The Dawn of Clinical Medicine: Bronze Age Medical Practice in Egypt

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ABSTRACT

The study and practice of medicine based on the direct observation of patients was at the root of the development of ancient medicine as documented by Bronze Age practices in Egypt. In spite of the influence of theology and magical spells, ancient Egyptian medicine also heavily relied on empiricism and developed systematic practices in what, at the time, was one of the richest and most developed countries in the world. The practitioners were subdivided into three groups, and at times were further subdivided into specializations. Data from different sources indicate that these doctors tended to be members not only of the upper classes, but also of other social classes as well, thus all classes benefited from the medical practices. Medical manuals recorded the result of some of this work, thanks to a trait that distinguished Egypt from most nations at the time – writing, which had been developed to the point that long and complex documents exist from as far back as 2500 BC. Repeated practices identified in the medical manuals guaranteed rigor for the medical endeavors. Exposure to ash from the catastrophic Santorini eruption at the end of the 17th century BC triggered the development of new remedies for ash-based ailments, and appears to have been linked to a wider dissemination of medical data. Int. J. Hist. Philos. Med. 2012; 2: 1-9. ©2011 Biomedicine International, Inc.

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INTRODUCTION

Egyptian medicine: a mixture of magic and science

The medical text from ancient Egypt known as the Ebers Papyrus, which was finalized around 1550 BC, contains a passage (Eb. 854 a) indicating that at that time physicians were subdivided into three groups. The swnw were physicians, whose work would be the closest to the modern definition of a medical doctor; at times swnw specialized in various fields, treating only eyes, the head, teeth, or the stomach, which surprised Greeks such as Herodotus as noted in his Histories, 2.84. The wab were medical priests in the sense that they were physicians and, at the same time, were priests of Sekhmet, a goddess who was credited with unleashing disasters such as cataclysms and epidemics. Finally, the third group was composed of nerep and sa who served the god Serket, handling poisons. Inscriptions show that physicians were allowed to belong to more than one of these groups simultaneously.

The characterization of the doctors, which include a clear use of theological references within medicine, reflects the fact that ancient Egyptian medicine understood health within a philosophical context that encompassed both theology and science. Thus, diseases and remedies were understood in a framework of gods, principles and spirits battling one another. One such principle at work is represented by the whdw, also transliterated as ukhedu, which were credited with making people sick, people dying, bodies decomposing,
etc., hence the translation of whdw as degenerative principles. In the view of the Egyptians, such principles required appropriate care – such as defense – in case they were present. Such views in ancient Egyptian medicine ought to receive careful consideration. In fact, outright dismissal of such principles as the fruits of superstition shortchanges the achievements of Egyptian medicine. Outright dismissal of the whdw fails to capture the intuition that some individuals are more prone to getting sick. This phenomenon, which today is a common-place and is attributed to mutations, malformations and/or weaker immune systems favoring the formation and/or development of diseases, would have been observed – at least phenomenologically – by Egyptian doctors as well.

The blending of science and theology comes from the fact that Egyptians understood the world in a Weltanschauung whereby gods directly intervened in day-to-day life. Egyptians considered their society to have been blessed by such gods. In fact, Egypt, unlike many countries, could rely upon a reliable source of water, the Nile. The river regularly flooded its banks, fertilizing them. Egyptians and foreigners visiting Egypt were very well aware of this fact, which enabled Egyptians to develop their society under more stable circumstances than were found in other areas. The Greek philosopher Aristotle (384-322 BC), the son of a physician, independently confirmed that Egyptian medicine developed from a clinical approach. In his Metaphysics (Metaphysica, 1-981b), Aristotle stated that as a whole, Egypt had resolved its practical necessities, which enabled its learned class to move to higher forms of knowledge such as mathematics, because that class was now able to devote its time to such endeavors. Aristotle’s conditions would have been fulfilled by 1800 BC. As per the text now known as the Rhind Mathematical Papyrus, which is a copy of a text dated by the use of grammar and words to roughly 1850-1800 BC, mathematics was well known in Egypt, where forms of combinatorial calculations were known. Focusing on medicine, a wide array of sources such as medical papyri, mummies, archaeological digs, and artistic representations, show that a professional class of doctors existed and tended patients as far back as the mid-3rd millennium BC. Inscriptions indicate that some patients were royal or otherwise linked to the court. Extrapolations from medical texts indicate that patients also came from other social strata. For instance, the military appear to have been the primary recipients of the operations listed in the Edwin Smith Papyrus as these operations tended to fix broken bones rather than ablations, dentistry work or other more “standard” operations better suited to civilians.

