

**Orthopedic and Folk Surgical Traditions in the Aurès:
An Interdisciplinary Reading of Historical and
Archaeological Data**

Douriya Hadjari ♦

University of Abdelhamid Mehri, Constantine2(Algeria),
douriya.hadjari@univ-constantine2.dz

Received: 23/01/2026 Accepted: 23/06/2026 Published: 30/06/2026
--

Abstract: This article addresses one of the most prominent surgical medical practices in the rural Aurès: orthopedic surgery, with the aim of highlighting the passed-down treatment methods and the role they play in the healthcare system of this community. In this context, we will explore the historical origins of medicine in the region, along with the influence of social and geographical factors on its development. We will rely on analyzing various scientific references that address the foundations of traditional medical and surgical practices, focusing on the character of the practicing physician and the places of their activity. Additionally, we will present the types of surgeries related to bones, such as trepanation, bone excision, and fracture treatment and we will highlight the treatment methods and the surgical instruments used. Therefore, this research seeks to assess the effectiveness of these traditional medical practices and their connection to the intellectual movement of ancient medicine, which contributes to highlighting their importance in the study of history of healthcare in rural Aurès of Algeria.

Keywords: Medical instruments; Aurassian practitioner; Surgery; Trepanation; Osteotomy; Fractures.

Introduction:

The Aurès region witnessed the spread of traditional medical practices that achieved remarkable success, enabling them to rival European medical centers. These practices became the first option for the inhabitants of this rural community despite the limited resources and the simplicity of the medical instruments used. Orthopedic surgery is considered one of the prominent practices due

♦ Corresponding Author

to the large numbers of injuries and fractures, whether in the skull, limbs, or other body parts. Interestingly, the success rate achieved by some of the surgeries is noteworthy, examples of that would be skull trepanation surgery, fracture treatment, and even replacing human bones with animal bones. Based on the aforementioned, research in this field is necessary to understand how traditional physicians were able to achieve results that rivaled those of the academic physicians despite lacking scientific and material resources. Additionally, it is essential to explore the reasons behind the significant demand for those surgeries, as well as the factors that have contributed to their success.

From this standpoint, the research problem revolves around the nature of these medical practices, their types, effectiveness, and impact on the local community, as well as their connection to ancient medical knowledge or the passed-down customs and traditions. To achieve that, the study employed a historical analytical approach. This was done through studying historical references and analyzing the medical practices based on the available texts, along with examining material evidence like architectural remains of medical establishments, surgical instruments, and bone remains. This study aims at highlighting the role of traditional medicine in the region of Aurès, assessing its impact on public health, and measuring its success in bringing about healing within the community.

I. The Historical Origins of the Aurès Medical Practices:

In order to study this point, we will analyze the health situation in the Maghreb during the 19th century, where rural communities used to rely on a local treatment system to confront illnesses and injuries due to the limited official medical care. Additionally, studying the historical origins of medicine in the Aurès and how it was introduced to these regions reflects the interaction of these communities with various forms of medical knowledge, whether through local heritage or external influences from neighboring civilizations.

I.1-Health Conditions in the Maghreb and the Treatment Methods Employed in the 19th Century:

Mentioning the details of the practiced treatment methods in

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

the Berber lands is challenging, especially due to our limited knowledge of medical practices in North Africa in the late 19th and the early 20th centuries. However, we will attempt to recount the main health conditions through accounts of travelers and historians who have visited these regions.

The traveler, **Horneman**, who visited Fezzan, mentioned the health deterioration in the region and the main diseases and epidemics prevalent there. He also addressed the treatment methods employed for these diseases, such as Syphilis (*lues venerea*), which was successfully treated with salts and the *Citrullus colocynthis* (*colocynth*) plant.

Additionally, he mentioned ulcer diseases and hemorrhoids, which were treated using medicinal plants. However, what he missed in this study is mentioning the characteristics of the physicians and surgeons of that region¹. Richardson mentioned in 1848 during his travels in the Sahara Desert that the most common diseases in Ghadamis are conjunctives, diarrhea, and leprosy, some cases of ascites, smallpox, syphilis, as well as different types of skin conditions.

As for the treatment methods, they differ based on the different cases, in case of ascites, local doctors make an incision in the body to drain the fluid, which is similar to the European technique used back then. He also mentioned treatment methods based on magical rituals, such as rubbing hair dog on the affected area in case of rabid dog bites, another example is using dead scorpions to treat stings from live scorpions, with the claim that there are effective cures². Therefore, we notice that most of the treatment methods mentioned in Fezzan relied on medicinal plants,

1 Horneman Frédéric: *Voyages dans l'intérieur de l'Afrique pendant les années 1797-1798*, Librairie André, Paris, 1802, p184-185.

2 Ritchardson, James: *Travel in the great desert of sahara in the year of 1845 and 1846* (The oasis and cities of Gahat, Ghdames, Mourzuk, Volume1, London1846, p 323.

local rituals, incantations, or charms, just as was the case in the Aurès region.

The same is true of most of the Maghreb countries. **Hassan El Wezzan** mentions that the conditions were terrible in the region of Haha, in the kingdom of Marrakesh in Morocco. He notes that education was unknown and none could read in the region except some Fuqaha (experts in Islamic jurisprudence). There were no doctors, surgeons, or apothecarists there, and cauterization was the only treatment for all diseases, just like animals were treated, except circumcision, which was performed by some barbers³

In his book, *Magic and Religion in North Africa*, the French orientalist, **Edmond Doutté**, conducted a study on the customs, traditions, and beliefs of the people of North Africa. However, in most of his conclusions, he argues that the practiced medicine in the region stems from magical sources, and that those who claim the profession of medicine don't possess any scientific prior knowledge⁴. However, we can say that despite the abundant use of rituals and local beliefs in the local medical practices, we cannot deny that there was a category that had received education, although limited. Additionally, many practices achieved remarkable success in the healthcare field. Perhaps a clear example of that is what the Medical School of Kairouan achieved compared to European schools since the 10th century. We are referring to the books of **Ibn al-Jazzar**⁵ here, which made their way into Europe since the 10th century. His books were translated and widely used in treatment methods. Additionally, Europe discovered the advantages of Kairouanese medicine through hygiene-based preventive methods

3 Léon L'African, Jeanm: Description de l'Afrique, volume 1, Dar al gharb al islami, 1983, p98.

4 Doutté, Edmond: Magie et religion dans l'Afrique du nord, Typographie Adolphe Jourdan, 1909, p37-39.

5 **Refer to:** Abu Ja'far Ibn al-Jazzar, Zad al-Musafir wa Qut al-Hadir, verified by Radhi al-Jazi Faruq Omar al-Asli Joumaa Cheikha, Mohamed Souissi Bayt al-Hikma, Tunis, 1999.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

in the 19th century. A testament to this is the eradication of Typhus, and the Tunisian medicine winning the Noble Prize in medicine in 1928⁶.

