile treatment in these decisions? What are the authorities and responsibilities of physicians in this regard?

Brain death and permanent vegetative conditions are relevant to the advances in the diagnosis and treatment of diseases and cause problems that are not defined in doctor-patient relations. One of them is "Brain Death". "Persistent Vegetative Condition" is the clinical picture that we will encounter more and more frequently. As a result of unsuccessful, inappropriate or delayed resuscitations, patients may possibly fall into the scope of both clinical conditions. These conditions may perhaps be categorized under malpractice. There are examples where the relatives of the patients who were started to receive a diagnosis of brain death were asked for their opinions on organ transplantation and their relatives absolutely did not want to donate their organs and were considered to be removed from the respirator, where doctors were met with a great resistance. Such authority may not be used in some societies because families may possibly do not accept that they are "Dead as Brains".

Is it an "ethical duty" to have this discussion, not to cause "blaming" the physicians who try to treat the patient but encounter complications, but to assume the responsibility and care of the patient? How far can a global-

izing health system be sustained in the axis of neoliberal policies? It will be an important support to the relatives of patients who are experiencing pain.

What are the responsibilities and duties of the physician towards the patient with a severe disability, disability? Neuroimaging results is known to bear crucial importance before courts dealing with malpractice claims. These are especially considered by experts and, in such a context, ignoring limitations or providing misdirecting evidence due to lack of competence may lead to ethical problems.

### **Ethics in neuroscience research**

The most important factors that enable research to be conducted in the medical world on an ethical level are; ethical education of researchers, ethical committees, and international regulations. In terms of research ethics, "vulnerable" groups are those that require maximum sensitivity and care. Some neurology patients are evidently also included in these groups.

Subjects such as the purpose of a trial, its estimated duration, the limits of confidentiality, the voluntary nature of participation, and the possibility to withdraw from the research at any time should be communicated to the participants. Obtaining duly informed consent from the participant and protecting the participant's welfare is the researcher's most important ethical obligation.

Studies conducted with patients who have impaired consciousness should be mentioned under this subheading. It is the general view that research on Alzheimer's has its characteristic ethical considerations, these patients should be evaluated with high sensitivity in terms of inclusion criteria, and the participant's informed consent should be reviewed throughout the process. According to the literature, one of the most important ethical problems is the decision-making capacity and sensitivity of patients with Alzheimer's disease. (Anderson 2013; Racine & Illes, 2007).

Problems with the participation and permission of the diagnosed psychiatric and neurological groups may affect their sensitivity (Lombera 2010). For example, those diagnosed with schizophrenia for the first time; However, it should not be forgotten that people who have not yet started schizophrenia treatment have a lack of decision-making capacity to participate in the research states that they find it important to ensure that therapeutic misconception does not occur at the stage of informed consent. In some cases, it may not be possible to obtain informed consent

from patients with neurodegenerative disorders, since cognition is impaired (Roskies, 2002).

There is a recent and striking example of research processes related to diseases that fall within the field of neurology. The United States Food and Drug Administration (FDA)'s "emergency use approval" for a new drug for the treatment of Alzheimer's for the first time in many years had a great impact. The FDA announced that the drug developed by the company Biogen is expected to help slow dementia due to its ability to reduce protein plaques that the disease causes to build up in the brain. The drug in question targeted the amyloid accumulated in the brains of people with Alzheimer's and was presented as reducing this abnormal protein accumulation and improving cognitive symptoms. One of the FDA advisors who voted against the drug's immediate use approval process, Dr. GC Alexander emphasized that the board felt the despair and the magnitude of the problem that the need for drug development in this area has not been met, but that the scientific evidence to support the safety and efficacy of the drug is also vague. He states that there is no clear and convincing evidence that the drug is safe and effective to give emergency use approval (Bauchner H 2022). A large-scale survey conducted after this process showed that three-quarters of the participants, who had no familiarity with the drug, were less supportive of the approval of the drug after being informed about the potential clinical and economic impact of the drug (DiStefano MJ, 2022). It has not approved the use of this new drug developed against Alzheimer's disease. The EMA (European Medicines Agency) explained that the drug Aducanumab was not effective in cases where Alzheimer's symptoms were detected early, emphasizing that the results of the studies were contradictory and did not show that it was effective in treating adults with early-stage Alzheimer's disease in general. Therefore, it is an important development that can be evaluated from an ethical point of view that EMA concluded that the benefits of the drug do not outweigh the risks and recommended that the marketing authorization be refused.

Efforts to get rapid approval may also come up in drug development for many other diseases such as Alzheimer's. But the real question is whether we have the right to lower the standards, the amount of knowledge we have about safety and efficacy, when a drug is approved.

## Discussion and as a result

Neuroethics is a multidisciplinary field that examines the ethical, legal and social implications of advances in

neuroscience research and technology. It addresses the ethical considerations surrounding the use of brain related knowledge, neuroscientific interventions and the impact of these sort of developments on the individuals and entire society. In this context neuroethics explores various issues such as; "consciousness and personhood", "brain imaging and privacy", "brain-computer interfaces", "cognitive enhancement", "brain stimulation and treatment", "dual use technology".

consciousness and personhood; at the actual situation consciousness term has been described according to the current paradigm. The issue is how do neuroscientific findings about consciousness and brain activity impact our understanding of personal identity and moral responsibility brain imaging and privacy; regarding with privacy in neuroethics, how should neuroimaging data be collected, stored and used to protect patients' / individuals' privacy? Another important topic from this point of view is how should ensure the relevant to informed consent brain-computer interfaces; ethical implications of brain-computer interfaces are recently appeared issues in the field of neurological sciences. To allow direct communication between the brain and external devices should be evaluated from neuroethical point of view and possible reflections in the medicolegal field should be scrutinized. The other important aspects that how can these technologies be accessed equitably and be used responsibly. cognitive enhancement; relevant to this subtitle using pharmaceutical and/ or technological interventions to enhance cognitive abilities one of the basic inquiries in neuroethics. So, whether presence of potential risks and possible ethical concerns associated with such this sort of enhancements are evaluated.

brain stimulation and treatment; the need of ethical guidelines has been obvious to govern the use of techniques such DBS for therapeutic purposes. To balance potential benefits with potential risks looks one of the important aims of relevant medical law.

dual use technology; research in the neuroscience field may have both beneficial and harmful effects/ therefore the research team have to be aware of such this dual feature. How do we address the dual-use nature of certain technologies and how do we prepare safeguard against potential misuse in the context of medical law.

These are just a few examples of the extremely complex ethical issues that neuroethics seeks to address. The field requires collaboration between specialists from different areas such as neuroscience, ethics, philosophy, law, policy to ensure responsible and ethical developments in neuroscience.

Being a social state at the global level means having equal access to basic health services. During the Covid 19 pandemic, we realized how far we could be from this concept and this ideal in a global context. We know that the reflections of general social conditions and the welfare level of societies in economic terms on health are at the forefront and constitute many variables of health. In this context, how to explain the fact that diseases related to malnutrition and vitamin deficiency such as beriberi and scurvy, which should have remained in the history of medicine, are seen in some countries in Africa in the 21st century? The persistence of diseases related to malnutrition and vitamin deficiency can be understood through the lens of social medicine and ethics. There are several interconnected factors contribute to this concerning situation such as socioeconomic inequality, food insecurity, health care infrastructure, educational awareness, ethical considerations, global health priorities.

Ethical problems are more common in neurology clinics due to the high incidence of deaths. Major clinical manifestations such as Brain Death and Persistent Vegetative Condition, which are within the scope of ethical issues, are followed in neurology clinics, and ethical problems are frequently encountered in patient-physician relations. There is no formal education on ethics in the neurology residency process. Adding the element of ethics as a kind of continuing education activity, conducting structured clinical ethics case discussions would be beneficial. Legislation on this subject is both insufficient and unknown in many countries.

Health professionals working in intensive care units are faced with ethical problems related to the patient group they care for and the characteristics of the service provided. For this reason, those working in intensive care units should have the knowledge and sensitivity to foresee these problems they face. With the effect of scientific and technological developments, ethical problems that arise in care environments are also changing and diversifying. In this context, the professional qualifications of health professionals working in intensive care units in the field of neurology, being knowledgeable about basic ethical principles and legal regulations, updating their knowledge, and having a teamwork understanding will contribute to both the prevention of problems and the creation of effective solutions. In the absence of legal regulations, ethical conflicts can have very serious consequences. In addition to legal regulations, regulations such as the establishment of ethical committees at the institutional level and the preparation of ethical guidelines will enable

more qualified decision-making based on professional and ethical principles in intensive care units, and will increase the level of health services.

As a neurological disease, Alzheimer's is a common and devastating disease for millions of individuals, both in the United States and around the world. The fact that it imposes a great burden on patients, on those responsible for their care, and on national economies in a global context will continue. Of course, research on this subject will continue. But as in the example of the drug that was quickly approved by giving emergency use approval for Alzheimer's disease; As a drug is approved for release from the research process, the fact that we have to account for the amount of information we have about its safety and efficacy and how far research standards can be lowered will never change.

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# The Place of Gazligol Thermal Springs in Afyonkarahisar in the Turkish Medical History and its Effects on Social Life

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## Summary

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Gazligol Thermal Springs are found in Afyonkarahisar in Turkey. The place is a therapeutical center and it has some effects on social life. These thermal springs are very valuable in terms of Turkish Medical History.

Humans' starting to live together caused social life to develop and the development of division of labor in social life caused transportation and communication services to emerge. Transportation and communication are counted as one of the most important elements of socio-economic growth. Transportation services starting with caravans reached new dimensions with the invention of the wheel.

Gazligol Thermal Area is located within the borders of the towns of Gazligol and Yaylabagi connected to the Ihsaniye district of the city of Afyonkarahisar in Turkey. Afyon thermal springs located in 4 regions named as Gazligol, Omer-Gecek, Heybeli and Hudai thermal springs have been providing healings for 3000 years in Afyonkarahisar, which is the thermal capital of Turkey. Afyon thermal spring waters provide healings for many diseases such as mainly rheumatic diseases, joint pains, neurological diseases, skin diseases, digestive system diseases and kidney stone. The thermal water having a characteristic of being benefited as both bathing cure and drinking cure is in use in the Gazligol region of Afyonkarahisar.

The city of Afyonkarahisar has become prominent in transportation and communication by using the advantage of being at the junction point well throughout history. Especially the roads, bridges and caravanserais built by Rome, Byzantine, Seljuks and Ottomans are each an important proof. Pilgrimage roads, caravan roads and royal roads connected big cities to one another. The Anatolian-Baghdad line opened in 1896 passes through Afyonkarahisar. In 1897, too, the Izmir Railway line was opened. In 1889, the Izmir-Aydin line reached the district of Dinar. Moreover, in 1936, the Afyon-Karakuyu, Isparta-Burdur line was opened. The presence of a railway line from Afyonkarahisar to four directions indicates that it is in a good condition in terms of transportation.

The government policies changing after the 1950's attached more importance to the construction of highways. While the State Railways had been attached importance in the load and passenger transportation until the 1960's, the highway transportation gained importance in Afyonkarahisar in the last quarter of the 20th century. Today, the load and passenger transportation via highway is directly proportional to the rise in the standards for highway and vehicles. This development in highways reinvigorated the economic structure of Afyonkarahisar, causing trade to increase by developing service sectors to an important extent.

**Key Words:** Medical History, Gazligöl, Social Life.

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## Thermal Springs Found in Afyonkarahisar

Within the same geothermal field, there are Orucoglu Thermal Resort Hotel and Cure Center and Hayat Thermal Enterprises belonging to the private sector. Moreover, within the same field, together with the investments belonging to the private sector, the buildings of the Rehabilitation Center of the Security General Directorate are under construction.

Afyon thermal springs located in 4 regions named as Gazligol, Omer-Gecek, Heybeli and Hudai thermal springs have been providing healings for 3000 years in Afyonkarahisar, which is the thermal capital of Turkey.

