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Pre-Hippocratic medicine

Medicina pre Hipokrata

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Introduction

Traditionally and conventionally, Hippocrates is considered the father of medicine. In that sense, medicine is divided into pre-Hippocratic and post-Hippocratic.

Pre-Hippocratic medicine is not well known. There were no precise records in that period. Very few places had economics and legislation that would enable the development of culture and science, and thus medicine. However, this does not mean that the data do not exist [1]. There is even knowledge of some systems of organs, and the most detailed information about the organic system is related to blood circulation. Although sometimes completely wrong, they still give us a significant introduction to the way they used to think and treat people. Often, they would come to a knowledge that coincides with the present one. They knew about the bloodstream [2]. Moreover, the bloodstream was mentioned by the Indians, the Chinese, Ebers papyrus, Alcmaeon, Asclepius, Diogenes, and Empedocles. It is also possible to follow their system of thinking and sometimes come across valuable research material, such as their empirical knowledge of plant use. Many pharmaceutical preparations have been created in this way. They also had a fascinating knowledge of surgery, especially considering the lack of equipment, the knowledge of asepsis, antisepsis, and hemodynamics of blood vessels. In the pre-Hippocratic period, medical specializations, hygiene, public health, and family planning were conceived. Pre-Hippocratic medicine was based on religion, magic, and practical methods. That being said, it was believed that diseases were caused by supernatural forces; both Homer and the Bible mentioned stroke. In addition to those beliefs, the authors of the Bible placed the soul in the heart [3, 4]. Perhaps one of the most interesting procedures of pre-Hippocratic medicine was trepanation. The survival rate of ancient trepanations was surprisingly high. Trepanation was mainly done in Neolithic Europe, South America, Africa, and the Pacific [5]. It is considered the root of material understanding of diseases in Egyptian medicine [6]. This paper deals with the knowledge of pre-Hippocratic medicine in ancient civilizations such as Mesopotamia, Ancient Jews, Persia, India, China, Greece, and Egypt.

Mesopotamian pre-Hippocratic medicine

Mesopotamia is the oldest civilization. It was created by the Ancient Sumerians and was practically the first human society. It is the place where the first letter in the world was written. The letter was preserved on clay tablets in the form of a cuneiform letter. The existence of law and literacy led people to take care of their health systematically, and that was practically the beginning of medicine as we know it. Mesopotamia originated in the Euphrates and Tigris basins in 5000 BC. After Sumer, Mesopotamian civilization was continued by the Babylonians and Assyrians.

The medical data of this society come from the oldest medical record in the world. Namely, the most important part of the Mesopotamian corpus of knowledge was the Nippur tablets (Figure 1). They are the remnants of the library of King Ashurbanipal from the 7th century BC. Today, 20,000 tablets are in the British Museum, 1,000 of which are dedicated to medical information. They contained recipes for herbal and mineral medicines and healing incantations.

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Astronomy and mathematics had a significant place in Mesopotamian society. They considered the stars to be manifestations of their Gods. Diseases were thought to be caused by angry Gods and stellar movements. They corrupted the spirit in a man, which was seen as a disease. The cure was practically to cast out the devil. They believed that the heart was the center of intelligence and the blood the most important juice of life.



Fig. 1 – One of the Nippur tablets, 4663 BC [6]. (http/hal.archives-ouvertes.fr/hal-01139613/document-page 20)

In 2000 BC, the first law in the world – the Code of Hammurabi – was passed, and the first medical regulations were written there. The Hammurabi code of laws stipulated that if a slave died due to a doctor's mistake, the doctor had to buy a new slave for the owner, and if a free man died due to a doctor's mistake, both hands of the doctor had to be cut off. This was the first mention of medical responsibility. Such rigorous punishments hindered the most important thing for the development of medical procedures – experimentation. Nevertheless, Mesopotamian medicine left speculative records about maintaining the cleanliness of food and drink. It is also interesting that they isolated the lepers. However, there was no systematic advice for the people in this sense (Figure 1) [1, 5].

Ancient Jewish pre-Hippocratic medicine

Many diseases were described in the ancient Jewish books, but not the cure. That being said, it was considered that diseases were given by God as a part of God's plan and that the treatment was meaningless. Circulation, stroke, and brain leads were described. The heart was considered to be the place where the soul was. Even today, that belief is even symbolically deeply woven into the Christian tradition. There was a talk of leprosy. The two-week isolation was ordered for lepers, as well as wearing special clothes and verbally warning others of their disease. The treatment was left to the priests, and the hygienic and preventive measures were part of the religious practice.