On another hand, **Dr. Raynaud**, in his study on hygiene and medicine in Morocco, describes how physicians practice their profession in small tents, where they keep their surgical instruments and medicines, which consist of herbs (which reminds us once again of the instruments and medicines used by physicians in the Aurès). The physician is also considered a pharmacist at the same time⁷.

Therefore, we conclude that the health conditions in the Maghreb were generally marked by deterioration. Moreover, the treatment methods used were similar to those used in the Aurès community, which we will discuss in the coming points, with a focus on those involving medicinal plants and some local rituals.

I.2- The Historical Origins of the Aurès Medicine and How it Entered the Mountainous Regions of the Aurès:

Despite the remoteness of the Aurès villages from cities and big metropolises, the prosperity movement witnessed in the Maghreb in the field of science and scholars since the 11th century played a pivotal role in spreading knowledge across its various regions.

To name a few, during the Hammadid Dynasty, both Al-Qal'aa and Béjaia became a refuge for many scholars⁸ who came seeking security and tranquility amidst the wars and tribulations,

6 Saddam, H : The Kairouan Medical School and its impact on modern medicine. Kairouan's scientific and technical contributions. Tunisia: The Center for Islamic Studies in Kairouan, 2011, p 22-23-24.

7 Raynaud, L : Etude sur l'hygiène et la medecine au Maroc. Alger : Imprimerie Typographique et lythographique, 1902, p 121-122.

8 such as the migration of some scholars from Kairouan, fleeing from the Hilalian invasion, as well as the reception of those fleeing the wars that erupted in Andalusia.

which allowed them to contribute to improving the academic level, including the establishment of many schools in the Andalusian style⁹.

Moreover, the Hajj caravans played a significant role in introducing knowledge to mountainous regions, which leads us to assume that the practiced medicine in the Aurès was introduced to this rugged terrain as a result of the Hajj trips organized by the Berber tribes after converting to Islam, some local inhabitants believe that one of their people learned medicine in Egypt and brought it to the Aurès at an unknown point in time.

However, it seems that the Aurès medicine didn't evolve over time¹⁰, except for some changes that were brought to the region by some mountain dwellers who were enlisted by France in World War I, they brought many elements of change and progress to these mountainous areas of the Aurès. Through their experiences in hospitals, they learned various European medical and surgical methods and confirmed that medicine is not limited to administering laxatives and amputating limbs¹¹.

As for the origin of surgery practiced in the Aurès region (the topic of our study), it is also mysterious, and it can be said that its history is linked to the earliest surgery performed in the region: trepanation. The two French doctors, Malbot and Verneau, in their research on this surgery, suggest that it was practiced in the Aurès during and prior to the Roman period, and it is likely that it dates back to the new stone ages (Neolithic era). This method was brought to the region by the first white-skinned tribes coming from northern areas¹². A number of studies conducted by anthropological

9 Zirar, R: The development of medicine and pharmacy during the Hammadid dynasty. *medicine and health services in the Islamic world throughout the ages*, 2023, p309-310.

10 Hilton, S : *Arab Medicine and Surgery (Study of the Healing art in Algeria)*, London: Oxford university press, 1999, p24.

11 Ibid, p 26.

12 Malbot , H., & Verneau, R : *Les Chaouia et la trépanation du crane dans l'Aurès II (Etude d'ethnographie algérienne)*. *l'Antropologie*, *VIII*, 1897, p175.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

researchers such as M.M. Broca, Prunières, Mortillet, and Sauzé have confirmed the use of trepanation on skulls found in the dolmens of the Roknia site in Guelma (Constantine province during the colonial period), which is very similar to the method practiced by the Aurès people¹³.

I.3. The Scientific References of the Foundations of the Professions of Medicine and Surgery in the Aurès:

Most of the studies of the practitioners rely on professional training supervised by an accredited physician, who is usually a family member of the young physician. In most cases, the profession of medicine is passed down from father to son, where entire families practice the profession of their ancestors. Generally, young physicians learn the foundations of their profession through two main stages:

I.3.1. The Theoretical Study Stage:

This stage relies on studying the methodology of a relative who is already practicing medicine. Most of the literate¹⁴ practitioners possessed books—some were handwritten works inherited from their fathers¹⁵, while others were authored by Arab writers and printed mostly in Egypt during the 19th century. These books could be obtained from Tunis, Constantine, and Algiers, whose national library contained 44 medical manuscripts¹⁶.

All practitioners used copies of a manuscript that they inherited from their ancestors through the Ouled Mira family. According to **Vérdène**, the publication date and the name of the author are missing in this manuscript. It was known as *Al Harouniya manuscript*, and contained recipes for all diseases and their treatment methods¹⁷. The original manuscript, titled: *Resalat*

13 Vérdène, A : De la trépanation du crane chez les indigènes de l'Aurès (Algérie). (F. Valcan, Éd.) Revue de chirurgie, 1885, p 826.

14 Some of these practitioners are completely illiterate, which is why they either rely solely on the practical stage, deeming it superior to books, as books contain a lot of incorrect information, or they seek help from a writer or a friend who can read when they need to go back to books.

15 Unfortunately, we do not have any examples of these manuscripts from the Aurès or Algiers

16 Raynaud, L: Op,cit, p 119.

17 Vérdène, A :Ibid, , p 824.

Al Haruniya was authored by **Eesa Ibn Hakam al Dimashqi** in the 9th century, and there is a copy of it in the Munich library, it's a 73 page manuscript, covering general medicine and hygiene.

The manuscript was titled *Al Haruniya*, in honor of the Abbasid caliph, **Harun ar-Rashid**, who lived during the time of the author. In Algeria, many manuscripts with the title *Al Haruniya* were found, but they were more organized than the original one¹⁸. It seems that these copies were the ones used by the Aurès practitioners. Printed books were also considered references for the practitioners. They are resorted to when the physician is confused or when they want to update their knowledge of the usages of some medical items. The most prominent authors whose books were popular among the people of the Aurès were: **(1) Ibn al-Baytar; (2) Imam al-Suwaydi; (3) Abu Nasr, known as Cohen al-Attar; (4) Dawud al-Antaki; and (5) Abdul Razzaq al-Jaza'iri.**

Ibn al-Baytar¹⁹ was the greatest botanist in the East, he was born in Málaga during the last years of the 12th century, he traveled to the East around the year 1220 AD, he also spent some time in the Berber lands during his travels to Morocco, Béjaia, Constantine, and Tunis, where he used the plants that grow in the region to treat some diseases²⁰. His book, *Jami' al-Mufradat* (the Compendium) held a significant importance among the Chaoui practitioners²¹.