Afyon thermal spring waters provide healings for many diseases such as mainly rheumatic diseases, joint pains, neurological diseases, skin diseases, digestive system diseases and kidney stone. The thermal water having a characteristic of being benefited as both bathing cure and drinking cure is in use in the Gazligol region of Afyonkarahisar.

Gecek Thermal: Gecek Thermal Spring located on the Afyonkarahisar-Kutahya highway is 16 kilometers to the city center and has no transportation problem. Water characteristic: it is included in the group of geothermal fluid, carbhydrated waters springing at a temperature of 700 C. Its radioactivity varies between 3,2 and 10 eman. Its



**Fig. 1.** Heybeli Thermal Spring.  
Source: Archives of Demirhan Erdemir

PH value is 7,6. Healing characteristics: it was observed to be beneficial in rheumatic diseases via bathing treatment, physical rehabilitation of people having undergone orthopedic interventions, metabolism and gynecological diseases. Treatment facilities: accommodation is possible all year round. There is the possibility of accommodation in 42 apart villas built by Afyon Chamber of Commerce and Industry and the detached houses.

Heybeli Thermal Spring: located on the Afyon-Konya highway, Heybeli thermal spring is 30 kilometers to Afyon, and has no transportation problem. Water characteristic: the geothermal water increasing to 52 degrees is included in the group of carbohydrated waters. Its radioactivity varies between 6,9 and 12,1 eman. Its PH value is approximately 7 (6, 8). Healing characteristic: it was observed to be beneficial for such problems as eczema, scabies, dermatitis in addition to rheumatic diseases. Moreover, in the treatments performed via respiratory tract, it was observed to be beneficial for chronic bronchitis, pharyngitis and asthma disease. Treatment facilities: it is possible to accommodate all year round in the thermal spring. There are 90 detached flats with a bathroom and thermal public baths and there is a hotel with a capacity of 50 beds. In the thermal spring managed by the Municipality of Bolvadin, thermal treatment units have not been established yet.

Gazligol Thermal: Gazligol thermal spring located on the Afyon-Eskisehir highway is 21 kilometers to the city center and has no transportation problem<sup>1</sup>. Water charac-



**Fig. 2.** Gazligol Thermal Spring, Ihsaniye.  
Source: Archives of Demirhan Erdemir

teristic: the geothermal water increasing to 64 degrees is included in the group of carbohydrated waters. Its radioactivity varies between 0,2 and 0,29 eman. Its pH value is 6,9. Healing characteristic: it was observed to be beneficial for rheumatic diseases via bathing treatment, skin diseases and gynecological diseases. Moreover, in drinking cures, it was determined to be beneficial for stomach, gall bladder, intestinal and kidney diseases. It is also known to have the functions of soothing and regulating blood circulation via the respiratory tract (inhalation). In Gazligol thermal spring, the soothing and healing thermal water springs which the body needs show richness and diversity.

Treatment facilities: in the thermal spring facilities managed by the Municipality of Afyon, there is a triplex villa having 9 thermal baths and there are 16 detached flats with a bathroom, 32 detached flats without a bathroom, 10 hourly family baths and 5 public baths with a pool. The historical public baths fed with special spring water are included in this number. In recent years, thanks to the hotel and pension managements built by the Municipality of Gazligol and the private enterprise, the bed capacity has increased greatly in the region.

3. Source: Archives of Demirhan Erdemir

Although thermal facilities in desired standards have not been constructed in the area, it is observed that many cooperatives have obtained permission to drill for hot water and for construction in recent years<sup>2</sup>.

Gazligol thermal and mineral waters, whose temperatures vary between 18.5 and 64°C, exhibit a character which is rich in Na and HCO<sub>3</sub>. Especially Gazligol is shown great interest by both domestic and foreign tour-

<sup>1</sup> Afyonkarahisar Kütüğü, Cilt. 2, Afyon 2001. Afyon Kocatepe Üniv. Yayın. No. 35, s. 447-448.

<sup>2</sup> P. Kandela, *The rise and the fall of Turkish bath in Victorian England*, „International Journal of Dermatology” 2000, t. 39 (1), s. 70.



**Fig. 3.** Gazlıgöl Thermal Spring.  
Source: Archives of Demirhan Erdemir

ists. Gazlıgöl is one of the places where there are many thermal springs and thermal hotels. The source of Kızılıay mineral waters, which has become famous for its name, is here. The geothermal water springing as artesian from many points of the area in the past periods created ponds and it was named as Gazlıgöl due to the gas emerging from the ponds by bubbling noisily. The hot water springing in the Gazlıgöl geothermal basin contains very useful minerals as well as it has a very rarely-found characteristic with the intensive carbon dioxide gas which it contains. The geothermal water springing as artesian from many points of the area in the past periods created ponds. The place was named as Gazlıgöl due to the gas emerging from the ponds by bubbling noisily. In Gazlıgöl, there are no ponds and lakes. Since no artesian waters are springing today, no gas outlet cannot be observed, either.

During the excavation works carried out in the Gazlıgöl Basin, some ruins belonging to the 300's B.C. were reached. For more than 5000 years, humans have been benefiting from these waters. The public bath built during the Roman period and the ones built during the Ottoman period were used for therapeutical purposes. That the daughter of the Phrygian king, Midas, benefited from these waters for her skin diseases became a subject for legends.

According to the legend, king Midas, not having had a child for long years, finally had a female child with an outstanding beauty and gave her the name of Suna meaning 'beautiful, tall'. Years passed, when the daughter of the king became a young girl, she caught an incurable disease and there appeared lesions on her body. None of the physicians could cure these lesions. The beautiful girl, who could not tolerate the pains of the never-recovering lesions, took to the roads and started to wander up hill and down dale. The king sent watchmen after his daughter to keep an eye on her. The young girl wandered for a while and came to the vicinity of Gazlıgöl included within the borders of the king's land. The young girl, who felt very

thirsty, saw a spring surrounded by greenery in the area, where the Gazlıgöl Thermal Springs located today, and quaffed from the water. The girl experiencing relief on the places where the water touched jumped into the water and her pains became lighter. After she got out of the water, she fell fast sleep in the greenery and when she woke up, she saw her lesions start to get dry. She spent a week beside the water and at the end of a week, her lesions recovered completely. Regaining her old beauty on the reflection of the water, Suna rejoiced very much. The watchmen seeing that Suna's lesions recovered came near the girl and they returned to the palace together. When the king mourning day and night for her daughter heard that her daughter recovered thanks to the hot waters springing in his land, he immediately ordered a public bath to be built to provide healing for passers-by suffering from various illnesses. With this legend, it is thought that this thermal spring constructed in Gazlıgöl has been providing people with healing since the time of Phrygians.

Moreover, in some historical documents, which are present at the Prime Ministry Archives, the importance of this thermal spring and the mineral waters springing here are mentioned. In a document dated 894, it is written that the revenues of the thermal springs located in Afyonkarahisar and known with the names of Gecek, Omer and Gazlıgöl Public Baths and the vegetable garden present in the vicinity of them are collected in the name of the Ministry of Education. Again, in a document dated 1896, it is mentioned that the mineral water springing within the inclusion of Gazlıgöl Public Bath, too, is run in the name of the Ministry of Education<sup>3</sup>.

Is the water of Afyon Thermal Spring drinkable? Of the thermal springs present within the general of the city of Afyon, the drinkable one is the water of Gazlıgöl Thermal Springs.

The Thermal Area of Gazlıgöl is located within the borders of the towns of Gazlıgöl and Yaylabacı connected to the Ihsaniye District of the city of Afyonkarahisar. It is located in the town of Gazlıgöl connected to the Ihsaniye district. It is on the Eskisehir highway and 21 kilometers to the city center. The flow rate of the Gazlıgöl thermal spring water, which is at the temperature of 45–68°C, is 9 liter/second. Its chemical structure is composed of hyperthermia, hypotechnic, alcathrin carbonated and light radioactive composition. If this water is drunk lukewarmly, it is good for painful and spasmodic kidney diseases,

<sup>3</sup> *Başbakanlık Arşivi Belgesi* (Ottoman Document), Gazlıgöl ile ilgili Belge, MF.MKT, 223, 1312 /1896. tarihli; ibidem, BEO, 2070, 1905 tarihli.

stomach diseases, liver, bile tract and spastic pains of the intestine. Bathing treatment: it is recommended for rheumatism, neuralgia, neuritis, arthrosis, gynecological diseases and seborrheic skin diseases.

The diseases which the thermal water helps to treat:

- rheumatic diseases, rheumatoid arthritis (inflammatory articular rheumatism),
- ankylosing spondylitis (the type of disease in which the vertebral column becomes motionless within the course of time),
- osteoarthroses,
- psoriasis-like skin diseases,
- soft tissue rheumatism (Fibromyalgia, enarthrosis pains),
- disc diseases such as herniated spinal disc and herniated cervical disc and sciatalgia,
- fascia – tendon diseases,
- gall bladder, kidney and urinary tract diseases,
- mechanical waist and neck pains,
- stiffness and rigidity occurring in joints after various orthopedic operations,
- gastrointestinal diseases (digestive system diseases),
- neurological diseases (neuralgias and paralyses),
- muscular diseases,
- strengthen organism and eliminate bodily weaknesses by regulating the ratio of ferrum,
- some long-lasting infectious diseases,
- sexual dysfunctions in males (impotence) and infertility problems,
- stress and all the problems resulting from stress,
- insomnia, irritability, physical and mental fatigue, amnesia,
- hair loss and split, nail and skin diseases,
- skin beauty and diseases,
- chronic pains,
- gynecological diseases,
- osteoporosis in the form of drinking sessions,
- functional disorders of upper gastrointestinal system,

The president of the Association of Gazligol Thermal Tourism Managers, Mustafa Basaran, reports that „Together with the increase in the interest in alternative treatments, there has been a great increase in the interest in and demand for thermal spring treatments in recent years”.

Again, the physician in charge in the thermal spring, Op. Doctor Gurkan Eryanılmaz, provides the following information: „Thermal springs, one of the alternative treatment methods, have very positive effects on arthroliths under the control of a specialist physician. The

patients with arthroliths, that is to say, osteoarthritis, are administered thermal spring treatments in the forms of bathing cures and mud bathing. Together with relaxation as a result of hot application, blood circulation increases. They can benefit from sulfuric, particularly salty and radioactive thermal spring waters<sup>4</sup>.

The Afyonkarahisar Gazligol thermal spring waters have such effects as strengthening muscles, regulating the work of endocrine glands, regulating synovial fluid, eliminating inflammation and strengthening and repairing bone tissue. Thermal spring cures must be done for at least two weeks and, in the meantime, a healthy and balance diet must be followed. Treatment must be performed via both in- and out-of- water exercises and massages must be done via treatment. Moreover, the enzymes secreted during the cure partly prevent the destruction in the cartilage as well. In the first stages of arthroliths, you can get rid of them without requiring a surgical operation”.

In the meantime, Ibrahim Nejat Demirozmez, who preferred Basaranlar Thermal Springs located in the Gazligol Basin of the city of Afyon to find cure for the arthritis in his knees, provided the following information by saying that „Every time I came to Basaranlar Thermal Springs, I feel at home. I have arthritis in my knees. Every time I come here, my pains diminish compared to the previous one and I return by feeling relaxed. Without undergoing any surgical operation, I reap the benefit of the thermal spring water. When my accommodation ends, I return by feeling more vigorous and healthy. I recommend this for everybody with a clear conscience”.



**Fig. 4.** Gazlıgöl Thermal Spring.  
Source: Archives of Demirhan Erdemir

<sup>4</sup> Z. Karagülle, *Balneoloji, Balneoloji ve Kaplıca Tıbbı (Hot Springs Medicine), Nobel Tıp Kitapları*, İstanbul 2002, s. 227–234; 1926 tarihli ve 927 sayılı “Sıcak ve Soğuk Maden Sularının İstismarı ile Kaplıcalar Tesisi Hakkında Kanun” (Law of Mineral Water, date: 1926).