The doctor as a special profession was mentioned only in the 2nd century BC. Interestingly, the cult of the doctor began to be built then, as the verses testify: "Respect a doctor because you need him. Because God created him, too; the doctor acquires wisdom from God; and receives gifts from the king; knowledge raises the head of the doctor; he stands proudly in front of the princes." The Talmud mentioned six doctors. Supervision of treatment was, however, the responsibility of a rabbi. They also issued hygiene regulations [1, 5].

Ancient Persian pre-Hippocratic medicine

Zoroastrianism ruled Old Persia. The essence of that religion, which still exists today, was the eternal dualism of good and evil. The God of good was Ormuzd, and the God of evil was Ahriman. Naturally, Ahriman was the one who caused the diseases. Because of that, there were no doctors in Old Persia. People were treated by priests. Even surgeons, who later appeared, were subordinate to them, being seen as artisans who were healing war wounds. Medical data were found in religious books called Avesta. Hygiene and prevention had a religious connotation. The cemeteries were built on hills, and the lepers were isolated [1, 5]. Healing was carried out with prayers, incantations, and herbs. In traditional Persian medicine, amenorrhea and oligomenorrhea were treated with cinnamon, nettle, mint, sesame, peony, hemp, fenugreek, and fennel [7, 8].

Indian pre-Hippocratic medicine

There are not many records of healing from the Incas, Maya poeple, and Aztecs. They saw disease as a punishment from Gods and demons. They prayed, offered sacrifices, performed trepanation, and used herbs for treatment. It is known that they used *Erythroxylum coca* and tobacco. They gave *Carapichea ipecacuanha* in amoebic dysentery as an emetic and quinine for malaria. The Maya protected themselves from demons by tattooing. Their medicine was somewhat similar to the Chinese one. However, it is still not known whether this was due to the backwardness of Asian teachings in the first people who crossed the Bering Strait or whether the two teachings developed independently of each other [1, 5, 7, 8]. Some of the plants that the Cherokees used and still use today are yarrow (for wound healing), ginseng (anti-inflammatory effect), blue cohosh (antirheumatic), black cohosh (serotoninergic), and Scutellaria (anxiolytic) [9].

Ancient Indian pre-Hippocratic medicine

The first Indian medical records were made between 1500 and 500 BC. Diseases were perceived as a magical act and treated with a mixture of rituals and herbs; surgery was also present. They were found in the holy books called the Vedas. Medical records also appeared in the oldest Vedas – the Rigveda. That book talked about doctors, surgeons, and herbal treatments. Younger Vedas or Atharva Veda talked

about leprosy, rheumatism, venereal and eye diseases, abscesses, tumors, jaundice, pain, and other problems. They paid great attention to hygiene and forbidden meals. Alcohol, mushrooms, onion, and garlic were banned. There were three Indian medical systems: Ayurveda, Siddha, and Unani. Ayurveda was a part of the Atharva Veda and had a special significance for ancient Indian medicine. Ayurveda had eight books on medicine. Around 500 BC, medicine in India completely passed into the hands of priests. They believed that the body consisted of 3 principles – air, bile, and phlegm – which built seven systems: lymph, flesh, bones, fat, blood, marrow, and semen. It was believed that diseases occurred if these elements were not in balance. This system of thinking was quite obviously a precursor to the hypocritical temperaments and Avicenna's myiasis, especially since, in different historical periods, there were fusions or overflows of knowledge between these cultures. The famous doctors Sushruta, Charaka, and Wabhata wrote one book each. Sushruta's book had a description of about 1,000 diseases, and there were a lot of surgeries in it. He also wrote about inhalation and baths. They performed rudimentary auscultation, palpation, and pulse examination and used smell and taste. Although they knew little about anatomy because they did not dissect corpses, they performed hernia surgery, rhinoplasty, laparotomy, amputations, lithotomy, and eye surgeries. They were the first to perform cataract surgery. In the fifth century BC, they had their first hospitals [1, 10].

Chinese pre-Hippocratic medicine

Chinese pre-Hippocratic medicine is believed to have originated 5000 years BC. However, Shen Nung is considered the father of Chinese medicine. He wrote a collection of 350 medicinal herbs with their effects. However, Huang-ti made an even greater impact, making a great medical book between 2698 and 2598 BC. Chang Chung-ching, who was called the Hippocrates of China, worked during the Han dynasty between 206 and 220 BC.