Imam al-Suwaydi, who was known as ad-Dimashqi, was born in Damascus in 1203 AD. He lived many years in Syria and Egypt. Among his prominent works: *Tadhkirat al Mufradat*, which is a manuscript on the treatments of body diseases from head to toes. Given the big size of the manuscript, some physicians summarized, Leclerc mentions that one of these summarized versions was found in Constantine, though its origin is unknown. Two other versions were found in Paris, the first one was titled:

18 Leclerc, L : Histoire de la medecine arabe (Vol. 1). New york: Burt Franklin, 1876, pp 85-86.

19 Ibn al-Baytar was born in Málaga in Spain during the last years of the 12th century, he traveled to the East around the year 1220 AD. He spent some time in the Berber lands during his travels to Morocco, Béjaia, Constantine, and Tunisia, where he used the plants that grow in the region to treat some diseases.

20 Leclerc, L : Ibid, pp 225-226.

21 Hilton, S : Op,cit, p 10.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

Mukhtasar Mufradat as-Suwaydi, authored by the physician, **Abdel Wahab**, and the second one was authored by **ash-Sha'rani**²². It seems that these are the same versions which **Hilton** mentioned as being used by one of the most successful Chaoui practitioners²³.

Abi Nasr, also known as **Cohen al-Attar** is a jew pharmacist from Cairo, he lived during the 13th century. He authored the book: *Minhaj ad-Dukan wa Dustoor al-A'yan*. His book was widely used by the Aurès physicians who owned copies of it. As for **Dawud al-Antaki**, he was born in Antakya, Turkey, and died in Mecca around the year 1599. Among his prominent works: *Tadhkirat al-Albab Wal Jami' Lil Ajab al-Ujab*. Many Chaoui people who practice medicine informed me that his book is considered the best reference in the science of plants, and that one of the physicians learned from him how medicine was transmitted from the Greeks to the Arabs in the Middle Ages²⁴. Many copies of his book were found in Algeria²⁵, and it seems that the Aurès people obtained one.

The last of the five aforementioned authors is the most popular among the current practitioners in the Aurès: **Abdel Razaq**, known as **al-Jaza'iri**. He was born in Algiers during the first half of the 18th century. He travelled to Mecca several times. Among his prominent works is the book: *Kashf ar-Rumooz Fi Bayan al-A'shab*, which is a very important reference in pharmacognosy and the science of herbs, arranged in alphabetical order. The book was translated into French by **Leclerc**.

I.3.2. The Practical Stage:

It consists of various surgical exercises and applications, along with anatomy. For this reason, the physician or practitioner in the Aurès had to train and gradually practice medical disciplines during their training period with their teacher. They did not receive formal education in surgery or anatomy. Rather, they acquired it through their trainings with the practicing Physicians. Nevertheless, the experience that they acquired through observing their teachers

22 Leclerc, L : Op,cit, pp 199-200-201.

23 Hilton, S : Op,cit, p 10.

24 Ibid, p 10-11.

25 Leclerc, L : Op,cit, p 303.

was enough, and it made them familiar with bone sites and the main organs, as well as arteries and many veins and muscles. The same observation goes for the humoral theory²⁶. As a matter of fact, physicians in the Aurès used to treat cases relying on experience acquired from their training period rather than extensive theoretical knowledge of the humoral theory. However, all the doctors had some understanding of this theory²⁷. After finishing the training period of the practitioner, where they get familiar with both theoretical and practical knowledge, they could start their career, without having a degree that proves their academic qualifications.

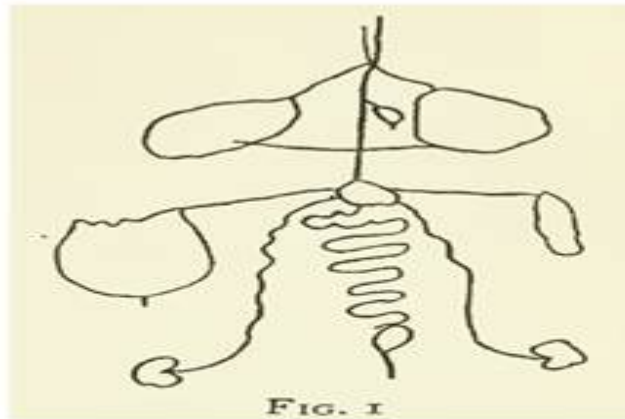


FIG. I
Fig 01: An anatomical diagram of the human body according to a medical practitioner.

Hilton (S), Arab medicine and...,fig1, p 15.

26 It is also known as the theory of medicine that was common among the Arabs, and it was inspired by the Greeks. The human body's physical condition is composed of four qualities: heat, cold, moisture, and dryness. Each of these qualities must remain balanced; otherwise, the person will die.

For more information, refer to: Jacques Jouanna, La théorie des quatre humeurs et des quatre tempéraments dans la tradition latine (Vindicien, Pseudo-Soranos) et une source grecque retrouvée, *Revue des Études Grecques*, 2005, pp. 138-167.

27 Hilton, S : Op,cit, pp 15-16.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

Even though Hilton denies the existence of any institution or school to learn medicine or surgery²⁸, Verneau mentions that three schools—Chebla, Taberdega, and Djellal—were attended by learners from all over the country²⁹.

II. Surgical Medicine and Orthopedic Surgery in the Aurès:

In this section, we will first explore the figure of the traditional practitioner or physician, a cornerstone of the healthcare system in the Aurès. Then, we will examine the main locations where the practitioners carried out their practice. Moreover, we will highlight the main branches of orthopedic surgery, which included various techniques and the usage of locally made, effective medical instruments.

