REVIEW

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Stroke in Ancient Mesopotamia

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ABSTRACT

Introduction: More than 6000 years ago, the cradle of civilization, Mesopotamia, grew-up in what is known today as Iraq. The history of cerebrovascular diseases in Mesopotamia is insufficient to supply scholar needs. Therefore, the goal of this review is to highlight some remarkable points in the history of what we may coin as “stroke medicine” during the ancient Mesopotamian eras and to explore the knowledge and expertise of ancient healers. The neo-Sumerian period (2112-2004 BCE) documented, through clay tablets, many medical records about two kinds of medical specialists; the āšipu (exorcists) and the ašu (physician-priests). **Methods and findings:** The information herein was gathered through literature review using online resources, such as NCBI, Google Scholar, PubMed, UCLA, and HINARI. Initially, most of the knowledge we have got was acquired mainly from two well-known transliterated cuneiform texts. Both tablets had clearly addressed stroke. One tablet, part of the “diagnostic” series is currently in the Louvre Museum in Paris, while the other one is in the British Museum in London and is part of the “therapeutic” series. The Mesopotamians had noticed and documented vascular disorders of the brain and some pertinent diseases. The ašu and the āšipu demonstrated an observational knowledge of anatomy and but no knowledge of the nervous system, the concept of pathology, or physiology as we call them today. Not all paralysis cases were viewed as a curse or an impact incurred by a supernatural deity. Physical treatment was mentioned to the patients. The familial occurrence of stroke was a well-known trait in that ancient period. **Conclusion:** This descriptive review tells us that the history of stroke in the medical practice was well-encountered in the first half of the second millennium BCE and that physicians were keen observers to describe stroke presentation and prognosis.

Keywords: Mesopotamia, stroke, cerebrovascular disease, history of medicine.

1. INTRODUCTION

More than 6000 years ago, the civilization of ancient Mesopotamia rose-up along the banks of two great rivers in the Middle East, the Euphrates and the Tigris (in modern-day Iraq). The people living there had established many cities (such as Uruk, Ur, and Eridu), mainly around a deity temple. The cultural and political unity, made by Sumer, Akkad, Babylonia, and Assyria, had founded large-scale empires through the kings and rulers of these eras (1). So far, we can identify almost a thousand Mesopotamian clay tablets and scripts, some of them date back to 3000 BCE, which describe certain illnesses and the ways of their therapy (2).

2. METHODOLOGY

This article looks into the historical aspects of stroke medicine in the Ancient Near East. The information was collected through literature review using online databases of NCBI, Google Scholar, UCLA, and HINARI. The article includes a brief perspective historical analysis of medicine as well as the evolution and knowledge that characterized stroke

medicine in Mesopotamia. By using this historical method, we have identified the main facets: the concept of stroke, etiology, healers, and practice by the use of remedies.

3. DISCUSSION

In spite of the scarcity of the ancient history of cerebrovascular diseases, but we can open a small historical window through this review. The documentation of science was one of the mandatory elements in the schools of scribes, which were created during the neo-Sumerian period in about 2144 BCE by King Ur-Nammu. However, the major summit was during the old Babylonian period. In these scribes' schools, by using the cuneiform script, both adults and children were taught the Sumerian and Akkadian languages and numeracy; in addition, medicine, laws, geometry, administration, and accounting were also included (3).

3.1. HEALERS AND PHYSICIANS

The neo-Sumerian period (2112-2004 BCE) had preserved many medical documents about two types of medical specialists. The first, called āšipu (or exorcists), who did a metic-

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ulous examination of the patient's body and of the environmental circumstances relevant to the patient's illness. The *āšipu* was a mediator to the gods because they were tolerantly dealing with the evil and supra-natural powers. The second specialist is much more like a scientific physician, called *ašu*; physician-priests who carried out an empirical practice by prescribing a remedy containing a plant, an animal, or a mineral in the form of an amulet. They treated wounds and injuries, dealt with broken bones, and gave antidotes. Nevertheless, patients had a choice to visit either of them (4). However, the therapeutic Sumerian tradition used a sort of concrete remedies to relieve some ailments (5).

As in nowadays, ancient people in Mesopotamia requested consultations from Assyrian-Babylonian healers. For example, in 1280 BCE, the Hittite monarch Hattusilli III asked the Babylonian king to send an *ašu* and a *āšipu* to his court, in order to treat him. It seems that the Hittite kingdom was exclusively dependent upon the Assyrian-Babylonian medical science (6).