According to the Chinese belief, there was a male principle of yang (health, activity) and a female principle of yin (illness, passivity). For the health to subsist, yang had to prevail. Everything consisted of five elements: fire, earth, water, wood, and metal. Everything was in balance, nothing disappeared, but one arose from the other. The Chinese understood diseases in this philosophical-metaphorical way. Namely, there were five main organs – heart, lungs, liver, kidneys, and spleen – and five secondary – gallbladder, small intestine, stomach, colon, and bladder. They even thought that relations between the organs existed – the liver was the mother, the stomach was the son, and the kidneys were the enemy of the heart. Chinese doctors did not deal with surgery and obstetrics; midwives gave birth. Only fractures were treated with extension. Herbs and pulse examination were used; as many as 200 types of pulse were distinguished. The Chinese doctors would also examine a person for several hours. They gave iron for anemia, gelatin for bleeding, and opium for pain, and they knew about anesthesia. Even today, acupuncture still has an impact on treatment. Their strength was in observation, so they knew about infectious diseases (smallpox, dysentery, cholera, variola, syphilis, taenia, Ascaris). The first attempts at immunization were a valuable contribution of Chinese medicine. They took pus from the smallpox lixivium, dried it and ground it, and gave the patient to snort it, even recording successes [1, 9]. Recent discoveries have shown that, contrary to the attitudes to date, trepanation was widely practiced in China as well. The misconception is thought to have been caused by problems while translating ancient writings. This practice dates back several thousand years, even with a solid survival rate. Moreover, there are records of surgeons, such as Hua Tuo [11], who performed cranial interventions.

Greek pre-Hippocratic medicine

As everywhere in the ancient world, diseases were attributed to supernatural causes that had physical manifestations. That is why the healing was mostly magical. The terms used in Greek medicine in the pre-Hippocratic period to refer to medicines were *iatromantis*, pholarcos, ouliads, and asclepiads. Only later did they move to a rational conception of medicine or techneiatrike [7, 12].

One of the first Greek physicians was Alcmaeon of Croton on the territory of today's Southern Italy in the 6th century BC. Many consider him the father of scientific medicine. There are 18 preserved texts about him, and five are believed to have been written by himself. They are mostly about physiology and psychology. He was also a philosopher, and many of his works on epistemology have been preserved. Herodotus also praised his healing skills [11]. Alcmaeon gave a description of the strokes and brain injuries, Alexandrian authors described nerves, and Galen connected cognition to the brain. Ancient authors even divided the brain into parts according to functions [4, 12]. Herodotus' writing about the Persian king Cambyses II is one of the most significant and earliest records of epilepsy. Specifically, he attributed the king's illness to either an angry God or a holy disease. He also speculated about the option that diseases were somatic. It is the first record to consider epilepsy as a somatic disease. This was crucial for beginning the transition of understanding the etiology of the disease as unnatural to somatic [13]. It is believed that Homer's description of the Trojan War in the Iliad contained the earliest records of neurological injuries. A description of the following was given: brain stem injuries, penetrating head injuries, signs of brain death, damage to the spinal cord, brachial plexus, and peripheral, all with signs of injuries. Note that this data is 5,000 years old [14]. Trepanation was performed in Ancient Greece in the Bronze Age. Paleo surgery is an area that dealt with trepanation in ancient times. In 2014, Papagrigorakis et al. [15] described the trepanation of the right parietal bone of the skull of a 30-year-old man found in the Delphi area. The tests were performed on computed tomography (CT). It was concluded that metal tools had been used and that they dated between 1900 and 1600 BC.

Egyptian pre-Hippocratic medicine

Ancient Egypt is a great civilization that lasted from 3300 to 525 BC. Among the oldest medical records are those that originate from ancient Egypt. The Egyptians significantly contributed to our understanding of the vascular system. However, perhaps the greatest medical significance of the ancient Egyptian data is precisely in the fact that they were the first to set up a concept that we understand today as public health. It should be noted that ancient Egyptian medical sources and the confluence of Greek pre-Hippocratic medicine were claimed by Pliny the Elder and Galen [1, 2, 15].

As in Mesopotamia, scholars in Egypt also developed mathematics and astronomy. The country had a long cultural continuity. They started as nomads but established a strong system of law and rule. This allowed for relative stability in economic and political terms. Such societies could record data, impose rules and standards, and train people for a variety of occupations. All this is a prerequisite for medical development. They were able to impose different laws, and that was of special importance for public health.