II.1 The Characteristics of the Physician or Practitioner in the Aurès:

The physician or practitioner didn't have a specific uniform. While physicians in big cities were called al-Hakim, al-Mudawi, or al-Jarrah³⁰, the Rural Aurès was characterized by adding the title "Si" to the physician's name. Some of them were wealthy and belonged to the upper class of



Fig 02: Medical practitioners in Aurès

28 Ibid, p 121.

Hilton(S), **Arab Medicine and...**, PL 01(a)

29 Malbot, H., & Verneau, R : Op.cit, p176.

30 Bertherand, E : Médecine et hygiène des arabes, Paris: Germer Billère, 1855, p 31.

society. This is apparent in their properties, which consisted of gardens and livestock rather than cash³¹. It seems that most of them were generous with the poor, and refused to take any fees from them. As for the fees of surgeries, they varied based on the patient's ability to pay³², as well as extra gifts that patients or their relatives might give to the physician depending on what they could afford³³.

II.2. Locations of Medical Treatment:

Generally, physicians don't have a special place for consultations or medical treatments. Instead, during their professional tours, they carry their instruments, bandages, and their small reed-made bottles in a leather bag that has many pockets³⁴. Even



Fig 03: Aurès dwellings used for medical treatment

Hilton(S), *Arab Medicine and...*, PL 01(b)

physicians with a good reputation who had patients coming to them from remote areas had their patients spend the night at a friend's house along with their relatives. In the case of Bedouin tribes, they had to spend the night in a tent set up outside the village, and the physicians would visit them there. However, the physician might travel to treat patients when they were unable to come, as long as

31 Hilton, S : Op,cit, p 11.

32 Surgery fees varied based on complexity, starting at fifty francs for simple surgeries and going up to 150 or 200 francs for more complicated ones.

33 Poor patients, for example, would offer a bowl of milk or a cup of coffee, while wealthier families would provide a dish of meat and semolina. It was also common for the doctor to receive gifts of dates or figs upon departure.

34 This bag resembles the one that hangs from the saddle of desert horsemen during travel.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

they were not in a distant location. The physician would visit them at their homes, in the market, or on the street.

It was rare to find cases where physicians provided accommodation for patients. When available, these dwellings resembled stone cottages or Gourbis with dimensions of approximately eighteen feet in length and twelve feet in width. These dwellings had no furniture except for a few mats and bags brought by the patients' families, which were used for sleeping. The cottage could accommodate three patients, each accompanied by one or more relatives to take care of them and prepare their meals³⁵.

II.3. Surgical Specialties Practiced in the Aurès:

Before addressing the types of surgical specialties practiced in the Aurès, we have to note that all practitioners used to practice medicine and general surgery at the same time. This was not specific to the Aurès only. Rather, it was common in all rural Algerian villages³⁶. Some of them excelled in one specialty more than the other one. As a matter of fact, they used to be proud of their surgical skills, while not knowing much about medicine, or vice versa, although they considered surgery a more prestigious discipline than medicine. However, it seems that the minority who didn't have a special skill in surgery did this to hide the instruments that they use out of fear of being punished by the colonizers. Some of these successful physicians³⁷ or practitioners specialize in a specific branch of their specialty such as trepanation in the mountain of Cherchar and other places. Most ophthalmologists were of Moroccan origin. There were also physicians who

35 Hilton, S : Op,cit, p 13.

36 Bertherand, E : Op,cit, p 34.

37 The term "successful" is used based on the physician's or practitioner's reputation in their community, as it is extremely difficult to obtain any numbers that would allow for an assessment of their success or failure rate.

specialized in reducing dislocated joints³⁸.

As for the surgical specialties practiced in the Aurès region, they exhibited a noteworthy variety, and we have attempted to categorize them into various branches as follows:

General Surgery:

It included the treatment of umbilical hernia, ascites, and snake and scorpion bites. These cases required immediate intervention and treatment based on local expertise, utilizing available resources, such as dog skins and geckos, for treating snake and scorpion bites.

Delicate Surgery (Microsurgery):

It included eye surgeries for conditions like the formation of white membranes on the eyeball, and dental surgery that consisted of extracting or treating diseased teeth.

Obstetric and gynecological surgery:

It focused on providing assistance in difficult childbirths, as well as treating certain urgent women's health cases using traditional techniques. This was the specialty of female practitioners.

Prophetic Medicine Surgery:

This category included circumcision, cupping therapy, and cauterization, which were used as effective treatments, inspired from the prophetic traditions, and they were proven to prevent and treat various diseases.

Orthopedic Surgery:

This category is the focus of our study. It involved treating fractures and injuries that result from falls off cliffs or social disputes, using traditional methods that proved effective.

Therefore, we notice that this variety in surgical specialties demonstrates that medical practices in the Aurès were not random, as they encompassed a vast range of specialties, reflecting both development and adaptation to the different needs of the

38 Hilton, S : Op,cit, pp 11-12.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

community. It also highlights that practitioners in this region did not only deal with simple cases but were involved in precise and complex specialties, which reflects the depth and richness of local medical knowledge.

II.4. Orthopedic Surgery (Types, Treatment Methods, Medical and Surgical Instruments):

II.4.1. Trepanation Surgery(Tanqāb al-Rās):

It is a surgery related to skull bones affected by a fracture, spasm, or hematoma. Physicians divide skull bones into three layers based on cranial thickness: the outer bone layer (external layer), the inner bone layer (internal layer), and the intermediate layer between them where blood accumulates. For your information, trepanation can be performed on any part of the skull, except for the suture areas, which are locally known as ‘Katba’³⁹, trepanation is performed in several stages, which include:

- Scalping Stage:

Physicians place a fresh piece of meat from the right side of the goat (above the liver) on the injured area for three days, which facilitates scraping the scalp, or they directly remove a part of the scalp using scalpels, then press down firmly on the scalp until they reach the bone. The skinning process can also be done using a knife and a blade or a knife and a saw. A rectangular piece of skin is then removed by drawing four lines or two intersecting incisions at a right angle, after which the edges of the scalp are folded back and secured with hooks.

- Tissue Scraping:

It is done right after scalping or left until the end, after the bone excision, where the surgeon scrapes the tissues sticking to the bone using scrapers, then treats the bone surface with Phoenician juniper powder, which is mixed with warm butter before starting the

39 Vérdène, A: Op,cit, p 830.

surgery. In some cases, merely scraping the damaged bone is enough for healing. In this case, the surgery finishes quickly⁴⁰, but in cases of bone excision, it takes longer.

- **The Trepanning or Sawing Stage:**

It varies depending on the case, the trepanation is either performed using a drill, where a group of closely drilled holes is made near the area where the bone injury is located, or done using a saw. Whichever instrument is used, the trepanation is either partially or wholly performed.