**Fig. 5.** Gazlıgöl. Source: Archives of Demirhan Erdemir



**Fig. 7.** Gazlıgöl. Source: Archives of Demirhan Erdemir

In the Afyon Gazligol Hotels area, there are Basaranlar Thermal, Grand Ozgul Thermal, Sefa Thermal, Gzm Royal Thermal, A Turkish Bath in Frigya Thermal hotels. Gazligol attracted attention with its healing waters in every period of history. In the Ottoman period, too, water was bottled from the place where there is the plant of Kizilay mineral waters now and sent to the palace. Later, upon the directives of the founder of the Turkish Republic, Ataturk, the plant of Kizilay mineral waters was put into service in the area.



**Fig. 8.** Gazlıgöl. Source: Archives of Demirhan Erdemir



**Fig. 6.** Gazlıgöl. Source: Archives of Demirhan Erdemir



**Fig. 9.** Gazlıgöl. Source: Archives of Demirhan Erdemir



**Fig. 10.** Gazlıgöl. Source: Archives of Demirhan Erdemir



**Fig. 11.** Gazlıgöl. Source: Archives of Demirhan Erdemir

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# Karure: Uroscopy in the Ottoman Classical Period

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## Summary

Before the laboratory medicine began, the uroscopy was the primary diagnostic tool for the physicians. Uroscopy, which means the visual inspection of urine in a specially flask called a karure had been used very often both in western and eastern civilizations. This study aimed to explain the opinions of Ottoman medical writers in the classical period.

**Key Words:** Urinalysis, uroscopy, karure.

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## Introduction

In the pre-modern medicine, the diagnosis of an illness was based on its presenting symptoms and examination of the afflicted individual for external signs of disease. Uroscopy and Feeling the pulse were also an integral part of pre-modern medicine. By the late Middle Ages, uroscopy became the central diagnostic means both in Europe and in Islamic lands.<sup>1</sup> The present survey aims at studying the opinions of the Ottoman medical writers in the classical period on the diagnosis of diseases via urine examination.

## Theoretical Basis of Uroscopy

According to Ottoman medical writers in the classical period; uroscopy is the examination of urine with the naked eye to gaining essential insights into the nature, causes and prognosis of illness. The theoretical basis for uroscopy goes back to the ancient concept of humoral pathology. According to humoral pathology, the body consisted of four humours: blood, phlegm, yellow bile, and black bile. Each of these humours was thought to originate from a different region of the body. The urine is produced in the liver in the so-called cooking process, which transforms chyle into a mixture of blood and humours, which is then excreted by kidneys and bladder. Due to this process, urine gives the physician information about the state of the humours, which are constitutive elements of the body and determine health or disease.<sup>2</sup>

## Collection of Urinary Specimens in Karure<sup>2,3,4,5,6,7,8</sup>

The technique of collecting urine was thought to be important for accurate interpretation. Before the collection of urinary specimens, the patient should not take in any food which may affect the urine color. For instance, saffron changes the urine color to yellow, henna changes to red, greenstuff such as spinach and lettuce change it to green. And the patient should not be in a mental and physical condition that alters his or her urine. That factors such as fasting, thirst, sleeplessness, and tiredness change the urine color.

The Ottoman medical writers recommended collecting the full amount over 24 hours in a large clean vessel named karure and keeping it out of the sun or heat, which could alter color. Karure is a bladder shaped vessel, rounded at the bottom allowing for better sedimentation and its neck was longer allowing for a better grip.

The urine examination should be in the early morning before something eating and drinking. The patient should pass all urine in the bladder into karure vessel. Then the urine should be kept 1-3 hours in the vessel to sedimentation. During this time, the mouth of vessel should have been covered. After that the physician should first shake the vessel and held up to the light for proper inspection. Different parts of the vessel represented different areas of the body. The karure was divided into 4 levels, whereby the uppermost denoted an illness of the head, and the remainder indicated afflictions of the heart and lungs, the abdomen, and the bladder and urinary tract, respectively.

## Urinary Features

Physicians would pay attention to the urinary features such as colour, consistency (urine dilution and concentration), volume, brightness (transparency or opacity of the urine while light passes through it), visible contents, odor, and froth as the means of diagnosis.

### *Colors*<sup>2,3,4,5,8</sup>

The most important and most obvious characteristic of urine to which the physicians had to pay attention was color. Ottoman medical writers distinguished 31 different shades, each one was indicative of a different disease or pathological constitution. The color spectrum ranged from yellow to red, green, white and black. The main colors were subdivided into different degrees.

#### *The Degrees of Yellowness*

- a. **Straw yellow:** It indicates the coldness of the body and the digestive weakness.
- b. **Lemon yellow:** It is a sign of good digestion and balanced body temperature.
- c. **Gold yellow:** It indicates the induced body temperature and excess bile in the body.
- d. **Orange peel yellow:** It is a sign of high body temperature.
- e. **Flame yellow:** A sign of high body temperature.
- f. **Saffron yellow**

#### *The Degrees of Redness*

- a. **Bronze, saffron red:** It indicates the weakness of the kidney.
- b. **Pink:** A sign of the excess blood in the body.
- c. **Blood-red:** A sign of the excess blood in the body.
- d. **Dark red:** A sign of the excess blood in the body.

#### *The Degrees of Whiteness*

The whiteness of urine indicates the excess phlegm and coldness in the body, uncooked humours, melting organ or absence of color substance due to a congestion in the vessels.

- a. **Meşak:** It indicates immature humours.
- b. **White as mucus:** It indicates immature humours.
- c. **White as fat:** It is a sign that kidney fat is melting.
- d. **White as yoghurt:** It indicates a bad prognosis of the acute disease.
- e. **Rayi:** Like rehayi

- f. **Felahi:** It indicates a bad prognosis of the acute disease.
- g. **White as milk:** It indicates that the patient with acute disease will die soon.
- h. **White as semen:** It is a sign that the patient will soon have a stroke or paralysis.
- i. **White as tin:** It indicates a good prognosis if it has not sediment.

#### *The Degrees of Greenness*

The greenness of the urine was considered a frightening sign and interpreted that the patient would soon die.

- a. **pistachio green:** A sign of coldness
- b. **Light blue:** A sign of coldness
- c. **Dark blue:** A sign of coldness.
- d. **Oil green:** A sign of muscular melting
- e. **Chard green:** A sign of bad prognosis
- f. **Frog green**
- g. **Leek green:** A sign of bad prognosis by the children and extreme mature humours.
- h. **Mildew color:** A sign of extreme mature humours

#### *The Degrees of Blackness*

The Blackness of urine was interpreted the excess of black bile and it might be up to consumption of colored foods such as wine.

- a. **Yellowish black:** A sign of icterus and of an excess of black bile transformed from yellow bile
- b. **Reddish black:** A sign of bad prognosis and of an excess of black bile transformed from blood
- c. **Greenish black:** A sign of an excess of black bile
- d. **Whitish black:** A sign of coldness and of an excess of black bile transformed from phlegm

#### *Consistency*<sup>2,3,5,8</sup>

**Thin urine:** It indicates a kidney insufficiency, body weakness, drinking too much water, a congestion in the vessels, an excess of black bile, coldness, dryness and urinary calculus. It has been interpreted as a bad prognosis in an acute disease.

**Thick urine:** It has been interpreted as an excess of humours in the body.

**Balanced urine:** It is a sign of balanced humours.

### **Brightness**<sup>2,5,8</sup>

**Cloudy urine:** It looks like there is an impurity inside. Cloudy and thick urine is considered a good sign if it can be discharged easily and in large quantities; if it resembles wine, it is considered a bad sign. Additionally, cloudy urine indicates an abscess in the kidney. If it looks like chickpea juice, it indicates pregnancy in women.

**Clear urine:** Extremely clear urine has been seen as a sign of lack of body strength, tumor in the head and headache.

**Balanced urine:** It is a sign of balanced humours.

### **Odor of the Urine**<sup>2,5,8</sup>

**Odorless urine:** It indicates that the illness is immature yet.

**Low-smelling urine:** It indicates the coldness of body temperature and immature humours

**Bed smelling urine:** a sign of inflammation and an ulceration in the urinary tract

**Pungent urine:** It occurs due to excess of yellow bile

**Sour smelling urine:** It indicates to black bile and becoming moldy of cold humours.

**Sweet smelling urine:** A sign of excess of blood in the body, and a feverish and acut disease.

### **The Volume of the Urine**<sup>2,3,5,8</sup>

**Low urine output:** It indicates to failure of the forces, eating less, drinking less, weakness of kidney, ascites, increased excretion, diarrhea and bad prognosis in the acute disease.

**Excessive urine volume:** It occurs due to eating to much fresh fruits. Excessive urine volume can be a sign of excretion of excesses in the body, and melting of the body. If the excess urine in acute illness has black colour and the patient feels relieved after urination, it is considered as a good sign.

### **Froth of the Urine:**<sup>2,3,4,5,6,7,8</sup>

**Many and big bubbles:** A sign of the viscosity of humours

**Many and dense bubbles:** A sign of an excess of pflgm

**Black and red bubbles:** A sign of icterus

**Few bubbles:** A sign of the viscosity of humours

### **Visible Contents of the Urine**<sup>3,4,5,6,7,8</sup>

Another important diagnostic criterion was the presence of visible materail contents. The contents distinguishes three different kinds, depending on their location in the karure. Some contents stay on the surface, others sink as a sediment to the bottom of the flask, and others remain floating in the liquid. The nature, quality, quantity, form, position, time and amalgamation of sediment of urine provide so much valuable information about the various states of the body.

## **Conclusion**

Urinalysis was an important diagnostic tool for diagnosis of illness and management of patients at the classical period of Ottoman medicine. They believed that Urine most directly indicates the state of the liver and condition of the genitourinary organs and their passages and vessels. Urinalysis was done by examination and observation of urine. Different features, including color, density, transparency, sediments, volume, odor, taste and froth were evaluated.

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# Conceptual Development of Temperament (Mizaj) Through the Ages: A Review

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## Summary

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Temperament, used synonymously with the Arabic word Mizaj, is one of the basic concepts of Tibb-e-Unani that distinguishes it from other systems of medicine. Of the seven Al-Umur-Al-Tabi'yah, Mizaj occupies the second position preceded by Arkan upon whose interaction it emerges. Unani System of Medicine emphasizes that temperament (mizaj) has a direct influence on the personality of an individual and it is supposedly responsible for health and disease inflicting them. It in fact covers all the aspects of a personality and gives a more consolidated concept in terms of defining health and disease. However, the concept of temperament is not only confined to the bounds of Unani Medicine but has been discussed and widely studied in other branches of study as well in context of designating and understanding human personality. This review paper intends to explore the development in the concept of temperament over ages.

