

Women in medicine through the ages

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SUMMARY

Background: *Female practitioners of the medical arts have been active since the ancient world. The role of women in science, and particularly in medicine, has changed significantly over time.* **Methods:** *We provide a chronological review of the growing knowledge in medicine related to women's activities through the ages with particular attention to occupational medicine. Throughout history hazards have been shaped by the forces that shape work itself, social evolution, shifting economic powers and demographic changes.* **Results:** *Mythical Greece, Egypt and ancient Rome were the cradle of ancient medicine. In the past century, women were allowed to enter the medical profession with increasing acceptance. Some of the most important women in ancient and modern medicine are recalled, such as Mother Pesesbet in ancient Egypt, Artemisia of Caria and Phanistrate and Philista in the Greek period, Hildegard of Bingen, Marie Marguerite Bihéron in England, Elisabeth Blackwell, Emily Jennings, Maude E. Abbott and others. Women in occupational medicine are described separately, such as Alice Hamilton, Harriet L. Hardy, Molly Newhouse and Olga Macek.* **Conclusions:** *Certainly, the first few women who illuminated the way for the generations that followed them into medicine, the women who made outstanding contributions to medicine, and the women who are currently finding success in medicine deserve our respect and admiration.*

RIASSUNTO

«**Le donne in medicina attraverso i secoli**». *Le donne che praticavano l'arte medica erano attive fin dai tempi antichi. Il ruolo delle donne nella scienza, in generale, e particolarmente nella medicina si è modificato in modo significativo nel corso del tempo. In questa presentazione, passiamo in rassegna cronologica la conoscenza medica sempre maggiore, il ruolo e l'attività delle donne in medicina nel corso della storia, con particolare attenzione alla medicina del lavoro. Nel corso della storia, i rischi occupazionali derivavano dai determinanti del lavoro stesso: l'evoluzione sociale, l'alternanza dei poteri economici e le variazioni demografiche. La mitica Grecia, l'Egitto e l'antica Roma furono la culla della medicina antica. Nel corso del secolo scorso, alle donne è stato concesso di entrare nella professione medica con sempre maggiori consensi. Vengono citate alcune delle donne più rinomate della medicina, dai tempi antichi fino al presente periodo, come Madre Pesesbet nell'Egitto antico, Artemisia di Caria e Fanostrate e Filiste nel periodo Greco, Hildegard von Bingen, Marie Marguerite Bihéron in Inghilterra, Elisabeth Blackwell, Emily Jennings, Maude E. Abbott e altre. Vengono descritte separatamente le donne protagoniste della medicina di lavoro, come Alice Hamilton, Harriet L. Hardy, Molly Newhouse e Olga Macek. Senza dubbio, le prime donne che hanno illuminato la strada per le generazioni successive nella professione medica, le donne che hanno portato un contributo straordinario alla medicina e le donne che attualmente godono di successo, meritano il nostro rispetto e la nostra ammirazione.*

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INTRODUCTION

Women have been present in medicine and health care for centuries. However, people often ask why there are not more women scientists? The main answer to this question may be that institutions of higher education and scientific laboratories and institutes denied women access in the past centuries.

More than half the people involved in health care are and always have been women. Female practitioners of the medical arts were active in the ancient world (9). It appears that women were involved in folk, alternative and commercial medicine as natural healers, midwives, surgeons, bone-setters, medical herb gatherers, and priestesses of the gods (9). The question about the role of women in medicine includes whether they were priestess and healers or second-class doctors (26).

Wise women gathered herbs, and infused them into herbal remedies, provided the everyday nursing care that was almost all the help available for the sick until two centuries ago. They bathed the arthritic and manipulated their joints and looked after pregnant women and delivered the babies. Since most of the remedies provided by the physicians were ineffective until about a hundred years ago, it may well be said that most practical medicine was in the hands of women: the woman healer, a recognised member of society, as depicted in early Egyptian hieroglyphics.