3.2. ANATOMY

The process of mummification was not practiced in Mesopotamia. Thus, the knowledge and details of the human anatomy in Mesopotamia were significantly less than that of ancient Egypt. The *ašu* and the *āšipu* had understood only an observational knowledge of anatomy but no knowledge of the brain and spinal cord. The reason behind this was that Mesopotamians were restricted by the religious taboo against dissecting a dead corpse. However, they dissected only the liver and the lungs of perfectly healthy animals (7). The circulatory system was not known by healers. The heart for instance (the Assyrian term was “*libbu*”, which means the heart) was considered the center of emotion and thinking because of the remarkable change in the heart rate during excitation and emotional outburst. The blood “*damu*” (which is the origin of the Arabic word of blood “*Dem*”) was well-known to sustain the life of an individual. The blood vessels were also recognized by Assyrians-Babylonians and they called them collectively “*Sherianu*” (which is also the origin of the Arabic word “*Sherian*”), but the term seems to coin the arteries only (8). They understood the importance of taking the patient's pulse and could offer rational explanations about diseases. In the Epic of Gilgamesh, written more than 4600 years ago, when Gilgamesh's friend, Enkidu, died, Gilgamesh said, “I touched his heart and it does not beat at all,” (9).

3.3. DESCRIPTION OF STROKE-RELATED SYMPTOMS

Many of the transliterated Babylonian medical texts of clay tablets had mentioned and described the so-called neurologic anguish. But, the most distinguishable sources addressing stroke are actually two clay tablets. The first one is tablet 27 in the “diagnostic” series (AO6680) in the Louvre Museum in Paris, which dates back to the 11th century BCE. The second one is part of the “therapeutic” series and is concerned with stroke treatment (K.2418+), which is housed in the British Museum in London (10, 11) (Figure 1). The first line of the text of tablet 27 in the “diagnostic series” reads, “If a man is suf-

Figure 1. Tablet K.2418 of the “therapeutic” series. The tablet was fragmented and only the left half of it has survived. It contains 26 lines of Akkadian script about the medical treatment of stroke. Not on display. From the library of Ashurbanipal II at Kouyunjik (in modern-day Mosul Governorate, Iraq). Neo-Assyrian period, 7th century BCE. The British Museum, London. Photo ©Trustees of the British Museum. Used with kind permission, under CC BY-NC-SA 4.0 license.

Figure 2. Gypsum bas-relief showing a dying lioness. The lioness was hit by two arrows, which appear to pierce the lower back. The animal roars and walks in agony, using her forelimbs and dragging the hindlimbs. She has paraparesis. The 3rd arrow hits the left shoulder. From the North Palace of Ashurbanipal II at Nineveh (in modern-day Mosul Governorate, Iraq). Neo-Assyrian period, circa 645-635 BCE. On display at the British Museum in London, Room 10a. Photo ©Osama Shukir Muhammed Amin.

fering from facial paralysis and half of his body is paralyzed it is “stroke” (7, 10, 11).

Figure 3. Gypsum bas-relief showing a dying lion. The animal's lower back was hit by an arrow. The lion vomits blood and his hindlimbs are flaccid, indicating that he has paraparesis. Another arrow seems to hit the lion at the neck. From the North Palace of Ashurbanipal II at Nineveh (in modern-day Mosul Governorate, Iraq). Neo-Assyrian period, circa 645-635 BCE. On display at the British Museum in London, Room 10a. Photo ©Osama Shukir Muhammed Amin.

The notification and registration of stroke disorders and some relevant behaviors observed in the Land Between Rivers, Mesopotamia, were understandable, to some extent, compatible with our own in contemporary medicine. The term *mišittu*, used as a specific description of and is perfectly equivalent to the word stroke adopted by the *āšipu*. Of interest is the *āšipu*'s recording of stroke according to the functional loss on one side of the body and to a partial or complete loss of movements in specific body parts (facial, arm, hip and leg symptoms) (12).

Assyrian *āšipu* knew the consequences caused by injuries localized in certain areas of the brain: a lesion in the left hemisphere will produce aphasia, while if the wound is located on the right side, the patient will suffer a paralysis on the left side of his body. In addition, the *āšipu* prognosticates the stroke according to the side of paralysis. Right-sided paralysis associated with aphasia carries a gloomy prognosis than the left-sided one (12). The *āšipu*'s description of paralysis resulting from a mild stroke or transient ischemic attack appears to be dealt with in the following example: "If he has a stroke and either his left side or his right side is affected and his shoulder is not released, but he can straighten out his fingers and he can lift his hand and stretch it out and he is not of food or drink-affliction by a ghost of the steppe. Recovery in three days" (12).

The Babylonians recognized the objective descriptions of the unilateral nature of stroke involving the limbs, face, speech, and consciousness depending on physical components (11, 12). They distinguished the facial weakness (mouth paralysis) of stroke from that of uncomplicated unilateral facial paralysis, which is known in modern terminology as Bell's palsy (7). This is shown in the following text: "If a man has a flaccid paralysis of the face, his affected eye deviates from the other and day and night remains open..." (7, 11, 12).