Naturally, a mystical view of the world was to be expected. In that sense, they also observed the human body. The ancient Egyptians saw diseases as magical entities with physical manifestations. They believed that spirits, demons, and Gods created diseases by blocking the standard channels of movement of the spirit in the human body. The entity that was physically blocking the channels was allegedly Wekhedu. They thought there were 46 channels, and once they were blocked, pus appeared. They thought the Gods could get angry by bad behavior or in some other way. Like every pantheon, the Egyptian Gods had their own sectors, even in the domain of health. The goddess of medicine was Heka. During pregnancy, women were protected by Bes. Serket protected and healed from the scorpion bites. During the treatment, these channels were magically unblocked. In that sense, patients were treated with a combination of magical and physical methods. In the beginning, there was no doctor as a profession. The treatment was performed mostly by priests of Sekhmet. Sekhmet was an Egyptian warrior goddess and the goddess of healing, curses, and threats. Only in the later period did the forerunners of today's doctors appear. Egyptian doctors were widely known in foreign countries. As magical means, they used prayers, incantations and rituals, amulets and good luck charms, tattoos, statues, and gifts. The first recorded Egyptian physician was Hesy-Ra in 2700 BC during the reign of King (pharaoh) Djoser. He was the commander of doctors and dentists. The first recorded Egyptian physician was Peseshet about 2400 BC, but both of them are thought to have existed at least 500 years earlier. The best doctors worked in the palace. There were medical supervisors and specializations (ophthalmologist, dentist, stomach doctor, proctologist forerunner). Interestingly, the proctologist was called "*neryphuyt*", which literally means anal shepherd [2, 15]. Interestingly, the punishments for bad treatment were so rigorous that the doctor could have been sentenced to death.

From the physical methods, they used rudimentary surgery, herbs, and some tools. There is even a display of Isis on the birthing stool. They learned about the human body through the process of mummification. The economic potential enabled them to procure medicines and plants from the most remote areas for at least some members of society. Moreover, in the absence of immediate existential care, they were able to experiment with treatment and raise the quality of life standards.

There are records stating they took care of the health of the builders of the pyramids and that the builders were given some variant of compensation in case of illness. For the time they lived in, it was surrealistically advanced. Needless to say, the average resident could not even dream of this level of quality of life and health care.

The medical literature of ancient Egypt is one of the richest of that period. The Ebers papyrus (Figure 2) is among the oldest medical records. It is believed to have been written in about 1500 BC. The document may possess material dating back to 3400 BC. The Ebers papyrus contains over 700 magical formulas, incantations, and prescriptions for medicines. Some of the data from the Ebers papyrus still have credibility today. Osteology was quite credible at that time, and they also knew something about how the brain and liver worked. In addition to the Ebers papyrus as the most valuable preserved document written in the hieratic script (13 medical papyri in total), the Edwin Smith papyrus is also worth mentioning. Edwin Smith was a rich American who bought the papyrus in 1862 and donated it to the library of the New York Academy of Sciences. This text is a real textbook of orthopedics and traumatology. However, the most important medical knowledge of ancient Egypt was related to blood circulation. The Ebers papyrus [16] mentions hemiplegia and brain injuries [2, 15].

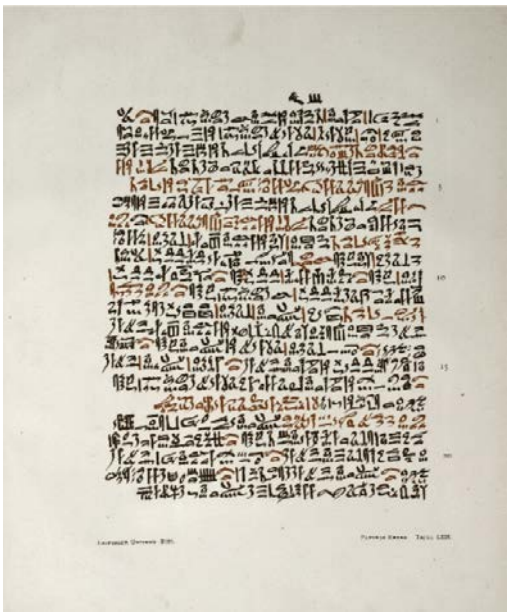


Fig. 2 – Papyrus Ebers, Leipzig University [16]. (http://digi.ub.uni-heildelberg.de/digilit /ebers 1875bd1/-page 21)

Egyptian vision of blood flow

The channel system was believed to look like this: Vessels come from the heart and carry the appropriate fluid for each part of the body. It is believed that the air goes first to the heart, then to the lungs, and then to the stomach. The nostrils have four vessels – two carry mucus and two carry blood. The 'breath of life' enters the right ear, and the 'breath of death' enters the left ear. Four vessels lead to the parietal part of the head, and if something is not right with them, the person goes bald. There are four vessels in the forehead for the eyes, and the problem with them causes eye diseases. Six vessels reach the soles of the feet and six lead down the arms to the fingers. Four vessels bring air and fluid into the lungs and spleen. Two vessels carry urine to the bladder. Four vessels supply the liver with liquid and air and must not be overfilled because it causes diseases. Two vessels enter the testicles and provide semen. Two vessels go into the glutei muscles. Finally, four vessels that carry air and feces go into the anus.