Mythical Greece, Alexandria in Egypt and ancient Rome were the cradle of ancient medicine where the beginnings of anatomy and physiology were combined with the natural philosophy of great personalities such as Hippocrates and Galen (50). Archaeological finds provide helpful information concerning women who performed medical activities. Among the tombs of Imperial Rome, along with medical instruments there are three that belong to female Roman physicians who practised surgery and dentistry (28). In fact, the heritage of women in surgery goes back 5500 years to ancient history (38). At least since the times of the medical school in Salerno in the 11th century, women received licences in surgery (18). Between 1400 and 1800, women in England were widely engaged in medicine and sur-

gery. Because of the restrictions against women as surgeons, women sometime masqueraded as men in order to pursue their profession (18).

ANCIENT EGYPTIAN PERIOD

Egyptian tombs and funerary stelae dating back to the ancient Empire testify extremely well the hierarchies in Egyptian society (3). In earlier centuries, women had a much wider role in medicine in many cultures. The woman healer was certainly a recognised member of society, as depicted in early Egyptian hieroglyphics. In classical Egypt, for many centuries women played a significant role as physicians, notably in the medical school at Heliopolis and Sais. In ancient Egypt, at least one woman had the title of physician (36). Worship of Isis, the great goddess of medicine, was universal among ancient Egyptians (55). Priestesses of Isis were regarded as physician-healers who obtained their healing powers from the goddess (26, 35). Egyptian records demonstrate that, as early as 1500 BC, there were women students and teachers at the medical school of Heliopolis and Sais, and women even performed surgery (38). The history of women as medical and surgical practitioners stretches back to at least 3500 BC (31). On the walls of the sepulchre of Ramses III, near Tutankhamen's tomb, archaeologists have located the most ancient pictorial record of a woman physician (35). Illustrations of women performing surgery were common on tombs and temples throughout Egypt, suggesting that female physicians were widely accepted by the general population (38). Excavation of the tomb of Akhet-Hetep at Giza revealed a monument dedicated to his mother, Peseshet, who is identified by many important titles including "Overseer of Women Physicians". Peseshet held the title of "Lady Director of Lady Physicians" which indicates that there were other qualified lady physicians. She is probably the world's earliest known female physician. One of her duties was to look after the king's mother. She practised at the time the great pyramids were built in Egypt, about 2500 BC (23, 37). The only other named woman doctor in ancient Egypt was Tawe, who lived and practised around 300 BC.

ANCIENT GREEK PERIOD

Some women in classical Greece were known for their medical skills. Many women were well known as herbalists and healers. “Agamade of the golden hair” in Homer’s Iliad was skilled in medicine and herbal lore. Artemisia of Caria who lived around the 5th century BC was a medical student and botanist who gave her name to the *artemisia* genus of plants. In ancient Greece, the goddess Athena cured blindness; Hera, the chief healing deity, and Leto, the surgeon, as well as Pallas and Circe were worshiped for their healing skills (26,35,55). Leto, the wife of Zeus and mother of Apollo, is said to have been a surgeon (38). Hygeia and Panacea, Apollo’s daughters, were “holy mortals” who were probably also independently practicing physicians (38).

Phanostrate was an acclaimed female physician in Athens in the 4th century BC. Greek women doctors taught medicine, took care of patients, performed operations and provided obstetrical care (35). Philista (318-372 BC) was an excellent lecturer on medicine. Because of the restrictions against women, women sometimes masqueraded as men in order to pursue their profession. In 300 BC, an Athenian woman named Agnodice disguised herself as a man and went to the great and famous University at Alexandria, Alexandrian Herophilus. She returned with the best training possible in those times. Aspasia was another woman doctor of renown from the 1st century AD, Graeco-Roman by parentage. She wrote a classic text on gynaecology, recommended special diets and exercise for pregnant women, and the use of tampons and herbal preparations for contraception. There is also evidence that women surgeons practised in ancient Greece and Rome (31).

ANCIENT ROMAN PERIOD

Women physicians were numerous during Roman times. Archaeological findings provide helpful information concerning female Roman physicians who practised surgery and dentistry (28). Female physicians in ancient Rome, called *medicae*, mana-

ged busy practices and were on equal footing with male physicians (12). In the same period, women physicians were also common among the Germanic “barbarians”.