It makes sense, given the necessity of treating patients, that a professional group of doctors existed and was subdivided by category and/or specialization, as confirmed by Aristotle’s testimony, and that remedies had developed empirically. However, no records of number or identities of patients used in developing treatments, or the number of patients to whom treatments were applied, have so far been found. With regard to the ailments of these patients, not unlike today, they would have presented with a wide array of diseases and other ailments that needed medical care. Given the shorter average life span in ancient times, ancient Egyptian doctors would have mainly observed patients affected by transmissible diseases, and relatively few by chronic diseases, which tend to develop later in life, although medical papyri do record both classes of diseases.

Theoretically, in a country where the annual floods of the Nile resulted in stagnating waters for 2-3 months each year, malaria ought to have been a big problem. However, to this day, the best data for malaria in ancient Egypt come from mummies rather than
medical manuals,\textsuperscript{11,16} possibly indicating that malaria cases are just waiting to be identified in the medical manuals, perhaps in treatments of individuals affected by burning forces or principles, or even a presence in the air. One should not forget that elsewhere and for a long time, malaria had been attributed to bad air, hence the name \textit{mala aria} – bad air in Italian – as well as to marsh air, hence the alternative name ‘paludisme’ for malaria in French.\textsuperscript{17} Another disease known to have afflicted Egyptians is tuberculosis, which is attested both in mummies and probably in the \textit{Ebers papyrus} in \textit{Eb. 860-861}.\textsuperscript{2}

Scenarios for epidemics have been reconstructed, mainly from medical manuals. Briefly, an epidemic of tularemia struck the eastern Nile delta around 1715 BC creating unstable sociopolitical conditions,\textsuperscript{18} which may be held responsible for the arrival of another pathogen, which around 1710-1680 BC resulted in an epidemic of diphtheria or a diphtheria-like disease.\textsuperscript{19} The manuals, corroborated by archaeological findings, also show that Egypt was spared from the so-called Hittite plague that engulfed much of the Middle East in the late 14\textsuperscript{th} century BC notwithstanding the strong ties between Egypt and the areas where the plague was present.\textsuperscript{20}

It is also possible that weather anomalies, such as those associated with the Santorini eruption at the end of the 17\textsuperscript{th} century BC, and another storm affecting central Egypt as recorded in the tempest stela around 1570-1560 BC,\textsuperscript{21} may have affected the health of Egyptians. For instance, corpses may have attracted vermin, and also have resulted in cases of cholera. Additionally, the higher than usual humidity from the increased precipitations may have resulted in a greater than usual number of cases of diseases vectored by insects and other invertebrates (e.g. malaria) that would have proliferated under such meteorological conditions.\textsuperscript{22}

Other issues that would have kept doctors busy are work-related accidents, attacks by animals, wounds from battles and complications thereof as clearly established in the \textit{Edwin Smith Papyrus}\textsuperscript{23,24} infertility,\textsuperscript{25} and an otherwise odd set of ailments that the manuals describe as treating burns with alkalis. Such remedies single out injuries from acids, which, in the pre-industrial Egypt of the Bronze Age, consisted of fruit juices, derivatives thereof such as vinegar, and other products such as yoghurt, i.e. items not known to cause burns needing medical attention. Since the only other possible caustic agent had to come from nature, the burns were most likely from sulfates in airborne volcanic ash that precipitated over Egypt, a land without volcanic activity in historical times.\textsuperscript{22,26,27}

\textbf{Clinical medicine in the medical papyri}

In its most complete form, a treatment in an ancient Egyptian medical papyrus would list a diagnosis of the ailment, a prognosis for the patient, a prescription for the patient, and an accompanying spell. The last component, the spell, should not detract from the validity of the treatment. It was understood either to activate or to invigorate the prescription. In such a light, it is possible that the spell did actually benefit the patient to whom the treatment was being applied. After all, the patient would have believed that the spell would favor the healing process, and so it could have played a role with results akin to what today is known as the placebo effect.\textsuperscript{28}

Paragraph 55 of the \textit{London Medical Papyrus} (\textit{L 55}) provides a good example of the clinical side at work when treatments were being developed. \textit{L55} reports a diagnosis of a “body burned by red water”. The diagnosis actually continues and blends into a spell,
which calls for “the body not to form white bodies and worms”, implying that, without treatment, white spots and larvae of insects would have formed, and thus white spots and larvae did form in many cases. The author of L55 then added a prescription of “clay, resin substance, ochre, plant dye, ox fat, wax”.