- **Bone Excision Stage:**

Some surgeons start the excision of the bone carefully immediately after finishing the sawing process using elevators. Other surgeons leave it in place for one to three days to find the bone's dead nerves, and it is removed on the third day. To prevent the natural closure of the scalp, a cotton piece soaked in honey and butter is placed.

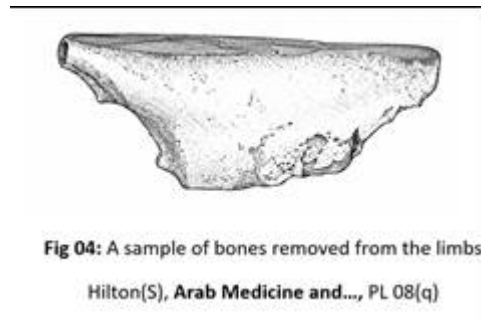
These procedures suggest that Aurès practitioners possessed an empirical anatomical knowledge acquired through repeated practical experience rather than formal academic education. Despite the rudimentary nature of the instruments, the precision described in trepanation procedures indicates a sophisticated understanding of cranial structure and surgical risk management. This challenges the colonial portrayal of indigenous medicine as merely magical or irrational.

II.4.2. Excision and Replacement of Bones from the Limbs:

40 Hilton, S : Op,cit, pp 31-32.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

Critical injuries, where the limb bones are affected, must be treated by excising damaged bones. This is done by making an incision at the area of the injury using a regular local knife. The knife is used cold if the patient hasn't lost much blood, and hot if the opposite occurs. The tissues that surround the injury are pulled using elevators. The bone surface is then examined with a probe, while the separated bone fragments are excised by a forceps. Saws are rarely used⁴¹ to excise bone segments from limbs. European scissors or knives are usually preferred for this procedure.



There were other successful cases of bone excision from the limbs, where large portion of the tibia was removed. The injured person didn't have any support when standing, except for the fibula bone. They were then treated with the Phoenician juniper powder before placing a bandage soaked in olive oil. Although the patient had a permanent limp in this case, the surgeon was proud of their success, especially after a European physician suggested amputation. The Tibia is one of the most significant examples of bone excision from the limbs, and it is now kept in the Pitt Rivers Museum.

As for replacing bones with animal bone material, most

⁴¹ However, some practitioners use trepanation saws for this purpose, and one of them even used a special saw designed specifically for this task.

surgeons agree that in order to perform this surgery, the affected bone has to be surrounded by a tissue that keeps that matter in place. Such surgeries were performed by local practitioners on many people, and most of them were successful. The main examples of this method are:

- **Using a Sheep's Leg Bone:**

This case was recorded in a person who had a severe tibia fracture in his youth, to the point where a piece of the bone was lost. He underwent a surgery where his bone was replaced by a sheep's leg bone. The surgery was successful, and the limb became strong and functional.

- **Using a Dog's Leg:**

Many cases of the inhabitants who underwent this surgery were found, especially since most surgeons believe that dog's bone is more suitable to use than sheep's bone. In this surgery, the damaged bone is first excised, ensuring the edges of the remaining bone in the limb are trimmed. The surgeon then cuts a piece of a leg bone of a dog that was recently killed, provided that the length of this piece matches the gap that was made. Then, the replaced bone is carefully put in place and fixated using the tissues surrounding it, without the need for wires to fixate it to the human bone. Finally, bandages and splints are placed. The healing period of this surgery ranges from two to two months and a half, especially in case of the elderly.

II.4.3. Fractures:

The fracture cases recorded in the Aurès are numerous. Similar to practitioners in other regions, they treated simple cases as well as more complex ones like fractures, sprains, and diastasis recti⁴². Below are some of the most important cases:

- **Limb Fractures:**

Among the methods used in case of a simple fracture, such as the tibia fracture, the bone is first aligned in its place, unsalted

42 Bertherand, E : Op,cit, p 456.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

butter or oil is rubbed onto the injury site, then a little bit of wheat flour is sprinkled on it. There was another method, which is placing equal-sized compresses, sprinkled by wheat flour and the ground leaves of the *Thymelaea* plant, leaving them for seven days. Then,



Fig 05: Methods of Splinting

Hilton(S), **Arab Medicine and...**, PL 06(c) , William (M. W), Simpson(H), **Among the ...**, p188-189.

the splinting stage begins, where the limb is bandaged with a cotton cloth, then a layer of sheep wool. The splints are then fixated, with their shapes varying depending on the medical condition. This stage involves placing four straight, flat pieces of wood (the type of wood doesn't matter), one at the front, one at the back, and one on each side of the limb, which are then fixated using cotton bandages. The foot then is tightly tied in a natural position with a piece of wood fixed to the wall if the patient resides in a house, or driven into the ground if the patient lives in a tent. Swelling of the foot suggests that the bone healing process is progressing effectively, while the absence of swelling indicates otherwise.

Another type of splint, considered more advanced than the previous wooden one, was found. Many practitioners prefer using this type, especially for the tibia, as well as the arm. This splint consists of a mix of splints and bandages that are fixated in place using two to three tourniquets⁴³. They varied depending on their raw materials. Some of them were made of a collection of six flat pieces of white wood and stitched together using a thick thread. Another

⁴³ Hilton, S : Op,cit, pp 42-43 .

type is made of up to eight bamboo strips, each divided into a length of two to three inches, and stitched onto goat leather. There was another type of splints made of the lygeum plant. However, it is not as solid as the wooden or split bamboo splints. Therefore, using wood is preferred over using braided lygeum in cases of femur fractures.

Moreover, a case of a knee injury with a transverse fracture of the patella (kneecap) was recorded, where the upper part was affected due to muscle contraction and required to be relocated to its natural place. A skilled surgeon in trepanning surgeries and bone replacement in the limbs performed the surgery by first measuring the distance between the top of the patella and the ankle on both legs carefully. After failing to push the affected bone downward with great pressure using his two thumbs, he placed a round wooden handle over the bone and struck it hard with a hammer. He repeated this process three times. Then, a new measurement of the limbs indicated that the patella was in a good state. The surgeon then applied bandages above and below the knee⁴⁴ and tied them with cloth strips on each side of the knee to prevent them from slipping. However, he left the patella exposed to apply light cautery touches on the skin above the patella. The cauterized skin surface was anointed with hot pine tar, and a pillow was placed and tightly tied around the injured knee. This pillow was made from dirty sheep wool, cut from the hind part of the sheep, and specifically prepared for this purpose. The patient healed, but he was left with a permanent limp.