**Key Words:** Mizaj, Personality, Temperament, Unani Medicine

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## Introduction

There are reasons for everything we do as human beings, though it is often difficult to understand the factors operating. However, many of the answers for human behavior can be found in peoples' temperament or personality<sup>[1]</sup>. According to David Keirse, two thousand years of consistency in terms of temperament distinctions is no accident, instead it is a reflection of the fundamental pattern in the warp and woof of the fabric of human nature.<sup>[2]</sup>

Temperament is the dynamic organization within the individual that determine his characteristics, behavior and thought.<sup>[3,4]</sup> Accordingly, it serves as a mechanism to explain how individuals contribute to their own development in a given environmental context. It is dependent on the relative quantities of innate heat and innate moisture and for a particular species; the temperament is specific, lying in a particular range of maximum-minimum limit within which the temperament for all members of that species is confined.<sup>[5,6]</sup> Harmony (Mizaj-e-mo'tadil) between persons and their surroundings is produced through bidirectional interplay between inborn temperamental attributes and external demands, supports, and circumstances.<sup>[7]</sup> Rothbart and Derryberry (1981) defined

temperament as constitutionally based individual differences in reactivity and self-regulation influenced over time by heredity, maturation, and experience.<sup>[8]</sup>

## History And Development

The study of the human personality goes all the way back to the famous Greek physician Hippocrates (460-370 BC), who is known to record the first known personality model, postulating that one's persona is based upon four separate temperaments. The origin of this concept may be traced back to Egypt or Mesopotamia, but it was only during the Greek era when at the hands of Hippocrates, it developed into a medical theory focusing on health and disease. Later on Galen, extended Hippocrates's theory by applying a body fluid to each temperament: blood, mucus, yellow bile and black bile respectively. Then came the medieval era of Arab philosophers and physician, who significantly contributed to the concept of temperament. The Arab physicians described the concept of Mizaj in a universal manner as compared to the modern concept of temperament, which is limited to the psycho-somatic behavior only. Later in the 18<sup>th</sup> century, rapid advancement of medicine served to discount

the four humors theory as a realistic practice of medicine. However, it retained its importance in terms of designating personality.<sup>[9]</sup>

Late 19th/early 20th century physiologist, **Wilhelm Wundt** is noted to be the first person to make clear distinction between human body and personality, expounded on the four humors theory in 1879. He emphasized that temperaments could not be limited to the body fluids only, instead the four temperaments sanguine, phlegm, cholera and melancholy, were actually four dimensions of the human personality and no individual was completely of one temperament; rather that everyone typically has varying proportions of two or more.<sup>[9]</sup>

Rapid growth in of the field of psychology in early 20<sup>th</sup> century led to an increased interest regarding individual personalities that paved the way for the development of following theories at the turn of the century<sup>[9]</sup>:

**Sigmund Freud** posited a structural model of the mind in which the three components of human mind viz., id, ego, and superego interacted and wrestled with each other for dominance that results in the whole of each human's behavior.<sup>[2,4,9]</sup>

**Eduard Spranger**, a German philosopher, theorized four attitudes towards ethical values and named them as artistic, religious, theoretic and economic.<sup>[9]</sup>

**Henry C. Link**, another philosopher from Germany presented a theory of four character styles and thought of people as hypomanic, depressive, hyperesthetic or anesthetic.<sup>[2,9]</sup>

**Erich Fromm**, yet another German philosopher penned down four human orientation viz., exploitative, hoarding, receptive and marketing.<sup>[2,9]</sup>

**Carl Jung** (1920) categorized mental functioning into four principle categories; sensing, intuition, thinking, and feeling in his book "Psychological Types". According to him, individuals can be identified or typed by their preference for a given function, which is characteristic to them. Thus, he presented the "function types" or "psychological types."<sup>[2]</sup>

**Alfred Adler** (1927) distinguished personality types based on the levels of energy they manifested. The Adlerian types are dominant, leaning, avoiding and socially useful types. He doesn't considered these types as absolute.<sup>[10]</sup>

**W. H. Sheldon** (1942) along with Stevens presented a system of classification of temperaments to complement his classification of somatotypes in his book 'The Varieties of Temperament' and named them viscerotonia, somatotonia, and cerebrotonia.<sup>[11]</sup> He described each of

these temperaments by the enumeration of 20 characteristic traits<sup>[12]</sup>

**Katharine Briggs and Isabel Briggs** (1962) developed an introspective self-report questionnaire known as Myers-Briggs Type Indicator<sup>®</sup> based on Jung's theory to identify sixteen patterns of action and attitude with the purpose of indicating differing psychological preferences of how people perceive the world around them and make decisions.<sup>[4,9,13]</sup>

**Alexander Thomas and Stella Chess** (1970) studied nine behaviors in children viz., activity level, rhythmicity, approach or withdrawal, adaptability, threshold of responsiveness, intensity of reaction, quality of mood, distractibility and gave three personality types- the easy child, the difficult child and the slow-to-warm-up child.<sup>[14,15,16]</sup>

**H. J. Eysenck** (1976), a German-born English psychologist described two personality dimensions extraversion and neuroticism in his book "Dimensions of Personality" and added a third dimension- psychoticism to the model in the late 1970s.<sup>[17]</sup> He also noted how these two dimensions were similar to the four personality types first proposed by the Greek physician Galen as follows:

- i. High N and high E = Choleric type
- ii. High N and low E = Melancholic type
- iii. Low N and high E = Sanguine type
- iv. Low N and low E = Phlegmatic type

## Greco-Arabic Concept of Temperament (Mizaj)

The Unani physicians believed that everything present on the face of Earth possesses a temperament, best suited to its functions implying that Mizaj is the property of an atom, a molecule, cell, tissue, organs and of an organism as a whole. Given below are the statements of some of the infamous Unani scholars on the temperamental theory.

**Galen** (129-200AD) opines, "Temperament is a quality produced by action and reaction of opposite qualities of body fluids (Akhlat). When these components interact by virtue of their respective powers (qualities) a condition is achieved which is found in equal proportions in all the components of that intermixture; this is called temperament".<sup>[18]</sup> In his Kitab-ul-Insan, he described five parameters or determinants of temperament known as **Ajnas-e-Khamsa** viz., configuration of the head, the merits and demerits of his sense of perception, actions of a person, power of reasoning and function of the body

**Ali Ibn Abbas Majusi** (930-994AD) in Kam-il-us-San'at fit-Tibb has explained Mizaj in the following

words, “all types of bodies (light or heavy), which are found in this ever-changing world are formed by four elements (ustuqussat) after mixing in different or uniform quantities in accordance with the needs (of the body). As a result of this mixing, one or two qualities become dominant, over the body, and this is called mizaj”.<sup>[19]</sup>

**Abu Sehal Masihi** (960-1000 AD) says that since there are so many primary components (ustuqussat) of the body which are mixed together not in close proximity, it is necessary that the qualities of primary components must be mixed as a whole new quality arises from the intermixing of primary components which will be in between the previous qualities, called mizaj.”<sup>[20]</sup>

**Ibn-e-Sina** (980-1037 AD) says, “the temperament is a quality resulting from the interaction of opposite qualities present in elements consisting of minute particles so that most of the particles of each of the elements may touch most of the others. Thus, when these particles act and react on one another with their properties, there emerges from their total properties, a uniform quality, which is present in all of them. This is the temperament (Mizaj).”<sup>[21,22,23,24]</sup> He further writes that “since the primary properties in the aforesaid elements are four namely hotness, coldness, moistness and dryness, it is obvious that the temperaments of the integrating bodies are the products of these very properties.”<sup>[23]</sup> Further, he mentioned the ten signs (**Ajnas-e-Ashra**) through which (various) states of temperaments are discernible.<sup>[21,22,23,24]</sup>

**Ismaeel Jurjani** (1041-1136 AD) in *Zakheera-e-Khwarzam Shahi* writes about mizaj that when different qualities of elements acts and reacts by their powers then previous qualities become diminished and a new moderate quality is developed which is known as mizaj.<sup>[25]</sup>

**Ibn-e-Hubal Baghdadi** (1122-1213 AD) states, “when elements get admixed, most of the elements mix with each other and their various qualities act and react, so heat breaks the cold and cold breaks the heat. Similarly, dryness try to breaks wetness and wetness try to breaks dryness. Low grade qualities mix with high grade qualities, light weight particles mix with heavy weight particles until a new quality is developed which is equally found in all the components of elements. This new and moderate quality is known as mizaj”.<sup>[26]</sup>

**Allama Nafees** (1213-1288 AD) says that “when elements mix with each other they act and reacts which, result in developing a new moderate quality in between the all four previous qualities and new quality is known as mizaj”.<sup>[27]</sup>

**Gruner** says that Arabic word mizaj contains the idea of mixture’, medical translators used the word commixtio or complexion which carry the idea of mixing or blending or weaving.<sup>[21,28]</sup>

**Dawood Al-Antaki** (1543-1599 AD) gives his view that: “Mizaj is a uniform quality which originates by the action and reaction of four elements which divided into smaller particles so that the maximum particles of each can mix with each other.”<sup>[29]</sup>

**Ayyub Israili** explains Mizaj as a type of moderate quality which is originated by the action and reaction of different opposite particles. When elements mix with each other and one element affects the other then they break into small particles due to action and reaction process. This process should be of such type that the biochemical structure of each element breaks the strength of quality of other elements, resulting in generation of a moderate secondary quality. This moderate secondary quality is known as mizaj.<sup>[30]</sup>

**Allama Sadidi** writes, “Mizaj is such type of malmoosa (touching quality) which is produced by the effects of different qualities of smaller particles of elements and the character to adopt the effects of these different qualities”.<sup>[31]</sup>

**Shah** defines temperament as the pattern of qualities as a whole which emerges from the action and reaction of the mass and energy. According to him as the basic qualities of the energy are heat and coldness and of the mass are dryness and moisture, their natural interactions lead to the emergence of a new balance of qualities which varies with the quantitative proportion of the primary qualities”.<sup>[24]</sup> He added that temperament is the part of the personality, which is genetically based. Along with character and those aspects that are acquired through learning, the two together are said to constitute personality.<sup>[32]</sup>

**Mehdi Hasan** described temperament along with the four elements; he says that, the four elements are result of four qualities coldness, hotness, moistness and dryness. Two qualities in combination constitute an element e.g. Cold + Moisture = Water. The ultimate units are pure qualities that have been identified as Heat Oxidation, Moisture Hydration, Cold Reduction, and Dehydration. So the temperament can be understood by the following examples: Saudawi or Melancholic temperament should be interpreted not as cold and dry but in which reduction and dehydration are preponderating.”<sup>[33]</sup>

**Taiyab** suggest that in Greco-Arab Medicine, temperament is a synthetic concept which express the various



physical as well as psychological tendencies of the individual in terms of matter and energy i.e. activity as heat and cold & reactivity as dryness and moisture".<sup>[34]</sup>

**Zaidi and Zulkifle** writes that the temperament is an intrinsic state which enables an individual to survive and to procreate comfort ability and is responsible for distinctive morpho-bio-physio-immuno-psychological identity of an individual".<sup>[35]</sup>

From all these definitions it can be summarized that Temperament is a new quality, which is developed after inter mixing of the properties of particles of the elements which gives a new state to the compounds.

### Typology Of Temperament

It was Galen (AD 131–200), who added to Hippocrates' work by connecting a person's temperament and personality to imbalances in their humors. He developed the first typology of temperament in his dissertation "**de temperamentis**", and searched for physiological reasons for different behaviors in humans. He mapped them to a matrix of hot/cold and dry/wet taken from the four elements.<sup>[33]</sup> These four temperaments are in fact a proto-psychological interpretation of the Unani concept of humors and suggests that four body fluids affect human personality traits and behaviors. From then through modern times, they, or modifications of them, have been part of many theories of medicine, psychology and literature. The characteristic features of four types of temperaments are as follows:

#### **A. Mizaj-e-Damwi (Sanguine Temperament)**

These people have hot and moist temperament; they are tall with strong muscular body; broad chest, large and strong bones and well-formed joints. They have a reddish complexion; black, thick and straight hair showing rapid growth. Blood vessels are mildly prominent with full and strong pulse. Their digestive power is wonderfully good with good appetite. They have a sound sleep; and excrete moderate amounts of concentrated urine. Their physical activities and speech are average, psychological aggressiveness and psychic condition comes on easily and are easily lost, mental condition is good, in dream red object are seen frequently and the general health is remarkably sound.<sup>[30]</sup>

This temperament is fundamentally impulsive and pleasure-seeking. Sanguines are sociable and charismatic; they tend to enjoy social gatherings, making new friends and tend to be boisterous. They are talkative and

generally have an almost shameless nature, certain that what they are doing is right. They are full of confidence. Sanguine people are warm-hearted, pleasant, lively and optimistic.<sup>[36,37]</sup> According to Ibn-e-Sina, they have slight feeling of heaviness in their body especially at the base of the eyes, head and temple. They get troubled with hot environment and food and feel comfortable in cold weather and like dry things.<sup>[23,38]</sup>

#### **B. Mizaj-e-Safrawi (Bilious/Choleric Temperament):**

These peoples have hot and dry temperament, a medium stature, thin and hairy body, moderate musculature deficient in fat, well-formed and prominent joints, yellowish complexion, thick, curly, black, rough and abundant hairs, prominent veins, strong and rapid pulse. They pass fiery and yellow urine. Sometimes, they feel sensation of pain and pricks over the body.<sup>[5,23]</sup> They feel comfortable with cold things and get troubled with hot things. This temperament manifests a short response delay, but the response is sustained for a relatively longer time.<sup>[35]</sup> Their digestive organs are active, appetite is good, and sleep is light and often disturbed. According to Ahmad, these people are proud, revengeful, shrewd, and zealous and get angry quickly. They are also energetic and intelligent individuals with a strong inclination to indulge in sexual pleasure.<sup>[27]</sup> The choleric temperament is fundamentally ambitious and leader-like. They are task-oriented people and are focused on getting a job done efficiently. They can dominate people of other temperaments with their strong wills, especially phlegmatic types, and can become dictatorial or tyrannical. However, they can quickly fall into deep depression or moodiness when failures or setbacks befall them.