MEDIAEVAL AND MIDDLE AGES

During the dark ages, women in Christian monastic institutions kept herbal and diagnostic skills alive. The most renowned woman was the mystic Hildegard of Bingen (1098-1179) (45, 48). She was the daughter of a noble family offered to God as a tithe. She had visions, explained as a voice from heaven, and explained by modern writers as migraine. She wrote two medical manuscripts on plant and mineral medicines, and on physiology and the nature of diseases. Her remedies were partly herbal and partly spiritual (7).

ANCIENT CHINESE PERIOD

Judging from the existing documents in China, there appears to have been no apparent discrimination against female physicians in ancient times (56). For instance, in the early stages of medical development in China, the classes were often represented by female students. Many stories passed from dynasty to dynasty with approval of the successful treatment of adolescents by female doctors who were then conferred with honorary titles. Also recorded in history were clinics and pharmacies owned by female doctors. As indicated in many historical documents, outstanding female doctors enjoyed respect equal to that of their male counterparts (57).

MEDIAEVAL PERIOD IN EUROPE

Medicine in medieval Europe benefited from Greek, Arabic, Hebrew and Latin influences. During the Middle Ages, in continental Europe and in Britain, women doctors were known as “wisewomen” and as healers – not only as midwives. Macha, queen of Ireland and a druidic priestess, foun-

ded a hospital in 600 BC, which was used for 600 years (26). In England, women were licensed to practise medicine although they were not allowed to study at the universities.

The medieval period saw an increasing role of women in medicine. However, in the 12th century the newly founded universities of Europe and Britain were not open to women, except in Italy. The 11th-century university of Salerno, Italy, was one of Europe's first. Many women both studied and taught there. The women physicians of Salerno contributed to several textbooks, including the first textbook on women's medicine. Since the times of the medical school at Salerno in the 11th century, women received licenses in surgery (25). The first recorded female medical school faculty member was a famous Salerno teacher, Trotula (16, 35). She described how female doctors did not dare to reveal the difficulties of the diagnosis of sickness to a male doctor. Female doctors dealt with gynaecology, obstetrics, cosmetics, skin diseases, emotional stress and infertility. Her ideas were sensible and humane.

In classical times and in the middle ages, aristocratic women and even empresses had skills in medicine and interest in developing hospitals. For instance, Eudoxia, Empress and wife of the Emperor Theodosius, founded a great hospital in Jerusalem, in the 5th century AD. The empress Julia Anicia (472-512) was deeply interested in medicine and her illustrated codex of Dioscorides' herb treatise has survived. From the 7th century onwards, new hospitals opened, controlled by the church and organized by nuns. During the middle ages, there was a Jacob Felicie de Almaniac an extraordinary women healer of the 14th century. In 1322, she stood trial for the illegal practice of medicine (33).

During the witch-hunts, occurring from the 13th to 18th centuries, women were edged out of the medical profession and lost access to formal medical education. In England and France, the passing of licensing laws and the formation of guilds prohibited women from the practice of medicine.

Barbro Christina Hastesko-Fortuna (1698-1771) studied medicine and was called a "lady of a manor and physician" (32). She treated eye diseases in all social classes in a wide area. The various medicines prepared by her were effective, as testified

by young and old witnesses, particularly when they were used according to her instructions. The most famous medical woman surgeon in Switzerland during the 16th and 17th centuries was Marie Colinet of Bern (38).

There is a tombstone inscription in the churchyard of Newton St. Petroc of Prudence Potter, who died in 1689 and spent her life in the industrious, charitable, and successful practice of "physick, chirurgery and midwifery".

Lady Mary Wortley Montagu is mentioned as an 18th century crusader for introducing England to smallpox inoculation (21, 22, 43, 51). The famous Marie Marguerite Bihéron (1719-1795) played an essential part in the evolution of the ideas concerning the teaching and medical use of anatomical data. Her contribution in that field prepared the way for the important reforms which would take place at the end of the century, leading in particular to the development of modern surgery (8).

Anna Morandi Mazzolini of Bologna introduced the innovative practice of using wax models of diseased specimens in medical teaching and was appointed Professor of Anatomy in 1760.