- Collarbone and Rib Fractures:

The collarbone fracture is considered a dangerous injury. After splinting it, it has to be treated with cauterization, forming consecutive points on the skin along the bone's path. One of the practitioners advised to apply an ointment that assists in the healing process of the bone ends. This ointment consists of a cup of wheat

⁴⁴ Hilton, S : Op,cit, , p 45.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

four, some salt, and eggs, and it is applied seven times. If the rib is inclined inward, it gets returned to its natural position with suction, using a special bleeding cup. This method involves applying bandages tightly without over-tightening on the rib fracture.

- Jaw Fractures:

Generally, nothing can be inserted to replace the shattered bone in the jaw. As a general rule, splints aren't applied for jaw fractures, even though there are special cases where curved wooden splints are used. One surgeon used such a splint beneath a jaw fractured on both sides. He fixated it using bandages that pass over the top of the head. The patient recovered within three weeks, and was nourished with milk only.

Another practitioner, before bandaging a simple jaw fracture, applied an ointment consisting of honey and butter, then sprinkled some tannin powder over it. After that, he either applies flaxseed powder boiled in milk to form a paste, a similar ointment made of milk and powdered *malva sylvestris* leaves, or a paste that consists of old mashed dates, after removing the dates from them. All the three pastes are beneficial.

- Joint Dislocation:

Dislocation is considered more dangerous than bone fracture in a limb. Hip joint dislocation can occur in four different directions. The foot position indicates the direction where the dislocation occurred. Carpal bone dislocation is treated through pulling the foot hard and straight, followed by applying a splint to the limb. Cauterization is applied over the joint, and some practitioners consider it a detoxifier that prevents a set of complications⁴⁵. The patella (kneecap) is then returned to its place by hand after rubbing the limb with oil. Finally, hot compresses made of fresh cow dung and salt are placed on the injured area after relocating the joint.

One of the practitioners believes that muscles do not break.

⁴⁵ Bertherand, E : Op,cit, p 456.

Rather, what happens to the muscle is a displacement of a portion of flesh. The treatment in this case is a massage after bathing. Arabs and Chaouis agree that bathing in the Hammam or bathhouse, followed by a massage is considered a comprehensive treatment of various diseases that affect the body. Unfortunately, such utilities can only be found in large urban centers, such as Batna or Biskra, and are rarely found in the Aurès villages. When this treatment cannot be applied, cauterization is resorted to⁴⁶.

II.4.4. Surgical and Medical Instruments:

- **Surgical Instruments:**

Most of the instruments are designed in a primitive way, with rough construction. Every surgeon makes their own instruments by themselves through cutting out a model of the required instrument on paper using French scissors. This model is then taken to a local jeweler, who crafts it for a very small fee using bracelets and other jewelry. After that, he attaches a wooden handle to the instrument, and it becomes ready to use for many years. In fact, most surgeons use instruments that they inherited from their ancestors⁴⁷. Among the most important of these instruments are:

The Knife and Scissors: Also known as *al-Khoudmī* or *al-Būsa 'ādī*, it is a curved or convex instrument used by practitioners either cold or heated to the point of turning red. As for the scissors, the models that we have are of a European origin.



Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

Razor or Blade(al-Shafra) : It is used for incisions, and must be heated too. Some are simple, while others have three sharp edges, the long curved one is used for straight and long incisions, the short one is used for small incisions, and the one with the rounded edge is used to open abscesses.

Scalpels(al-Maṭābiʿ): They are specific to the trepanation surgery, and are used after being heated. They are characterized by their iron edges, which are round or rhombus-shaped, with a wooden handle.⁴⁸

The Stem(al-Misalla): It is a metal instrument that resembles a pen, and it comes in two types. The first type has a hook at the end, used to pull the edges of the scalp backward, while the second type has a headless hook with a wool tuft at the tip, which serves to absorb the blood resulting from excavation⁴⁹

Retractors(al-Kammāshāt): One type had a V-shape and was used to pull the scalp backward, whereas the other resembled the pincers and featured a leather handle.

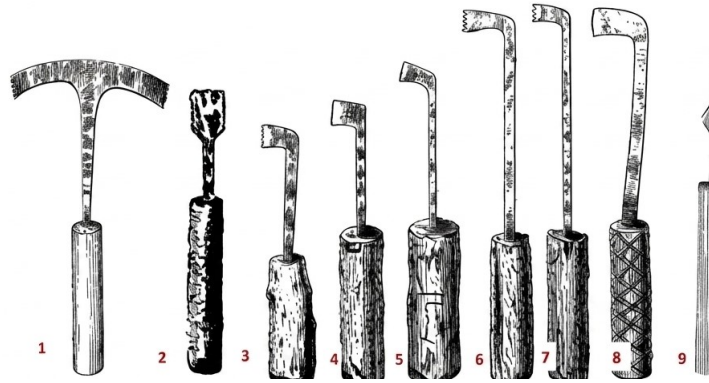
Scraper(al-Sabīka): It is used by the surgeon to scrape tissues sticking to the bone.

Drills and Probes(al-Mathāqib, al-Masābir): The drill is used in trepanation surgeries by rotating it between the palms of the hands. Excessive penetration is avoided in most drilling procedures, as this prevents the surgeon from reaching the dura mater as much as possible. The drill is characterized by its upper iron part, which contains two side spikes or three spikes, and the lower part is a wooden handle⁵⁰, sometimes decorated with geometric patterns and grooves. As for the probes that test the depth of the injury, they were used in various surgical interventions. Some served both as a drill

48 Hilton, S: Some Arab and Shawia Remedies and Notes on the Trepanning of the Skull in Algeria, The Journal of the Royal Anthropological Institute of Great Britain and Ireland, Vol. 43. 1913, p 717.

49 Vérdène, A: Op,cit, p 826.

50 Malbot , H., & Verneau, R : Op,cit, p179.



and a probe, while other function as probes only.

Saws(al-Minshār): The saw is an iron or steel instrument. Its types varied depending on its function. Some were simple and L-shaped, others were curved, and some had a T-shape⁵¹, in addition to the circular saw. These saws had round wooden handles that were sometimes decorated. Their upper parts were flat and featured three to four large spikes, or narrower ones (up to seven). All these types were used in trepanation surgery. As for the ones used for bone excision, they were rectangular, had a blade at the end, and didn't have a handle.

Elevators, Hooks, and Forceps (al-Mahazz, al-Minqāsh, al-Malāqit): These instruments are carefully used to remove bone fragments⁵².