Although they made many mistakes in describing blood flow, it is still fascinating how much they understood it at all [17]. However, they had access to blood vessels visually only through the process of mummification. In no way could they functionally examine the blood vessels. Yet, they understood that the heart was the center of the bloodstream and that it pumped blood into the body through blood vessels. Furthermore, they considered the heart to be the meeting point for vessels that carried not only blood but urine, tears and semen, and feces. That system of vessels was called Metu. It was thought that feces could contaminate parts of the body that it did not need. For that reason, the enema was considered a treatment for many diseases, such as malaria and smallpox. However, they thought that the most important physiological function was breathing [2, 17].

Diseases of ancient Egypt

Ancient Egyptians used opium or thyme for pain. For headaches, they advised to mash together flour, incense, the wood of we, wane plant, mint, a horn of a stag, sycamore seeds, mason's plaster, and water and apply to the head; or use poppy seeds or aloe. They used honey, milk, and frankincense for asthma.

Sandalwood, mint, garlic, and juniper were used for digestion, and mint for bad breath. Emetic was mustard, and antiemetic mint. Epilepsy was treated with camphor. Interestingly, they treated the cold with incantations. They also had a rudimentary knowledge of gynecology. They were acquainted with the signs of pregnancy and herbal contraception. They used a plug of crocodile scale for contraception as a kind of diaphragm. They knew about some gynecological diseases as well. Ancient Egypt had the knowledge of dental treatment. For gingivitis, they used cumin, incense, and onion. The pain was relieved with opium. They even drilled holes in the bones to heal the abscess. It was not noticed that they extracted the teeth; they filled their teeth. They understood some mental disorders such as dementia and depression, believing that they were the act of angry Gods and evil spirits that blocked the channels. They knew about some skin, intestinal, and eye diseases. They treated burns with aloe, and willow leaf wraps cured inflammations [18].

Ancient Egyptians performed some surgical procedures. Specifically, they knew how to repair broken bones and dislocated joints, perform amputations, and operate on abscesses and tumors. This surgical knowledge was also a part of the mummification. For instance, they inserted a hook through the nose to break bones (probably *lamina cribrosa*) and remove the brain. They used hooks, spoons, knives, and even forceps. They tried to fill the bone holes with oyster eggs, probably as a variant of homeopathy. They had prostheses, but only when mummified – they were not a therapeutic tool. They also performed circumcisions. They sutured the wounds; they burned wounds and hemorrhoids (primitive cauterization). They drew blood [1, 2, 18].

However, perhaps the beginning of medical hygiene was the greatest contribution of ancient Egypt to medicine. They understood the concept of infection and dirt. They taught people that rotten food, especially fish, and dirty water were dangerous. They advised bathing and cleaning food. They highly valued cleanliness so much that they connected it to religious practices. They believed that not only cleanliness but also makeup around the eyes contributed to the protection from diseases. The priests wore white linen robes and regularly washed the body, dishes, and clothes. They used mosquito nets because malaria was common. They even had primitive toilets [1, 18].

Conclusion

Pre-Hippocratic medicine is the beginning of the systematization of human treatment. Everything we know today about medicine dates back to the pre-Hippocratic period. Ethics, medical responsibility, phytotherapy, surgery, hygiene, public health, family planning, immunization, and even medical specializations have their roots in pre-Hippocratic medicine.

This period is often associated with the mystical in medicine. If this knowledge were applied today, in most cases, it would certainly belong to pseudoscience. However, things must be viewed in the context of a given time and historical-cultural circumstances. With the few resources and options they had, these people laid the foundations of today's scientific medicine. Not to mention that we still use some of their conclusions to this day. Surgeons often use their procedures, and their work with plants is largely the basis of pharmacology. Pre-Hippocratic medicine needs to be well researched. Some forgotten empirical knowledge of the old doctors may prove to be life-saving.

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