VICTORIAN PERIOD (19TH TO 20TH CENTURY)

The Victorian debate eventually served to open doors in universities and their medical schools that had previously been closed to women. Elizabeth Blackwell (1821-1910) was the first woman in the United States to receive a Doctor of Medicine degree in 1849 from Geneva Medical College, Geneva, New York (9, 44). She was one of the first advocates of preventive medicine, women's health care and personal hygiene for physicians as a means of reducing the spread of infectious diseases.

Elizabeth Blackwell and Elizabeth Garrett Anderson (1836-1917) established training schools for women in America and England (6, 44, 49, 52) and also established a Dispensary in a poor area of Marylebone in London for treatment of women and children of the lower classes (13, 14, 53).

One of the earliest surgeons in the US Army was Mary Walker (1832-1919) (18). Harriet Kezia Hunt was the first woman physician in the early

part of the 19th century (5). Mary Putnam Jacoby was a prominent 19th century physician and the first woman introduced to the New York Academy of Medicine (5, 55). Elizabeth Garrett Anderson was the first woman in Britain to obtain the title of M.D. but not the first in Europe (1). Nadesha Prokofevna Suslova was the first woman to obtain the title of M.D. in Russia in 1867 (53). Margaret Kennard also took in the aspirant medical women Frances Morgan, Eliza Walker and Louisa Atkins. Garrett Anderson, Jex Blake and Blackwell worked together to set up the London Medical School for women in 1874.

In 1862, a Female Medical Society was established in London providing a higher grade of midwives and also dealing with gynecological and pediatric ailments. A female Medical College was opened in 1864 in London and attracted a number of women seeking medical education.

The first Canadian woman to practise medicine was Dr. Emily Jennings Stowe who qualified in 1867 at the New York Medical College for Women. The first woman graduated in medicine at the University of Manitoba in 1894. Dr. Maude E. Abbott (1869-1940) was among Canada's and the world's most famous physicians and scientists due to her outstanding studies of congenital heart disease. Her atlas of 1,000 cases with clinical, pathological and morphological findings was the first systematic study of these abnormalities. Dr. Abbott developed a patho-physiological classification of cardiovascular defects which was fundamental for the development of cardiac surgery (15). She also considered prevention by prenatal care, recognizing possible genetic and environmental risk factors (27).

Rachel Hirsch (1870-1953), a famous Jewish scientist, was only the second woman to attain a professional medical position at the Charite Hospital in Berlin (34). In 1906, she discovered that solid particles are able to pass from the veins and arteries into urine (Hirsch effect). In 1913, she became the first woman to be named Professor of Medicine in Prussia.

During the first decades of the 20th century, several different kinds of psycho-therapeutic techniques were used. Tora Sandstrom (1886-1949) established herself as a psychotherapist, with consulta-

tion rooms in Stockholm in the mid-1930s (39). It is now 100 years since Dorothy Reed wrote her historic paper on Hodgkin's disease (58).

Margaret Kennard (1899-1976) was an American pioneer in the experimental study on sparing and recovery function (17). Her famous experiments were performed on monkeys and apes at Yale University during the late 1930s and early 1940s. By describing the behavioural effects of brain damage on infantile, juvenile and older primates, she drew new attention to just how important developmental status can be at the time of neural insult. In many respects, Kennard helped launch the modern era of research on sparing and recovery of function by demonstrating that several factors in addition to lesion locus can affect post-injury performance and by recognizing, if neural reorganization does occur, that it probably takes place in spared parts of the damaged system. Florence Nightingale (1820-1910) was a practising mystic in the Western tradition. She was a legendary healer who changed the role of women in the public health system in the middle of 19th century (11).

Kate Hurd Mead (1888) was well known for her lectures on the history of medicine (30, 40).

FIRST WOMEN IN OCCUPATIONAL MEDICINE

Occupational medicine requires the combination of preventive and psychosocial principles with diagnostic acumen and therapeutic creativity (20). The period of modern occupational and environmental medicine was marked by a pioneer work by two female physicians in the United States. Alice Hamilton (1869-1970) was one of the first female physicians in general, and the first to recognize and explore the risks and hazards of occupational exposures in the USA (10, 29). She was a hard-working scientist and a persistent humanitarian worker. She completed her medical education and further training in the USA and Europe.