Going stepwise, the first thing to notice is that one item is actually missing from L55. In other words, this therapy is quite different from standard ones for burns: the area affected by the burn was not washed as is standard practice. In fact, as observed by the author of the treatment, the very burn was caused by waters that had turned reddish. Since rinsing was out of the question, and the most abundant water source was the one of the Nile, it stands to reason that it was Nile water which having turned reddish had caused the problem in the first place.

The treatment prescribed was one of bandaging with material soaked in a medical mixture. The active components of this mixture point to acid-derived burns: clay from wells, a plant dye, and ochre, appear to constitute the active ingredients, while wax, fat, and resin appear to have formed the excipients of the formulation. Egyptian clays tend to be alkaline; similarly, plant extracts provide strong alkaline substances, and ochre is known for adsorbing acids. The remedy falls within the class of prescriptions developed in the wake of the fallout of volcanic ash over Egypt, which would have triggered a flurry of new remedies for ailments that had not previously existed in Egypt, which was a country devoid of volcanic activity during historical times.

Another illustration of the hands-on approach by the ancient Egyptian doctors comes from the aforementioned Ebers papyrus. Section 347 (Eb. 347) and 348 (Eb. 348), describe ophthalmological treatments again linked to volcanic fallout as suggested by the use of alkaline active treatment. Ash fallout covering individuals would have first affected the upper part of the body, hence the eyes. The white spots that formed in both eyes were treated with turtle bile, an alkali, pointing to an insult from acids, and thus volcanic ash most likely from fallout. Honey, which would have formed a paste, was then added. The latter treatment also prescribes a polysaccharide paste enhancing the use of honey. Once again the active ingredient is an alkali. The eyes being treated are described as being reddened by blood, which is consistent with individuals whose eyes were dusted with ash attempting to scratch off the ash, which, since it was a mixture of sulfates and natural glass, would only have made matters worse.

In other words, the fallout of ash presented the Egyptian doctors with new ailments as Egypt was devoid of volcanic eruptions in historical times, implying that Egyptian medicine was without ready-to-use treatments. Thus, using technologies developed earlier, such as pastes, doctors looked for active ingredients that could be blended in and that provided relief for the patients. Another piece of information that can be retrieved from the medical papyri comes from repetitions. Some of the recipes are identical or quasi-identical in several different medical papyri, or occur in duplicates.

Thus, a treatment for burns resulting in k3k3wt, or blisters, over the body, is found in the London Medical Papyrus (L19) as well as in the Ebers Papyrus (Eb. 549). Similarly, remedies in the Edwin Smith Papyrus (ESmith. 21.3-6 and ESmith. 21.6-8) are also found in the Ebers Papyrus (Eb.714 and Eb.715) and the Hearst Medical Papyrus (H.153 and H.154). At times whole sections are duplicated. Thus, the two remedies L15-16 in the
London Medical Papyrus correspond to the four remedies Eb.494-495 in the Ebers Papyrus, while L47-48 correspond to Eb.499-500, L49-50 correspond to Eb.492-493, and L56-57 correspond to Eb.504-505.

The presence of identical or quasi-identical remedies within the same text, such as Eb.484 and Eb.497 in the Ebers Papyrus, indicates that they are variants of each other. The same phenomenon appears in the London Medical Papyrus L52 and L56, which are variants of each other and furthermore correspond to a treatment in the Ebers Papyrus, Eb.504. This phenomenon of duplication would indicate that texts were being copied, that small manuals listing a few remedies existed at several sites, and that these were integrated into larger works. The existence of such small manuals would have been very useful for doctors across the country, and most likely served exactly such a purpose.