#### **C. Mizaj -e-Balghami (Phlegmatic Temperament)**

They have cold and moist temperament, flaccid and obese body built with soft and flabby muscles, flat chest, large and not well-formed joints, and whitish complexion. They have thin, straight, brownish or whitish hair, which shows slow growth; blood vessels are not prominent with slow and infrequent pulse. Their urine is colourless and more in quantity. They experience excessive heaviness of the body. Their physiological functions like digestion, appetite and thirst are poor, sleep is excessive, memory is bad and irretentive and their power of imagination and perception is slow and feeble. These people feel comfortable with the use of hot and dry things and in hot weather. They are sexually frigid and also do not get angry easily.<sup>[5,39,40]</sup> The phlegmatic (Balghami) tempera-

ment is characterized by a longer response delay but the response is also short-lived.<sup>151</sup>

The phlegmatic temperament is fundamentally relaxed and quiet, ranging from warmly attentive to lazily sluggish. They tend to be content with themselves and are kind and prefer to observe and to think on the world around them while not getting involved. They may be shy and often prefer stability to uncertainty and change. Their fear of change (and of work) can make them susceptible to stagnation or laziness, or even stubbornness. They are consistent, rational, curious, and observant, qualities that make them good administrators.<sup>1371</sup>

#### ***D. Mizaj -e-Saudawi (Melancholic Temperament)***

They have cold and dry temperament and are characterized by lean and thin built with narrow chest, coarse and rough skin and dark complexion. Hair are black, thin and have slow growth. According to Ahmad, the blood vessels are narrow and pulse is slow. Their digestion is weak with irregular appetite. They have interrupted sleep and often suffer from insomnia. Their sense is acute and they have excellent memory. Hock observed that the individuals of this temperament are irresolute, reserved, despondent without courage, slow and awkward. He further writes, "The melancholic is a man of missed opportunities." They show sluggish inclination towards sexual activity.<sup>135,391</sup> They experience excess of evil thought and anxieties.

The melancholic temperament exhibit a long response delay and the response is sustained at length, if not, seemingly permanently.<sup>1351</sup> and is fundamentally introverted.

Melancholic people often are perceived as very (or overly) pondering and are both considerate and very cautious. They are organized and schedule oriented, often planning extensively. Often they are perfectionists. Their desire for perfection often results in a high degree of personal excellence but also causes them to be highly conscientious and difficult to relate to because others often cannot please them. They are self-reliant and independent, preferring to do things themselves in order to meet their standards. One negative part of being a melancholic is that they can get so involved in what they are doing they forget to think of other issues. Their caution enables them to prevent problems that the more impulsive sanguine runs into, but can also cause them to procrastinate and remain in the planning stage of a project for very long periods. Melancholics prefer to avoid much attention and prefer to remain in the background; they do, however, desire recognition for their many works of creativity.<sup>1371</sup>

## **Discussion**

Humans have always been curious about themselves and the different behaviour they exhibit, which gave rise to what is known as temperament or personality. Personality assessments have been developed over the past several centuries to describe aspects of a person that remain stable throughout a lifetime i.e., the individual's character pattern of behavior, thoughts, and feelings. They have been used to sort, classify, and categorize people. The philosophers of Unani medicine have put in a lot of efforts in elaborating this concept from the time of Hippocrates and Galen till date. Philosophers and thinkers from other fields of study, in particular psychology also showed considerable interest in the theories of temperament, but it was somehow short-lived. Although numerous attempts were made one after the other, but their personality typing remained shallow and therefore, could not possibly go beyond typecasting an individual, unlike the Unani System of Medicine that has incorporated the "Temperament" into its fundamentals and uses it to look way past his physical and psychological traits. Although, as discussed above, the concept of temperament is not novel to Greco-Arab medicine, however, it is definitely unique in the sense that it is much deeper in terms of understanding human beings. The concept has been vital to the system of Unani Medicine as it plays a key role in the maintenance of health and not only helps to categorize individuals into different personalities but also helps to understand their bodies in a better way.

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# Cosmetic Uses of Plants in Asia

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## Summary

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The utilization of plants as cosmetics has a long history in Asia. The advantages and fewer negative effects have been increased the popularity of plant-based goods in cosmetics. The plants are currently evaluated in the treatment of skin and hair care, as beauty rituals, as anti-aging agents and even treatment of cancer following traditional practices. This is because of their alleged abilities to heal hair damage, improve human skin-make it appears younger, and prevent several diseases. To improve the extraction of bioactive chemicals from plant sources on a larger scale for use in cosmetics, numerous approaches have been developed. This study explores the use of botanicals as cosmetics in the Asian continent. An emphasis has been laid here on traditional methods, modern advancements and provide a thorough understanding of the function of plants in Asian skincare and prospective advantages of the botanical resources.

**Key Words:** Plants, Traditional practices, Cosmetics, Skincare, Beauty rituals, Anti-aging, Asia.

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## Introduction

Humans have used cosmetics for washing and beautifying purposes for more than 6,000 years (1). The beauty or adjustment of look is what is meant by the term “cosmetics”, when referring to the human body. The earliest evidence of use of cosmetics dates back to ancient Egypt, between 3100 and 2907 BC (2). People have adopted the practice of changing their outward appearance, whether it be to increase their prospects of social success, falling in love, or simply to boost their self-esteem (3). Various civilizations have evaluated and are still using a large number of minerals, animals, plants, and chemical compounds as care for their outward appearance and skin. In fact the beauty is a trend that shifts with time and is influenced by religious and cultural customs (4). In ancient Egypt males as well as females used olive oil

to clean and soften their skin, which was scented with aromatic botanicals. The plant oil has been used for cosmetic reasons by the ancient Romans and Egyptians. They have also used lavender oil for beauty purposes as well as in the treatment of wounds. Several ancient societies have also employed castor oil, olive oil, and rose water as cosmetics and as skin cream (5). The use of natural components found in botanicals for cosmetic purposes has recently attracted significant interest on a global scale. Majority of people in South Africa still like using herbal items for personal care to enhance their attractiveness because they don't include synthetic chemicals, provide the body with nutrients, and are said to have comparatively fewer side effects (5). A large population of humans are using cosmetics and skin care products in their daily lives. The pharmaceutical sector aims to make high-quality products and frequently relies on plants, an

endless raw material source, considered harmless and non or less toxic (6). Humans have made use of natural resources experimentally for skin care and altering their physical appearance based on ethnobotanical knowledge and traditional uses. However, interest in the skincare and wellness has grown significantly lately, and there is now a high demand for some potent plant extracts (6). Extracts from medicinal plants are frequently employed as active components in cosmetics. A number of sources from the horticulture for commercial purposes and wild harvesting in the developing nations provide plant materials for this purpose (7). There is a deep interest in the hunt for plants with cosmeceutical qualities worldwide. The secondary metabolites, which are capable to alter or restore good skin and external beauty, are primarily found in plants. Phytochemicals with cosmetic uses include; polysaccharides, saponins, anthocyanins, steroids, phenolics, coumarins, carotenoids, flavonoids, organic acids, and lignans; all secondary metabolites. A variety of plants have been commercially investigated and used as ingredients in the creation of cosmetic items by various industries and develop new plant-based products having pharmacological effects (8,9). The plants like; *Centella asiatica*, *Allium sativum*, *Hibiscus rosa-sinensis*, *Aloe vera*, *Tamarindus indica*, *Curcuma longa*, and *Lawsonia inermis* have gained special attention due to their traditional applications. The cosmetic potential of different plant taxa including their anti-acne, anti-melanogenic, anti-aging, and anti-tyrosinase characteristics have been thoroughly investigated (10). The herbal cosmetics or products are developed by formulating a base using a variety of legal cosmetic components before adding one or more herbal substances that are used solely to deliver specified cosmetic benefits. Due to the absence of their adverse effects, demand for herbal medications is rising at a high rate (5). Ayurveda (Himalaya, 4500-1600 BC), Sowa Rigpa (Bhutan, 700 AD), Jamu (Indonesia, 800 AD), Kampo (Japan, 500 AD), Traditional Chinese Medicine (TCM) (China, 3000 BC), herbal medicine (Bangladesh, 4500-1600 BC and 900 AD), Thai medicine (Thailand, 1200 AD), Mesopotamia (5000 BC) and Islam (721-1013 AD) are some of the classical examples of traditional medical practices in Asia (11,12,13,14,15,16,17,18). In recent years, the trend for using natural and plant-based ingredients in cosmetics has gained popularity worldwide, with many Asian beauty traditions and ingredients becoming popular in the global beauty industry. This review presents the rich heritage of cosmetic uses of plants in Asia with a focus on traditional practices and contemporary developments.

## Traditional Cosmetic Practices

Different Asian nations have a long history of beauty rituals that are firmly ingrained in their natural resources and cultural traditions. These customs were passed down through the centuries and frequently used items that were readily available nearby. The ancient Indian way of traditional medicine known to world as Ayurveda makes considerable use of plant-based substances in skincare and cosmetics. Face masks, lotions, and oils containing turmeric, neem, sandalwood, aloe vera, saffron, and various essential oils are used to cure various skin disorders and promote healthy skin (19). Traditional hair shampoos used the plant shikakai. The saponin-rich pods generate a mild detergent with a pH that is neutral. Saponins, a foaming ingredient, are also present in aritha powder, which is made from sapindus pericarp, popularly known as soapnut (20). Traditional Chinese skincare regimens heavily rely on Chinese herbal medicine. Various formulas use plants including ginseng, goji berries, pearl powder, and licorice root to treat skin issues and retain youthful skin. To develop outer attractiveness, traditional Chinese beauty techniques emphasize regulating the body's interior energy (Qi). To increase lymphatic drainage and circulation, face massages include gua sha and jade rollers (21). The importance of health and leisure is strongly emphasized in Thai culture. To generate aromatic and reviving sensations for the skin and senses, traditional Thai plants like lemongrass, kaffir lime, pandan leaves, and coconut are used in spa treatments and cosmetics (22). In Japan, geishas have traditionally been linked to elegant beauty. Their beauty routines include washing with rice water, exfoliating with rice bran powder, and applying camellia oil for smooth, soft skin. Additionally, geishas apply "ochre," a white lead-based cosmetic that was once used to achieve pale skin. Natural components including cherry blossom extracts, camellia oil, rice bran, seaweed, and green tea are frequently used in Japanese beauty products. These substances are well-known for having moisturizing, antioxidant, and calming effects (23). Jamu is a traditional herbal treatment used for both health and beauty in Indonesia. Concoctions produced from various herbs, roots, and plants are involved. Because of the supposed skin-improving and rejuvenating properties of jamu, women frequently ingested and applied it (14). Due to Indonesia's rich flora, tropical plant extracts like those from coconut, tamarind, kemiri (candlenut), and jamu plants are used in skincare and beauty products. Natural substances like rice water, turmeric, lotus, and pomelo are

frequently used in Vietnamese beauty practices to cleanse and brighten the complexion. Rhodiola, goji berries, and sea buckthorn are just a few of the high-altitude plants and herbs that Tibetan medicine uses for their antioxidant and restorative characteristics. Botanical substances are often used in Korean beauty products. Korean skincare products frequently contain snail mucin, ginseng, green tea, rice, lotus, and green tea. These components are thought to moisturize, brighten, and enhance the skin's overall appearance (24). Most of the information on the Mesopotamian cosmetics comes from cuneiform-written ancient literature and archaeological excavations of burial sites, which have uncovered a wide range of cosmetic containers. For the Sumerians, scent and incense had great significance and even served as a means of communication with the gods. Many of the incense variations were made from wood, herbs, and oils. As a kind of color cosmetics, various pigment colors were applied to the face. The main component of color cosmetics was eye makeup, which was applied with a needle-shaped tool and mostly comprised of antimony paste (25).