Stiffness and spasticity are features of long-term complications of a stroke and were differentiated from early flaccid paralysis (13). The diagnostic and therapeutic series tablets also revealed the recognition of the spectrum

of the prognoses of stroke, from recovery within 2 or 3 days to persistent disability or death. A clay tablet mentioned that Menanu, king of Elam, suffered a stroke in the 15th day of April "Nisanu", his mouth was paralyzed and he could not speak and he died on the 7th day of March "Addaru" (14). Hence, the tablet describes mouth paralysis and loss of speech, which indicates a dominant cerebral hemispheric lesion, as well as the death, happened after about one year since the calendar was a lunisolar (Umma calendar, started from April and ended by March) (15). However, there were difficulties in discriminating transient ischemic attacks from epileptic seizures and how to differentiate between them. Difficulties were encountered in separating transient strokes from epileptic seizures, as we also face nowadays (12).

The disorders of behavior and awareness were recorded as a mysterious and supernatural phenomenon. Coma and dissociated consciousness were well-known to the *āšipu* and were attributed to a spirit known as *alû*. Accordingly, coma may be associated with spastic paralysis and the prognosis of a comatose patient was also described by the *āšipu* in this text: "If something like a stupor continually afflicts him and his limbs are tense, his ears roar and his mouth is 'seized' so that he cannot talk- the hand of an evil *alû*" (13). The patterns of respiration in comatose patient were also noticed by *āšipu*, such as rapid and shallow respiration and gasps (12).

As in contemporary medicine, many signs of coma evaluation, such eyes-opening, respiratory pattern, and noxious stimuli were also targeted. Therefore, the approach of splashing of water on the comatose patient's face was applied by the Mesopotamian healers. This maneuver produces a facial pain to face, and nasal tickling may incite eye opening or any other distinctive response movement. The following text from a clay tablet reads, "If he has been sick for 6 days and he does not get a respite on the seventh, they throw water on his face and he does not open his eyes- he will die. If he opens and closes his eyes at the water, they throw over him and wails-he will recover" (12).

The Assyrians conceived that a trauma or injury to the middle of the back of lions during hunting leads to paralyzed hind-legs. The lion-hunting bas-reliefs of the Assyrian king Ashurbanipal II, which once decorated his North Palace at Nineveh, depict lions with paralyzed hind-legs as a result of arrows piercing the animals lower back and ending up with spinal cord damage (16) (Figures 2 and 3).

3.4. THE MEDICAMENTS AND REMEDIES OF STROKE BY MESOPOTAMIANS

The treatment typically involved recognizing the illness according to the causative source. After then, some medical agents were used to counteract the disease and its symptoms. This is done simultaneously with certain religious rituals to pacify the gods and goddesses. Limb weakness, heaviness, and stiffness were the usual targets for seeking medical care and therapy. Many clay tablets have told us that the treatment of these stroke-related symptoms had encompassed a multitude of orally administered plant-based recipes (13). The Epic of Gilgamesh

narrates that Gilgamesh was searching out for a curing plant for his friend Enkidu, who was suffering from a deadly illness in order to revitalize his diseased body. Accordingly, the Mesopotamian awareness of pharmacopeia using herbal medicine was well-recognized (17).

The Babylonians had no concept of pathology or physiology as we know them today, but, unlike epilepsy, not all cases of limb paralysis were viewed as a supernatural curse. Physical treatments were mentioned to the patients. It included massaging by using oils from plants and seeds, beer, hot poultices, and leather bandaging, as well as, and possibly, rehabilitation in the form of a crutch, might have been supplied in the case of impaired mobility following a stroke (7).

3.5. THE BASIC CONCEPTS OF CAUSATIVE FACTORS OF STROKE DISORDERS

Like all ancient peoples, the Assyrians and Babylonians believed in evil spirits. These spirits were everywhere, wondering among ruins, cemeteries, and deserts, as well as inside houses. The gods/goddesses, spiritual morals, religious fraternity, and priests/priestesses were dominant concepts in the Mesopotamian culture; therefore, the majority of the neuropsychiatric disorders were viewed as supernatural. However, some Mesopotamian “doctors” did recognize that paralysis could sometimes result from other physical causes, such as snake bite, scorpion sting, or trauma (11). The Assyrians and Babylonians believed that the brain (“muḫu”), was one of the most important parts of the head. In addition, they had noticed that fever is a big concern and reflects a major illness of the head. Other well-recognizable illnesses were headaches, cloudy awareness, bloody eyes, and sun (heat) stroke (12).

The following are remarkable examples of documented and well-described cerebrovascular diseases in the ancient Mesopotamian records. The Elamite king, Humban-Nimena III (reigned 692-688 BCE), who invaded Babylon and revolted against the Assyrians during Sennacherib's rule, died after developing a stroke. His illness was reported as “his mouth seized so that he could not speak” (18). Another Elamite ruler, Humban-Haltash I (who was Humban-Nimena III's brother and reigned from 688-681 BCE), also died from a stroke. Therefore, this stroke familial tendency in the Elamite kings was an outstanding etiological factor to mention (19).

4. CONCLUSION

In spite of having no knowledge about anatomy and physiology of the human body, ancient Mesopotamians were able to observe, document, and treat some illnesses, and stroke was no exempt. The history tells us that the Mesopotamian society understood that some diseases were not merely a curse but rather an abnormality originating from the body itself and that some of them might be treatable.

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