More insight into clinical practice comes from the Edwin Smith Papyrus, the second longest medical manual from ancient Egypt, which is also known as the Edwin Smith Surgical Papyrus because of its largest section listing surgical procedures. This text was written, as indicated by the handwritings, by two different scribes. The earliest handwriting, based on its style, places the scribe around 1600 BC. The later scribe would have used the space still available on the papyrus scroll decades thereafter, and he added a few remedies to provide a young-looking appearance (ESmith. 21.8-22.10), together with one for treating the anus (ESmith. 22.11-14).

What is important from a clinical viewpoint is that the first scribe copied a set of surgical operations (ESmith 1.1-17.19). Three facts establish that the scribe copied an older text. The text presents archaisms vis-à-vis the time of the scribe, implying it was from an earlier time. It ends abruptly in the middle of a sentence, implying either that the scribe failed to copy the whole text or that he did not have the full text available. The latter is correct in this case as the scribe had additional papyrus scrolls on which to work, and thus had no reason not to finish the copying work for which he was paid. The operations described start with the treatment of injuries to the head and proceed down the body only to stop with the treatment of the vertebrae, rather than the lower extremities of the body as would have been logical.

In other words, around 1600 BC a text that had lost its final components was copied. The time of the copying cannot have been accidental: the list of surgical operations was not falling apart due to humidity or an attack by rodents. It was missing a piece, perhaps recycled by another scribe, who wrote something very important on the back of a segment of the scroll after having severed it from the original. Thus, there was no immediate need to copy the text because of a concern that it would completely disappear. The need to copy came from a different source: around that time Egypt was plunged in a bloody civil war that lasted decades. Having a copy of the old surgical text would have been useful for soldiers and officers wounded in battle.

That the copying of the work by the scribe was a specific deliberate act is confirmed by the fact that the sections he wrote down after the surgical operations can also be related to a 1600 BC scenario. He wrote down two additional medical texts: a set of eight spells (ESmith 18.1-20.12), and a set of remedies, one treating the restoration of menstruation (ESmith 20.13-21.3), and two treating the complexion with honey, northern salts and natron (ESmith. 21.3-6, and ESmith. 21.6-8).
The spells were meant for the wab of Sekhmet, i.e. medical officers serving the Egyptian goddess of diseases and disasters, warding off disasters that took place in a particular year, the j3d.t renep.t, or “disaster/plague year”. This word for disaster is known from a text, the Story of Apophis and Seqenenre, which describes the onset of the aforementioned protracted civil war.18 The disaster in the third spell (ESmith 18.17-19)14 singles out problems linked to the ability to conceive. As such, the spell is a mirror image of the remedy by the same scribe for women experiencing difficulties with menstruation (ESmith 20.13-21.3).14 Owing to the chemicals involved, such a problem could have been linked to the volcanic ash fallout that is known to have taken place in Egypt around that time,33,39-42 which would have unleashed severe problems for agriculture and Egyptian society as a whole.43 In fact, chemicals such as pesticides have been shown to disturb the length of the menstrual cycle, resulting in missed periods and intermenstrual bleeding.44

The eighth spell (ESmith 20.8-12)14 is another remedy for the disaster/plague year, and briefly mentions the skin is now fine, mirroring the two other remedies listed by the scribe at the end of his portion of the Edwin Smith Papyrus (ESmith. 21.3-6, and ESmith. 21.6-8).14 The last two remedies supply more information as to how to restore the state of the skin. Both used a honey-based paste to which northern salts and natron, which would have had similar or identical effects unless they neutralized each other, were added as the active components. In other words we have an alkaline agent for the skin, implying the skin had been affected by acids, which is consistent with the epidermis being exposed to volcanic ash fallout, or its derivatives, i.e. ash dissolved by rain in the weather anomalies caused by the ash in the first place, or even a volcanic plume hovering over Egypt.