- **Medical Instruments:**

51 Kirkup, J: The evolution of cranial saws and related instruments, in trepanation (History, Discovery, Theory) , Publishers Swets & Zeitlinger, 2005, p 294-295.

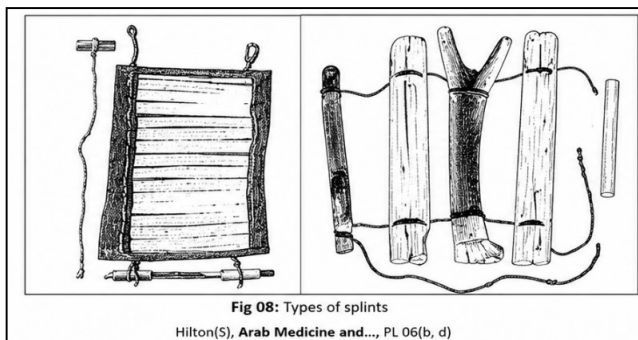
52 Hilton, S: Some Arab and..., Op,cit, p 718.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

Splints(al-

Jabīra):

Generally, splints are instruments made of woollen fabrics that are anointed with honey or tar. They are fixated using



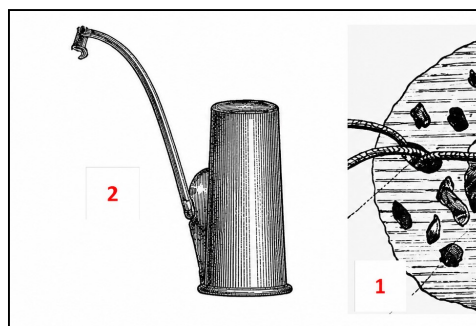
wooden supports connected together. Tourniquets are also used sometimes to further enhance the fixation and ensure that there is adequate pressure on the injured area⁵³. The finest splints are made from bamboo wood. Another type, made from the *lygeum* plant, was found. It is easy to adjust and very solid due to the density of its braids and the nature of its strips.

Cautery(al-Mikwāh):

Cauterization was used to treat various injuries. It is considered one of the most commonly used treatment methods among the people of the Aurès and the Arabs. Different types of cautery instruments were found to have been used by surgeons⁵⁴.



Suction Cup(Ka's al-Shaft): It is used to aspirate blood.



53 Mohamed Ben Larbey: S. La médecine arabe en Algérie, Paris: Faculté de médecine, 1885, p 31.

54 Hilton, S : Arab Medicine and Surgery ..., Op,cit, p 51.

Bandages(al-Ḍimāda): They were made of wood, lead, or bronze. Usually perforated to drain pus, and had fastening strap⁵⁵.

The diversity of locally manufactured instruments demonstrates that Aurès practitioners developed a coherent surgical toolkit adapted to the environmental and economic conditions of rural society.

III. Assessing the Role of Traditional Medical Practices in the Aurès Community:

In this section, we will first mention the reasons of the high rate of orthopedic surgeries, making a significant group of the local community resort to these medical practitioners and trust them. From a broader perspective, we will highlight the extension of the medical intellectual movement to these traditional practices through the inherited knowledge from ancient medicine, emphasizing the complementarity between local expertise and historical medical heritage.

III.1.The Reasons for Resorting to Orthopedic Surgery in the Aurès and the Effectiveness of Medical Practices in Treating it:

The widespread injuries in the Aurès region reflect a combination of the harshness of social conflicts and daily work in a rugged mountainous environment. Limb bone injuries mostly result from using firearms loaded with any type of projectiles, such as iron or stones. As a matter of fact, blood vengeance is considered a necessary social tradition for some people. For instance, one patient had a critical injury in his right leg due to a gunshot, while an elderly man had a serious fracture because of a gun bullet⁵⁶. According to Bertherand, the spread of bone diseases is also a result of syphilis, in addition to the aforementioned reasons⁵⁷.

Additionally, the Aurès community is extremely attached to

55 Mohamed Ben Larbey: Op,cit, p 32.

56 Hilton, S : Arab Medicine and Surgery ..., Op,cit, pp 39-40-41.

57 Bertherand, E : Op,cit, p 455.

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

its lands and agricultural assets. This was a constant point of conflict. Due to such conflicts, cases of head strikes were quite common. A testament to that are the serious injuries such as skull fractures and cracks. These injuries required resorting to trepanation surgeries. The patient would undergo the surgery to heal on one hand, and obtain a ransom or financial compensation from the party who caused the damage on the other hand. There were other social causes for these injuries, such as women seeking to obtain the right to divorce, which led a large segment of the community to undergo these surgeries willingly, without any hesitation.

Moreover, the region's rugged nature increases the risk of work accidents, especially when herding, which was practiced by all the tribes (especially by men) in areas like steep rocky cliffs. This constantly exposes them to falling and other accidents. Among the cases recorded was a thirty-year-old man who fell from a cliff while herding goats, resulting in severe fractures⁵⁸.

All these factors, whether social conflicts or natural accidents, made a large number of the Aurès inhabitants, whether men, women, and children resort to trepanation and other bone-related surgeries and treatments, considering that a necessary medical solution to deal with the frequent injuries in the region.

Furthermore, the folk practitioners were worthy of the trust placed in them by the Aurès tribes. As a matter of fact, these practitioners achieved a remarkable success in traditional medical interventions, whether in the field of surgery or other treatment methods⁵⁹. Many examples and testaments prove the success of these practices, especially in cases where European physicians were unable to achieve positive results. For instance, while European physicians would often resort to amputation as a final solution to

58 Hilton, S: *Some Arab and...*, Op,cit, p 45.

59 Some attribute this achievement in rapid recovery of patients and their ability to resist and battle pain to the incredible resilience of the Aurès people. This is a testimony of their physical strength, which they developed over time in this harsh environment. Refer to: M. W. (Melville William), Hilton-Simpson, Op,cit, p192.

treat limb injuries, local practitioners proved their skills in treating these injuries with effective methods, which saved numerous patients from disability or limb loss.

Even though some cases of patient death were recorded, these incidents were not interpreted in the same way by local inhabitants and foreign researchers. While Europeans used to consider these cases as evidence to the failure of traditional medical practices, this perception didn't reflect the view of Muslims who believed in Allah's decree and viewed death as a part of Allah's will and not necessarily a result of medical failure. Therefore, the difference in interpretation highlights the contrast between the western scientific perspective and the local cultural one that was based on faith and patience.