There are many Hadiths of the Prophet (pbuh) which refer to cleanliness, management of dress, and care of hair and body. Two Islamic alchemists Abu Musa Jabir ibn Hayyan (721 AD) and Muhammad ibn Zakariya al-Razi invented steam distillation methods and discovered how to concentrate and separate ethyl alcohol in the 11th century, which played an essential role in the development of perfume culture (25, 26). Al-Zahrawi (936-1013 AD) famous physician and surgeon lived in Muslim Spain, Andalusia in Cordoba. He considered cosmetics a definite branch of medication (Adwiyat Al-Zinah). His medical encyclopaedia entitled Al-Tasreef, in 30 volumes, which was translated into Latin and used as the main medical textbook in most Universities of Europe from the 12<sup>th</sup> to 17<sup>th</sup> century. This book influenced many authors both in the East and in Europe. In the 19<sup>th</sup> volume of Al-Tasreef a chapter was devoted completely to cosmetics and is the first original Muslim work in cosmetology. It deals with perfumes, scented aromatics and incense. There were perfumed stocks rolled and pressed into special moulds, perhaps the earliest antecedents of present-day lipsticks and solid deodorants. They used oily substances called Adhan for medication and beautification. On this basis Zahrawi described the care and beautification of hair, skin, teeth and other parts of the body, all within the boundaries of Islam (26).

The historical viewpoints on beauty and self-care in various Asian civilizations are shown through the ancient beauty rituals. Many of these rituals emphasize the sig-

nificance of natural materials and holistic approaches to beauty, even though some of these traditions may no longer be popular or appropriate owing to changing beauty standards and modern knowledge.

### Cosmetic Uses of Different Plants

The utilization of natural components found in botanicals for cosmetic purposes has recently attracted significant interest on a global scale. The goal is to create improved and new cosmetic goods that will nourish the human body with different nutrients and other beneficial minerals. According to studies, a variety of plant species have been investigated to create plant based goods (8, 9). The cosmetics business and salons that practice Ayurveda are sourcing and testing products made from Indian herbs (27). Cosmetic medications were categorized by Charak Samhita as Varya, Kandugna, Kustagna, bayasthapak, udardaprasamana, etc. astanga hrudaya and Susruta Samhita both discuss several alepam (poultice) Pradehas and upnaha anjana oils in the context of twak roga. The most widely used Ayurvedic medications include Dasnga lepam, Kungkumadi lepam, Dasana samskar churna, Kukummadi taila, Himasagar taila, Nilibringaraj taila, Chandanadi lepam, etc.

Zahrawi's contribution to medicated cosmetics include under-arm deodorants, hair removing sticks and hand lotions. Hair dyes are mentioned turning blond hair to black and hair care is included, even for correcting kinky or curly hair. He even mentioned the benefits of suntan lotions, describing their ingredients in detail. For bad breath resulting from eating onions and garlic he suggested cinnamon, nutmeg, cardamom and chewing on coriander leaves. Another remedy for bad breath was fried cheese in olive oil seasoned with powdered cloves and he also included methods for strengthening the gums and bleaching the teeth. As far the medicaments, he recommends "Ghawali and Lafayfe" for epileptic fits and "Muthallaathat", prepared from camphor, musk and honey, in fact very much like Vicks Vapour Rub, for the treatment of cold relief. Other utilities which we tend to consider as part of the twentieth century but which were present in Muslim Spain and which are described by Zahrawi include nasal sprays, mouth washes and hand creams. Zahrawi even suggested keeping clothes in an incense-filled nook so that they would have a pleasant fragrance for the wearer. These days the same is achieved by detergents and washing powders and conditioners such as "Lenor".

Nowadays, the market for herbal cosmetics is expanding quickly, and they are produced with superior, more practical modern technology. With the use of this technology, various plant species with proven medical properties, such as the ability to lighten skin, can be combined. The two main areas of skin and hair care are usually separated into five subcategories on the basis of functions of the herbal cosmetics, including overall beauty, face, body, medicated cosmetics and hair care goods (28).

### Benefits of Using Plant Extracts in Cosmetics

The bioactive compounds are source of active chemicals for cosmetics, several qualities, including photoprotective, antioxidant, anti-aging, wound healing, and anti-inflammatory provide benefits for skin and hair (29). In addition to providing the nutrients for healthy skin, the use of phytochemicals or bioactive extracts from botanicals in cosmetics have two purposes: care of body and effect on the biological activities of the skin (30). Vitamins, antioxidants, hydrocolloids, essential oils, proteins, terpenoids, and other bioactive substances are abundant in botanical products (31). These extracts offer various qualities depending on their composition. Multiple skin problems are caused by the constant exposure of skin to the varying surroundings, which alter the connective tissue because of the generation of reactive oxygen species (ROS) and lipid peroxides, as well as enzyme activity (32). The occurrence of free radicals is naturally regulated by a variety of advantageous substances known as antioxidants. An effective method to enhance the endogenous cutaneous system and reduce UV-radiation caused oxidative damage and the development of oxidative stress related illnesses is the topical administration of antioxidants (33, 34). Bioactive substances known as phenolic compounds are commonly present in plants and play a significant role in the human diet. Plant phenolics are made up of a wide variety of substances, including various non-flavonoids classes (stilbenes, phenolic acids, lignins) and flavonoids (flavonols, anthocyanins, flavones, etc.) (35). Due to their great ability to control free radicals, the significance of phenolic antioxidants has significantly expanded during the past ten years. For example, phenolic-rich plants are utilized to reduce the damaging effects of UV light on the skin. Plant extracts can be used to provide phenolic chemicals to the body as medications, dietary supple-

ments, and cosmetics (36, 37, 38). By absorbing UV light and eliminating reactive oxygen species, melanin shields the skin from UV damage. Tyrosinase overactivity results in excessive melanin synthesis. Skin conditions like freckles, senile lentigo, and melasma are caused by accumulation and production of melanin (39). Tyrosinase inhibitors are currently employed in a variety of plant or herbal extracts, including kojic acid, arbutin, and others (40). Nut or seed oil gives the fatty acids utilized in personal care products. Fatty acid called linoleic acid is often used in cosmetics as these have the ability to treat acne and moisturize the skin. Applying omega-3 rich oil or -linoleic acid to 45 participants cure mild acne considerably due to their anti-inflammatory power (41). Because of their oxidative impact, carotenoids are utilized as photoprotective against ultraviolet rays (42). Oils like those from pumpkin seeds, soybeans, and avocado contain phytosterols, which are cholesterol like molecules. Phytosterol's capacity to promote cell proliferation gives them anti-wrinkle and photoprotective effectiveness (43). Plant sterols are also capable of protecting the skin's natural moisture barrier and act as an antioxidant, providing nutrients for good health (44).

### Plants Used to Treat Hair Damage

In both cosmetics and primary healthcare, hair loss is a prevalent and growing issue. A significant portion of the population, regardless of gender, suffers from hair loss. Numerous factors, including internal illnesses, nutritional and hormonal issues, genetic features, and intoxications can contribute to hair loss. The 5-alpha reductase enzyme present in hair follicles is one of the main causes of pattern hair loss in the males. Three plants, *Tridax procumbens*, *Eclipta alba* and *Hibiscus rosa sinensis*, are reported to give protection against hair loss. Numerous traditional Thai herbs have been used for centuries to nourish and heal hair. However, there is still a lack of clear scientific information regarding how they work. Seventeen of the traditional Thai herbs used for treating hair were chosen for a study. The most effective inhibitor of 5'-reductase was *Carthamus tinctorius*, followed by *Phyllanthus emblica*, while the least effective inhibitor was *Rhinacanthus nasutus* (45). Typically, herbal cosmetics are administered topically. They are used to provide the hair smoothness and glossiness (46). Spikenard, also called as Jatamansi, belongs to Valerianaceae family and has *Nardostachys jatamansi* as its biological source, a tiny shrub primarily

grown in eastern India. Most of the different medical systems use rhizomes. Jatamansi is made up chemically of 1,8 cineol, joneol, and bornyl acetate. This herb's ability to promote hair growth has been demonstrated through clinical research (47). An ethanolic extract of jatamansi may promote hair growth (48). When coupled with *Eclipta alba* and *Hibiscus rosa sinensis*, it has been demonstrated that there are more follicular cells and a longer anagen phase (49). Bibhitaki is a plant of Combretaceae family, primarily comprised of deciduous trees. It is frequently used in conjunction with *T. chebula* and *Embelica officinalis*. A health harmonizer is the term used for describing this triple combination. This tree is mostly planted in Sri Lanka and few other Asian countries. It is used to heal a variety of diseases, but it also acts as a tonic for hair (50, 51). In addition to promoting hair growth, the seed oil is used to treat premature hair greying (52). Traditional herbalists have praised *Citrullus colocynthis*, *Eclipta alba* and *Cuscuta reflexa* for their capacity to stimulate hair development (53). The onion, *Allium cepa* belongs to the Amaryllidaceae family. The bulb is mostly abundant in albumin, a type of protein. Allicin, allyl propyl disulfide, allin, and allyl sulphides are among the additional chemical components found in this plant. Numerous other minerals, including magnesium, zinc, calcium and potassium are also found. This species has been discovered to be effective in the baldness treatment. On scalp, the juice or extract is administered topically until the hair turns red. Iron and other mineral elements contribute to the oxygenation of red blood cells. Thus, a variety of factors support hair maintenance and hair growth (54). Bhringraja is the local name for *Eclipta alba* in ancient times and this plant has been shown to enhance hair growth and stop hair loss. Its extract can be applied topically and orally to the scalp of the hair to encourage hair oxidation (55). The traditional Chinese medicines from *Polygonum multiflorum* Radix and *P. multiflorum* Radix preparations are derived from *P. multiflorum* and possess a long history of use in clinical settings for hair dyeing and growth. *P. multiflorum* was described as a very tonic drug that might "benefit for the essence, strengthen your spirits, protect your beauty, black your hair, and extend your life" as far back as AD 812 (56). The parasitic dodder *Cuscuta reflexa* (Convolvulaceae) is a leafless, twining species that grows in tropical and temperate climates and is widespread throughout India. It is frequently called amarbel. According to Dixit et al., the *Cuscuta reflexa* stem exhibits hair growth activity as

it cycles through the telogen and anagen phases of the hair follicle (57). Chinese medicine uses a plant called *Lygodii spora*, which is found in China. Matsuda et al. looked into the *Lygodii spora*'s capacity for hair growth (58). India is home to the herb *Ocimum gratissimum*. Orafidiya et al. demonstrated the effectiveness of *Ocimum gratissimum* leaf's essential oil called Ocimum oil in enhancing growth of hair in cyclophosphamide-induced hair loss and came to the conclusion that ocimum oil is able to enhance normal growth of hair and promote follicular proliferation in this condition (59). The dried and steamed *Panax ginseng* root is known as *ginseng radix*. *Ginseng radix* has action that encourages hair development (60). Gel made from *Aloe vera* or *Aloe barbadensis* has long been used to treat alopecia and promote hair growth. According to Inaoka et al., the main ingredient that promotes hair growth without causing skin irritation is aloenin. There is no evidence to support the use of *Aloe vera* as a therapy for brittle hair (61). According to research by Kobayashi et al., *Ginkgo biloba* leaf extract may be useful as a hair tonic because of its combination effects on cell development and apoptosis in the hair follicle (62). Henna, also known as *Lawsonia alba* has been mentioned as a hair growth promoter and was included in an ancient Egyptian remedy for hair loss (63). Coconut oil, almond oil, and tea oil preparations containing ariel parts of *Zizyphus jusaba*, *Citrus burgamia*, *Cuscuta reflexa*, *Hibiscus rosa-sinensis*, *Allium cepa*, *Lagenaria sicararia*, seeds of *Trigonella foinum graceum*, and fruits of *Embelica officinalis* were studied by Jain et al. for their ability to promote hair growth (64). The herb *C. colocynthis*, which belongs to the Cucurbitaceae family, is endemic to the drier regions of Africa and Asia and grows naturally throughout Indian region. The plant's roots and fruit were primarily employed as purgatives and agents for hair-blackening. Neem, kapoor (naphthalene), hirda, bringaraj, behada, amalaki, magic nut, henna, rosary pea, sweet flag, mandor and cashmere tree, are some of the most popular herbs used in Ayurveda (5). Hair care products include henna, shikakai, neem, amla, Brahmi (*Bacopa monnoria*), and a variety of oils like almond, arachis, castor, olive, eucalyptus, rose, and citronella oil. Natural materials are popular in cosmetics. About 1000 different plant extracts have been studied regarding hair growth. Herbal cosmetics and goods are now recognized as an ideal solution to the current issues of synthetic chemicals usage. This market is rapidly expanding and has a wide potential for expansion in years ahead (65).