“Clinical trials” in ancient Egypt

At a time well before the events that precipitated the development of pharmaceutical clinical trials to ensure that compounds would not be dangerous and to gauge their efficacy, doctors conducted their own “clinical trials”. Footnotes added to remedies attest that decades or centuries after the remedy had been written down, doctors commented on the very remedy after having used it on patients. For instance, the 33rd paragraph of the Kahun Gynecological Papyrus, possibly written around 1800 BC,25 details a recipe to alleviate the pains related to childbirth. The recipe asks the pregnant woman to grind beans with her teeth, and adds that the method has been observed to be effective in preventing acute pain in many cases (literally “one million times”). Such a comment could only have arisen from the direct observation of individuals over a long period of time. Such a comment also attests that the individuals visited by the doctors must have come from social classes that did not exclude commoners, or the doctors would not have been able to state that the observation had been noticed – even if metaphorically – “one million times”. Similar comments appear in other medical texts.

In the Edwin Smith Papyrus, there is a cosmetic to rejuvenate the skin by removing wrinkles and age spots, which was written down by the second scribe, indicating it was written – or copied – a few decades after 1600 BC.14 It is a lengthy and detailed protocol for the preparation of a waxy compound from almonds. The last few lines show the intervention of a medical practitioner stating how and where to apply the compound. Last but not least, the last line reads “Good a million times”. If we did not have the notes in the Kahun Gynecological Papyrus, and had we not the few lines of the medical practitioner in this text, today one would think that “Good a million times” was some marketing
ginmick from thousands of years ago. Yet again, we have an instance pointing to medical doctors looking for the effects of a remedy on a large scale, i.e. a Bronze Age approximation of what today are clinical trials.

Furthermore, in the *London Medical Papyrus*, a text finalized around 1335 BC and collecting material possibly from as far back as 2500 BC, there are several instances of doctors having added footnotes to remedies. Briefly, *L12* was annotated with a statement saying that the doctor had seen the effect of the remedy himself, and the treatment worked. The implication is that the doctor who added the note was not the one who developed the treatment. An almost identical comment is found in *L26*, which claims to fight off the *whdw* degenerative principles, and also claims the remedy can overpower them. *L14* reports an ailment for which the treatment was later checked and found to work during the time of king Amenehotep III, i.e. during the first half of the 14th century BC. Exactly the same footnote reappears in *L44*, which treats wounds with a cereal extract, and *L51*, which treats burns. A different note appears in *L21*, which treats burns with alkalis. The added comment reads “very good”.

**CONCLUSION**

In Egyptian medicine, physicians and medical infrastructures developed in response to diseases, both transmissible and chronic, as well as to face other health issues such as infertility and the results of accidents. Medical cures, as derived from Egyptian sources and comments by Aristotle, were based on direct practice by the physicians on the population, which included a wide variety of individuals from social strata not necessarily restricted to the world gravitating around the courts. Footnotes in the medical papyri testifying to the efficacy of remedies are one element proving that medical care extended beyond privileged social classes.

Testifying to ability of the Egyptian health system to face adversities, and thus show flexibility and efficacy, is the response to epidemics as well as the response to the ailments linked to the Santorini eruption at the end of the 17th century BC. In the case of epidemics, Egyptians were aware that the two epidemics that affected their country in 1715-1680 BC had come from neighboring Canaan. They also were well aware thanks to diplomatic correspondence that an epidemic had affected neighboring Canaan around 1350 BC. Forms of quarantine are reported in the same correspondence sent to Egypt. It stands to reason that Egypt, which had strong economic and military ties to the region affected by the plague, had developed its own quarantines to bar the entrance of possibly contaminated individuals or animals and that such quarantines worked.

In the case of the Santorini eruption, Egypt had not experienced volcanic activity in historical times, so its medical know-how did not have a ready-made treatment for burns from acids, eyes affected by ash, or intoxication by ash. However, the Egyptians had a “health system”, and it could rely on professionalism, dissemination of data via papyri, and a long-standing tradition of Bronze Age pharmacy. Thanks to the availability of excipients to form mixes for bandages and other treatments such as pastes, and thanks to some insight into the active compounds, Egypt was able to develop treatments empirically and provide relief to victims of the ash.
REFERENCES

27. Trevisanato SI. Six medical papyri describe the effects of Santorini’s volcanic ash, and provide Egyptian parallels to the so-called biblical plagues. Med Hypotheses. 2006;67:187-90.
40. Trevisanato SI. Medical papyri describe the effects of the Santorini eruption on human health, and date the eruption to August 1603–March 1601 BC. Med Hypotheses. 2006;68:446-9.