Accordingly, the local practitioners in the Aurès proved to have remarkable medical expertise and displayed great bravery in dealing with difficult cases. This enhanced their status within the local community and proved that folk medicine played a vital role in protecting people's health and alleviating their suffering, even amidst the challenges of the rugged terrain and complex social conditions.

III.2. The Relationship Between the Intellectual Movement of Local Medical Practices and Ancient Medical Practices:

The traditional medical practices in the Aurès region show a strong connection to the ancient medical practices, whether Arab or pre-Arab. This was evident in some surgical procedures, such as the trepanation surgery, which goes back to prehistoric times. This highlights the deep historical effect that was reflected in folk medicine in the region.

As for other surgical practices, it can be noted that despite being highly influenced by folk beliefs and myths, they achieved tangible success as previously mentioned. This success is attributed to the reliance of a great number of folk practitioners on valuable scientific sources, such as different Arabic medical books that

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

assisted them in developing their knowledge of surgery and treatment methods, as well as in effectively using medicinal plants to treat injuries.

The consultation of Arabic medical manuscripts by Aurès practitioners demonstrates that local medicine was not entirely isolated from the broader scientific traditions of Islamic medicine. Instead, these practices represent a localized adaptation of accumulated medical knowledge transmitted through manuscripts, oral teaching, and practical apprenticeship.

We also noticed that the treatment methods used among the rural local communities in different parts of the Maghreb were quite similar, reflecting a close level of the medical intellectual movement. This shows the scientific and cultural correlation in these regions that was further reinforced by the remarkable influence of Arabic medical schools, which played a pivotal role in shaping the medical practices.

Despite the simple and primitive medical and surgical instruments used within these communities, they were still effective in achieving the required goal, whether in injury treatment, fracture reduction, or pain relief. This success demonstrates that the local inhabitants leveraged the available knowledge to them, drawing from the prevalent folk beliefs, passed down medical heritage, and Arabic books and references that contributed to enriching their understanding of surgery and treatment methods.

Conclusion:

The research results indicate that traditional medical practices in the Aurès weren't isolated from the general medicine framework. Rather, they formed a part of a broader healthcare system. This emphasizes the importance of studying them to understand the medicine history and its development in the region. The research reached a number of results, the most significant of which are:

- The traditional medical professional does not differ

much from the academic physician. While the latter's success depends on scientific degrees and the trust of the patients in the physician's academic qualifications, the traditional practitioner's success is contingent on reputation and practical expertise that people praise. Moreover, there was not a clear distinction between general practitioners, specialist physicians, and surgeons. As a matter of fact, the traditional practitioner used to treat different medical cases, and would rarely specialize in a specific field, such as trepanation surgery.

- Even though traditional medicine was connected to a number of local beliefs and rituals, it wasn't a random practice. Rather, it was founded upon cultural knowledge that was rooted in history. Additionally, the fact that these practitioners had medical manuscripts is an evidence of their keenness to benefit from prior medical knowledge. Furthermore, they relied on the available local resources, such as using animal bones, snake skins, and medicinal plants.

- The practitioners used various treatment methods depending on every medical condition. They used plant-based ointments, bandages, splints, and cauterization. As for the medical instruments, most of them were locally made, and despite their simplicity and roughness, they effectively served their purpose.

- The study showed that most bone injuries and fractures in the Aurès community resulted from social conflicts. Some conflicts used to end with vengeance through beating or shooting. Besides, some trepanation surgeries were linked to obtaining ransom or divorce. On top of that, the rugged terrain in the region contributed to increasing the rate of accidents, particularly while shepherding, which was the main economic activity of the tribes.

- As for the high rate of the success of orthopedic surgeries, in addition to the skillfulness of the practitioners, which was often ignored by Europeans, some attribute this success to the strong and healthy physique of the Aurès people. Nevertheless, it

Orthopedic and Folk Surgical Traditions in the Aurès: An Interdisciplinary Reading of Historical and Archaeological Data

seems that a set of interconnected factors contributed to prove the efficiency of local traditional practitioners.

Based on these results, the research emphasizes the pivotal role of traditional medicine in the history of healthcare in the region, and calls for conducting more studies on the influence that these practices had on the rural communities and the aspects of their intersections with modern medicine.

Bibliography:

Bertherand, E. (1855). *Médecine et hygiène des arabes*. Paris: Germer Billère.

Doutté, E. (1909). *Magie et religion dans l'Afrique du nord*. Alger: Typographie Adolphe Jourdan.

Hilton, S. (1913, juillet-décembre). Some Arab and Shawia Remedies and Notes on the Trepanning of the Skull in Algeria . The Journal of the Royal Anthropological Institute of Great Britain and Ireland, Vol. 43.

Hilton, S. (1999). *Arab Medicine and Surgery (Study of the Healing art in Algeria)*. London: Oxford university press.

Horneman, F. (1802). *Voyages dans l'intérieur de l'Afrique pendant les années 1797-1798*. Paris: Librairie André.

Kirkup, J. (2005). The evolution of cranial saws and related instruments, in trepanation (History, Discovery, Theory) . Publishers Swets & Zeitlinger.

Leclerc, L. (1876). *Histoire de la medcine arabe (Vol. 1)*. New york: Burt Franklin.

Léon L'African, J. (1983). *Description de l'Afrique (éd. 2^{ème} éditon, Vol. 1)*. Dar al gharb al islami.

Malbot , H., & Verneau, R. (1897). Les Chaouia et la trépanation du crane dans l'Aurès II (Etude d'ethnographie algérienne). *l'Antropologie*, VIII, pp. 174-204.

Mohamed Ben Larbey, S. (1885.). *La médecine arabe en Algérie*. Paris: Faculté de médecine.

Raynaud, L. (1902). *Etude sur l'hygiène et la medecine au Maroc*. Alger: Imprimerie Typographique et lythographique.

Ritchardson, J. (1846). *Travel in the great desert of sahara in the year of 1845 and 1846 (The oasis and cities of Gahat, Ghdames, Mourzuk) (Vol. 1)*. London.

Hadjari Douriya

Saddam, H. (2011). The Kairouan Medical School and its impact on modern medicine. Kairouan's scientific and technical contributions. Tunisia: the Center for Islamic Studies in Kairouan.

Vérdène, A. (1885). De la trépanation du crane chez les indigènes de l'Aurès (Algérie). (F. Valcan, Éd.) Revue de chirurgie.

Zirar, R. (2023). The development of medicine and pharmacy during the Hammadid dynasty. medicine and health services in the Islamic world throughout the ages, 303-317.