Alice Hamilton was the first woman appointed to the faculty of Harvard Medical School while all the students were still men (this situation remained unchanged until after World War II) and was a leading expert in the field of occupational health. If

Ramazzini was the father of occupational medicine, it is perhaps not sexist to call Hamilton the mother of this discipline. She was a pioneer in the field of toxicology, studying occupational diseases and the adverse effects of industrial metals and chemical compounds on the human organism.

Living side by side with the poor residents of the community, she became increasingly interested in the problems workers faced, especially occupational accidents and diseases. The study of "industrial medicine" (diseases caused by certain jobs) had become increasingly important since the Industrial Revolution of the late nineteenth century had led to new risks in the workplace. In 1908 Hamilton published her first article on the topic of industrial medicine. In 1910 Hamilton was appointed to the newly formed Occupational Diseases Commission of Illinois, the first such investigative body in the United States. However, Hamilton was still discriminated against as a woman, excluded from social activities and the all-male graduation procedures. Hamilton played an important role in the study and prevention of a wide range of industrial conditions including the elimination of phosphorus in matches and the reduction of lead, mercury, benzene, trinitrotoluene, carbon dioxide and monoxide poisoning.

After her retirement from Harvard in 1935, Hamilton served as a medical consultant to the US Division of Labor Standards, and retained her connections with Harvard as emeritus professor. In 1995 her extensive contributions to public health were commemorated by a US Postal Service commemorative stamp.

Harriet L. Hardy (1905-1993) was the second female physician appointed as full professor at Harvard Medical School (46). A physician and industrial toxicologist, Harriet Hardy was a blazing force in industrial medicine. In a landmark study in 1946, she identified beryllium as the cause of chronic respiratory disease. In 1952, she established the National Beryllium Registry, one of the first registries to collect long-term data on a chronic disorder.

Hamilton and Hardy were co-authors of the second edition of *Industrial Toxicology* textbook.

A tough taskmaster, Hardy engaged industry and government in fierce argument, yet her essen-

tial impulse was practicing medicine. During her 88 years, Hardy was a staunch advocate for workers in clinical care, publications, and court testimony. Just knowing Hardy was an expert witness, at times persuaded plaintiffs to settle. She insisted on the difficult path of joint union-management decisions.

Molly Newhouse (1912-2000), the British doyenne of occupational medicine, recognized that small doses of asbestos caused mesothelioma, which led to an asbestos ban (47).

Olga Macek (1912-1984) was the first woman physician involved in occupational and social medicine in Croatia (4). Olga Macek was particularly interested in traumas suffered by industrial workers. She trained many young female physicians in occupational medicine who worked as industrial physicians and performed regular periodical and systematic medical examinations. A recent statistical report from 2004 shows that more than 2/3 (69.7%) of occupational health specialists in Croatia are women (41).

WOMEN IN MEDICINE TODAY

Women in medicine have travelled a long road to establish themselves as professionals (5). Women are slowly achieving positions of power in medicine (2).

The increasing number of women in medicine in western societies has raised the issue about their impact on medical practice (42). Women can make a difference to how medical care is given in the future. The increasing number of women physicians offers an opportunity to make a significant impact on the quality of medical care (54). Women doctors make a positive contribution to a male-dominant profession. Today they represent nearly 50% of incoming medical school classes. For instance, today medical women in Egypt represent 35%-45% of the staff of faculties of medicine and about one-third of all medical graduates (36). More than a hundred years have passed since the first woman graduated in medicine in Norway (19, 24). Today, in Norway more than 30% of doctors and 20% of specialists are women. In some specialties there are

still few women: 5% in general surgery and 9% in otorhinolaryngology; only in about 10% of the specialties are there a little more than 30% female doctors.

According to statistics released by the American Medical Association recently, it is increasingly likely that the doctor you see for routine care will be a woman. The AMA data indicate that while about only 20% of physicians are currently women, female students make up 40% to 50% of enrolments in medical schools. The increasing number of female medical students is changing the profile of physicians (25). According to the report by the Federation of the Royal College of Physicians, despite the fact that women make up more than 50% of medical graduates, they are under-represented in the advanced medical specialties, in academia, and in senior hospital posts.

NO POTENTIAL CONFLICT OF INTEREST RELEVANT TO THIS ARTICLE WAS REPORTED

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