## Plants Used for Skin Care

The living organ that shields body from the outside world is the skin, which also aids in maintaining fluid balance, controlling temperature, blocking hazardous chemicals and bacteria, and providing some sun protection. The stratum corneum that is the epidermis' outermost layer that is heterogeneous and selectively permeable, shields the skin from environmental stressors and desiccation while retaining enough water for it to function. A change in the stratum corneum's integrity is a common indicator of skin barrier dysfunction, which leads to rise in trans-epidermal water loss and skin moisture loss (66). Natural components are increasingly common in modern formulations, despite having been utilized for millennia as a means of skin care. Herbs, fruits, minerals, flowers, water, leaves, and soil are examples of natural ingredient sources (44). Prior to the use of synthetic materials with comparable qualities, plants served as the primary source of all cosmetics. Consumer demand, that is being driven by their awareness for purchasing environmentally friendly goods, is highlighting the use of plant extracts in skin care cosmetics (67). Herbal cosmetics are developed in a wide range and are frequently used for daily reasons. The public has a particularly high regard for herbal cosmetics such as herbal shampoo, herbal conditioners, herbal face wash, herbal soaps, and many more. Herbal cosmetics are made of plants like sandalwood (chandan), saffron (kesar), ashwagandha, and many more that are grown with good nutrition and all the other necessary ingredients. Although only around 70 spices are formally recognized, it is estimated that about 400 flavors are used worldwide. Herbs can be used to make tea, tablets, capsules, tinctures, creams, syrups, liquids, cosmetics, food flavorings, and medicines (5).

## Plants Used for Anti-Aging and Skin Lightening

Skin ageing is a complex biological process that develops because of exposure of skin to environmental pressures, particularly ultraviolet radiation from sun, as well as genetic, hormonal, and metabolic alterations. Various plants are used directly or in cosmetics to repair skin and slow down aging. About 73 species make up the genus *Vanda* (family: Orchidaceae), which is primarily found in Southeast Asia. Asian nations, particularly India, Nepal, China, and Bangladesh, utilize plants from this genus in their traditional medical practices. From *Vanda* species,

bioactive substances such as eucomic acid and phenanthrene derivatives, and phenolic compounds have been reported. Various extracts have been tested thus far for a variety of pharmacological functions, such as anti-aging (68). Locals have long utilized the *Alpinia galanga* plant as a cosmetic component for care of body, such as soaps used for body and other topical skin care goods, in many Asian nations, particularly in Vietnam, Thailand, and many Southeast Asian nations. These traditional *A. galanga* formulations are often created for usage inside the family utilizing simple extraction techniques, such as using warm water as solvent. Local communities now produce cosmetic goods with the extract from this type of medicinal plant in China, Thailand, and many other Asian countries (69). *Ginkgo biloba* tree nuts and leaves have been used for long time in Japan and China to treat illnesses, including poor blood circulation, impotence in men, hypertension, and depression impaired memory in the elderly. This plant is also establishing a reputation as an antioxidant and anti-inflammatory (70, 71, 72). Carrot seed oil is used as anti-aging, revitalization, and rejuvenation agent (5). Herbs such as *Centella asiatica*, *Curcuma xanthorrhiza*, *Cosmos caudatus*, and *F. deltoidea* are known to keep youthful complexion in women. Seven plants, *Crataeva religiosa* (Capparidaceae), *A. vera* (Liliaceae), *Ananassativus* (Bromeliaceae), *Nelumbo nucifera* (Nelumbonaceae), *Cassia fistula* (Fabaceae), *Nyctanthes arbor-tristis* and *Kaempferia galanga* (Zingiberaceae), are famous for their traditional cosmetic purposes in Myanmar. Five of those herbs, *C. religiosa*, *N. arbor-tristis*, *C. fistula*, *K. galanga*, and *N. nucifera*, have a reputation for preventing the signs of premature ageing (73). Numerous nations in Asia and Europe grow saffron. Saffron can lighten tans of the skin. It is said to add glow to skin and lighten the color of skin when combined with milk or cream. According to some reports, *Crocus sativus* functions as a defensive barrier to shield the skin from UV radiation, which causes injury to the skin. According to reports, it functions as a "natural sunscreen" and UV absorber (74, 75). Vitamins C and E are abundant in the oil extracted from seeds of grapes, which are antioxidants rich. Additionally, it contains different fatty acids and beta carotene. Resveratrol causes the skin to tighten because of its presence. Due to its propensity to boost collagen synthesis in polyphenols, fibroblasts, and flavonoids' antioxidant characteristics aid in slowing down the ageing process of the skin. It is also a role in the treatment of hyperpigmentation brought on by the suppression of the tyrosinase enzyme, which is necessary for the cre-

ation of melanin (76, 77, 78). *Plumbago zeylanica* plant resins have anti-wrinkle and anti-aging effects (79, 80). The southern region of Asia is the native home of *Ceylon leadwort*. The entire plant is beneficial for numerous skin treatments and cosmetic preparations (81, 82). The Labiatae family of mints includes *Perilla frutescens*. This is an annual bush like plant that is often found in the southern and upper Himalayan regions of Asia. Polyphenols like chrysoeriol and luteolin, which are present, have antioxidant effects. Rosemarinic acid, prunasin, trihydroxyflavone, caffeic acids, and other compounds can be found in the plant's leaves. It also contains flavonoids like 7-o-glucuronide and 7-O-diglucouronide of luteolin. This natural component contributes anti-aging and antioxidant effects to cosmetic compositions. Additionally, it is employed in hyperpigmentation as a skin-lightening agent (79). Wide range of plants have shown an ability to be used for skin care as alternatives to synthetic products (83).

### Plants Having Anti-Acne Properties

People today are highly concerned about their skin and hygiene. Because facial skin is so fragile, using regular soaps can be harsh on it. Additionally, using a lot of cosmetics can make facial skin even more sensitive, which can lead to moisture loss, oil gland blockage, and acne. About 60 to 70% of the general population suffers from acne (84). Many plants have anti-aging, antibacterial, and antioxidant characteristics. These include Bael leaf, neem, mint, barks like cinnamon and liquorice, essential oils like lavender oil, and roots like turmeric, among others. Because these antimicrobial properties typically inhibit the bacteria that cause acne vulgaris, these plants are used to treat acne (84). Many plants, including *Casuarina equisetifolia* (Casuarinaceae), *Michelia alba* (Magnoliaceae), *Syzygium aromaticum* (Myrtaceae), *C. longa* (Zingiberaceae), *I. balsamina* (Balsaminaceae), and *C. citratus* (Poaceae), and have been found to have preventive effects against *Propionibacterium acnes*. *Coriandrum sativum* (Apiaceae) *Melaleuca alternifolia* (Myrtaceae), and *Garcinia mangostana* (Clusiaceae), are three other plants with a preventive effect against *Propionibacterium acnes* and *Staphylococcus epidermidis*. Jatamansi oil has both static and fungicidal effects. Additionally, this oil's antimicrobial qualities paired with its established effectiveness as a skincare agent, this herb is used to cure a variety of fungal illnesses, poisoning, itching, dermatitis, psoriasis, and itching (49). *Azadirachta indica* (Neem) has therapeutic characteristics, the bark,

leaves, seeds, and latex are used to treat a variety of skin issues. The plant is native to India and Sri Lanka. Tetra-nortriterpene and tri-terpenoids in seed oil, nimbolin A and B, gedunin, tannin, nimbin, and volatile oil in leaves and barks are the principal chemical components. Anti-inflammatory, antimicrobial, and antibacterial effects have been demonstrated (85). Acne can be treated using it, according to research. In a study on acne, *Azadirachta indica*'s ethanolic extract shown anti-acne efficacy by preventing *P. acnes* from growing (86). *Curcuma longa* is widely used in Asia and India. Curcuminoids, an essential oil with a high concentration of bisatiolane derivatives, are the primary component of *Curcuma longa*. Curcumin has been linked to turmeric's amazing anti-inflammatory properties (87, 88). Typically grown throughout Europe and Asia, burdock root has medicinal properties. This Chinese herb is proof that it was used to treat dermatitis, acne, and seborrheic dermatitis in ancient times. This herb also has purifying and antibacterial qualities. The best usage for this herb is to treat oily skin and stop acne from developing (89).

*Thymus vulgaris* is a native plant to both Europe and Asia. Burns, wounds, acne, and rashes have all been treated with salves made from leaves. Carvacrol, thymol acetate, p-cymene, and apigenin are its principal components, and they all contribute to its activity (90, 91). *Amaranthus hypochondriacus* growing in Mexico and China is used to cure skin conditions like psoriasis, eczema, and acne. *Amaranthus* seeds and leaves are used as a face wash. The main ingredient, saponin, is important for treating skin. East Asia, South and North America, and South-East Europe are the native habitats of *Juglans nigra*. A good wash for skin infections like acne vulgaris is made from the *Juglans nigra*. In the northern hemisphere, pines are found everywhere. Pycnogenol, the primary component, is responsible for treating acne (90). Tropical Asia is the natural habitat of the *Citrus aurantium* plant. Linalool, limonene, linalyl acetate, -pinene, methyl anthranilate, nerol, geraniol, limonoids, and flavonoids are the main components. There have been reports of using the powdered peel's juice and milk paste to treat acne (92, 93). In China, India, and Southern Siberia, rhubarb is abundantly available. Potassium, calcium, and a small quantity of phosphorus are the main ingredients. This plant contains the emodin, anthraquinones rhein, and chrysophanol, which are used to soothe pain and lessen itching, which can cause psoriasis and acne vulgaris (94). The fruit, peel, leaves, and seeds of the *Carica papaya* are abundant in vital enzymes that have remarkable medicinal effects

when applied topically to treat a variety of skin ailments. According to research in the literature, papaya can restore and revitalize the skin. The papaya fruit includes the papain enzyme, which aids in exfoliation, or the removal of damaged and dead skin cells. Raw papaya juice is applied to cure inflamed acne and prevent pus formation (95, 96). *Taraxacum officinale* is abundantly available throughout Asia, North America, and Europe is used frequently in both traditional and modern herbal medicine systems. Sesquiterpene lactones, which are typical essential dandelion components and have anti-inflammatory properties (97). Its use in dermatological conditions like spots, pimples, and acne has a lengthy history (98). *Peperomia pellucida* (Piperaceae), *Averrhoa bilimbi* (Oxalidaceae), *C. longa* (Zingiberaceae), *Jasminum sambac* (Oleaceae), and *Dioscorea daemonia* (Dioscoreaceae), are herbs that are traditionally used to treat pimples. *A. sessilis* (Amaranthaceae), *Agelaea macrophylla* (Connaraceae), *C. odorata* (Annonaceae), *Plumeria acuminata* (Apocynaceae), and *Citrus microcarpa* (Rutaceae), are herbs that have been used to cure acne. *Adenostemma lavenina* (Asteraceae), *Wedelia biflora* (Asteraceae), and *Piper sarmentosum* (Piperaceae), are traditionally used to improve skin color (73).

### Plants to Treat Dry Skin

At all ages, dry skin is a very prevalent skin issue. It is distinguished by red, itchy skin that is prone to cracking and peeling because of moisture loss. The four cosmetic herbs *C. hystrix* (Rutaceae), *Ardisia elliptica* (Myrsinaceae), *C. longa* (Zingiberaceae) and *C. odorata* (Annonaceae) have historically been used to treat dry or rough skin. *Impatiens balsamina* (Balsaminaceae), *Archidendron jiringa* (Fabaceae), *Heliotropium indicum* (Boraginaceae), *Entada phaseoloides* (Fabaceae), and *A. paniculata* (Acanthaceae), are used to treat skin rashes and irritation (73). In Ayurveda, sesame oil serves as a foundation for numerous oils. It contains biologically active lignan substances named sesamol and sesamin. These substances increase the oil's oxidative stability. They can be employed as anti-oxidant substances and can have a moisturizing effect (20). Coconut oil does wonders to make skin soft and keep it hydrated. According to a study, use of extra virgin coconut oil like a moisturizer is safe and effective having no side effects. When applied for fourteen hours, coconut oil was proven to help decrease protein loss from wet combing of hair (99, 100). The Ayurvedic cosmetics can be categorized as either cosmet-

ics to improve the facial skin appearance, cosmetics for maintaining and growing hair, cosmetics for teenagers, for skin care (pimples, acne, and sustaining), powders, shampoos, soaps, perfumes and other different goods (20, 101). Mahonia and tea tree oil may one day be used as routine acne treatments. For atopic dermatitis condition, *Mahonia*, *Glycyrrhiza*, *Hypericum*, and several conventional Chinese medications show promising results. *Mahonia* and *Capsicum* are the next choices proposed by the available evidence; few plant-derived drugs like methoxsalen (8-methoxypsoralen) and dithranol are currently recognized as standard therapies in psoriasis. Plant extracts, such as black and green tea, coffee, carotenoids, and numerous flavonoids from fruits and different vegetables, can prevent skin against UV-caused erythema, premature ageing, and radiation-induced cancer when taken orally and applied topically. Botanicals have historically been used to treat vitiligo and hair loss (102). The licorice is a significant medical herb, and its ingredient glycyrrhizin which has anti-inflammatory and hepatoprotective properties is frequently employed as a sweetener as well as a pharmacological agent. Additionally, licorice is a crucial component of the ancient Japanese Kampo remedies. Licorice extracts are additionally utilized in cosmetics, culinary additives, cigarette tastes, and sweets (103). Crushed safflower (*Carthamus tinctorius*) flowers were used in Japan to paint lips, outer corners of the eyes and eyebrows. The color of the face and back was lightened using rice powder (*Oryza sativa*). Women in India used turmeric (*Curcuma longa*) as a germicidal cream and milk and one gramme of wheat flour (*Triticum*) as a remedy to remove dead tissue cells (104). Vitamin C-rich leaves of green tea (*Camellia sinensis*) and lipid peroxidation-inhibiting grape seeds (*Vitis vinifera*) both contain polyphenols (105). Green coffee seeds (*Coffea arabica*) contain chemicals that stimulate the synthesis of elastin and collagen (106). Because they suppress cutaneous tyrosinase, turmeric and ginger rhizomes are employed in anti-aging products (107). *Cucumis sativus*'s antioxidants block skin elastase and hyaluronidase (108). The *Aloe vera* plant bears red or yellow blooms and meaty, spiky leaves. Due to its ability to cure, moisturize, and soften skin, it is a commonly used ingredient in cosmetics. To quickly extract the calming gel, simply cut one *Aloe vera* leaf. *Aloe vera* includes folic acid, amino acids like isoleucine and leucine, antioxidant-active vitamins A, B, C, E, choline, and saponin glycosides which have a cleaning effect (109). Glycerides are abundant in coconut oil which is made from seed or fruit of the coconut palm

*Cocos nucifera*. It can be used readily in solid or liquid forms. It softens and hydrates the skin (5). Olive oil is obtained from the fruits of *Olea europaea* plant. Trilinolein, tristearate, triolein, tripalmitin, monosterate, triarachidin, tocopherol sitosterol, and squalene are key components. In cosmetics like lotions, shampoos, and other products, it serves as conditioner for hair and skin (110).

### **Plant Based Cosmetics is a Preferred and Beneficial Alternative**

Due to the expansion of the fashion and beauty industries in the modern era, herbal cosmetics have become fashionable. The desire for natural substances has increased over chemical formulations for the enhancement of beauty, especially among women. Additionally, these formulas enhance health and lessen negative effects brought on by chemical substances (111). Herbal cosmetics are free of any damaging synthetic compounds that are hazardous to skin. Plant parts and plant extracts are employed in these items instead of conventional synthetic materials (112). Natural cosmetics are safe to use than other cosmetic products. They have been dermatologists-tested and dermatologist-proven hypoallergenic. People using these products do not have to worry about getting itching or skin rashes (113). Natural cosmetics are suitable for all skin types. You might find natural cosmetics like eye shadow, foundation, and lipstick that suit you whether you have fair complexion or dark skin. People having oily or sensitive skin can use them without harming the condition of their skin. (111). Despite being a relatively new segment in the cosmetics industry, natural cosmetics now provide a large selection of cosmetics for all make-up fans to choose from. Additionally, natural cosmetics made locally or by well-known worldwide designers are available (114). Natural cosmetics are inexpensive. These products are occasionally less expensive than synthetic goods. They are offered at a discount and sold for a low-price during sales. Just do enough research to look for fantastic deals. According to a WHO estimate, around 80% of the world's population relies on natural products for their healthcare because of the unfavorable side effects and escalating prices of modern medication. Traditional herbal medicines are endorsed and suggested by the World Health Organization in natural health care programs due to their availability, cost, and relative safety (115). Using artificial beauty products can irritate human skin and cause breakouts. They may clog your pores, resulting in dry or oily skin. With natural cosmetics, one

need not worry about them. Natural ingredients guarantee no side effects and can be used anytime, anyplace. For instance, parabens, the most prevalent preservative in cosmetics that can enter the skin and may interfere with hormones function, are absent in natural cosmetics (116).

### **Global Influence and Market Impact**

For primary healthcare, almost 70% people in underdeveloped countries directly rely on traditional medicine (117). According to estimates, 18% of the top 150 prescription medications and 25% of modern pharmacopoeia are made from plants (118). From Asia most important nations in this regard are India and China. About half of all medicinal plant exports and 45% of all traditional medicine revenue worldwide comes from Asia (119). They are used for both domestic and commercial purposes. Asia is home to more than 38,660 different species of medicinal plants, making it one of the major bioresource hubs of the planet (120,121,122). Several Asian nations, including India, Bangladesh, Nepal, China, Myanmar, Indonesia, and Pakistan, actively cultivate and extract medicinal plants (123,124). Consumers have recently developed a greater awareness of green purchasing practises by taking environmental welfare and quality of life into account (125). It undoubtedly sparked a global upsurge in the manufacture and sales of green goods. The sale of environmentally friendly items surged globally from \$209 billion (2011) to \$845 billion (2015) (126). The cosmetics business has also seen expansion in recent years (127). One of the markets with the highest growth is the cosmetics sector in Asia (128). According to estimates, 15% of global population invests in skin-lightening goods, with Asia being dominant. A biotechnology business based in Vancouver, British Columbia, called SIRONA biochem said that Asia Pacific region spent almost \$13 billion on cosmetics and skin care goods. For skin whitening creams and other skin care products, according to estimation, \$432 million was spent in India alone in 2010. According to a recent poll, 80% of Indian males use fairness products, and the market is spreading by 18% annually (129,130). In place of hydroquinone, the current industry standard for depigmenting products, botanical and natural substances have gained popularity (131). Products that are non-toxic and hypoallergenic are very popular today (6). Only a few plant species have been mentioned. In fact, there are now many more plant species being used in skin care cosmetics and fragrances. Overall, Asian beauty practices have brought about a shift in the global cosmet-

ics market by influencing product formulations, skincare routines, and cultural aesthetics. The emphasis on skincare, innovation, and holistic approaches to beauty has resonated with consumers worldwide, shaping the way products are developed, marketed, and consumed in the beauty industry.

### Challenges and Future Prospective

The cosmetic uses of plants in Asia offer a wide range of benefits, but they also come with certain challenges and prospects that need to be considered. Plant-based components' diversity can make it difficult to ensure uniform quality and efficacy in cosmetic products (132,133). It can be difficult to standardize the extraction procedures and guarantee the potency and purity of plant extracts. Natural resources may be under stress due to the demand for plant-based cosmetic ingredients, which could result in overharvesting and habitat destruction. To avoid damaging environmental effects, it is essential to ensure sustainable procurement methods and safeguard biodiversity (134,135,136,137,138). Some compounds made from plants can cause allergic reactions in some people. To maintain consumer safety, it is crucial to conduct enough testing and label products with potential allergies. Concerns regarding cultural appropriation can occasionally arise when traditional plant-based components from Asian cultures are used in cosmetic products. It is crucial to consider the cultural relevance of these ingredients and to involve neighborhood populations in moral and just collaborations. Standards and laws governing cosmetics and their ingredients differ considerably between nations. It might be challenging to ensure that plant-based ingredients adhere to the relevant regulatory standards in various locations.

New and more potent cosmetic components may be found because of ongoing study and advancement in plant extraction methods. This entails looking into lesser-known botanicals and conventional treatments. Numerous plants have bioactive substances that might be useful for skincare. The cosmetics industry may undergo a revolution if these chemicals can be found and isolated for use in particular cosmetic applications. Personalized skincare is becoming more popular as the cosmetics business develops. Plant-based components may be used to produce products that are specifically suited to the skin types and issues of each customer. Consumers can be informed about the advantages of plant-based components and their customary usage thanks to technology and dig-

ital platforms. The process of shopping and choosing a product can be improved through augmented reality and virtual try-on experiences. The usage of substances derived from plants is in line with the global trend toward eco-friendly and clean cosmetic products. Sustainable and transparent brands are more likely to succeed. Sustainable alliances that help the cosmetics industry and regional economies can be formed by working with local communities and experts in traditional knowledge. Farmers and communities engaged in the sustainable ingredient sourcing process may benefit economically from the rising demand for natural and plant-based goods. The cosmetics business has the chance to appreciate and promote the traditional knowledge and cultural history linked to plant-based materials, leading to a greater understanding of Asian cultures (139-157).

### Conclusion

Plant parts have been used as a part of tradition in Asia for a long time because of their benefits for skin, hair, and different diseases without any major side effects. The usage of various medicinal plants in cosmetic preparations has grown over the last few decades as more botanicals have been claimed to have cosmetic promise. So, an overview of the plants with potential for cosmeceutical applications is given in this review. However, clinical trials emphasizing the standardization of constituent concentrations, shelf life and stability of the formulation, efficacy and safety are vital to be demonstrated. It is currently being researched and numerous therapies, both natural and synthetic, are available. However, natural products are steadily gaining popularity, and the usage of plant extracts in formulations is on the rise. Because synthetic items may pose risks to human health and have a variety of negative impacts. It would be desirable to pursue comprehensive research on the effectiveness of these medications and their preparation given the rising popularity of herbal care products. It's probable that in the future numerous new plant extracts with economic value will be discovered and the benefits of many popular herbs will be validated.

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**Consecutive Scientific Meetings**

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Organized by Ondokuz Mayıs University and

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**DAYS**

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