

Recent Advances on the Nutritional Effects Associated with the Use of Garlic as a Supplement

Historical Perspective on the Use of Garlic^{1,2}

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ABSTRACT The objective of this review is to examine briefly the medical uses of garlic throughout the ages and the role that it was considered to play in prevention and treatment of disease. Interest in the potential benefits of garlic has origins in antiquity and is one of the earliest documented examples of plants employed for treatment of disease and maintenance of health. Garlic was in use at the beginning of recorded history and was found in Egyptian pyramids and ancient Greek temples. There are Biblical references to garlic. Ancient medical texts from Egypt, Greece, Rome, China and India each prescribed medical applications for garlic. In many cultures, garlic was administered to provide strength and increase work capacity for laborers. Hippocrates, the revered physician, prescribed garlic for a variety of conditions. Garlic was given to the original Olympic athletes in Greece, as perhaps one of the earliest "performance enhancing" agents. It is of interest that cultures that developed without contact with one another came to similar conclusions about the efficacy of garlic. Modern science is tending to confirm many of the beliefs of ancient cultures regarding garlic, defining mechanisms of action and exploring garlic's potential for disease prevention and treatment. *J. Nutr.* 131: 951S-954S, 2001.

KEY WORDS: • garlic • allium • Codex Ebers • Hippocrates • Charaka-Samhita • *Historica Naturalis* • Home Book of Health

Interest in the potential benefits of garlic has origins in antiquity and is one of the earliest documented example of plants used for maintenance of health and treatment of disease (Block 1985, Kahn 1996). In this review, we consider briefly the highlights of garlic usage throughout the ages. It is fascinating to observe how ancient cultures developing in isolation from one another came to many of the same conclusions about garlic's action and efficacy.

Ancient Egypt. As listed in Table 1, the earliest known references indicate that garlic formed part of the daily diet of many Egyptians. It was fed particularly to the working class involved in heavy labor, as in the building of the pyramids (Moyers 1996). Indeed, a recurring theme throughout early history is that garlic was given to the laboring classes, presumably to maintain and increase their strength, thereby enabling them to work harder and be more productive.

Whether garlic was also consumed with the same diligence by the upper classes is less certain. It is of interest in this connection that when King Tutankhamen's tomb, which dates from ~1500 BC, was excavated in 1922, cloves of garlic were clearly identified (Green and Polydoros 1993, Kahn 1996). What purpose did the garlic serve in the tomb? Did it have religious significance? Was it a reminder of daily life in Egypt, or was it left by a careless workman during a lunch break? We do not know the answers to these questions, but the presence of garlic in the tomb is strong evidence that the vegetable was in use at the time.

The authoritative medical text of the era was the *Codex Ebers* (Bergner 1996, Lawson 1998), which consisted of a number of volumes. Several of the treatments authorized the use of garlic. The *Codex Ebers* is one of the earliest sources indicating prescription of garlic for the treatment of abnormal growths. It is probable that these growths represented malignancies of one kind or another. Abscesses would also have fit into this category. The *Codex* also prescribed garlic for circulatory ailments, general malaise and infestations with insects and parasites.

Biblical. According to the *Bible*, the Jewish slaves in Egypt were fed garlic and other allium vegetables, apparently to give them strength and increase their productivity, as it was believed to do for the indigenous Egyptian citizens. The Jewish people must have developed some fondness for garlic, because when they left from Egypt with Moses, it is written (Table 2) that they missed "the fish, the cucumbers, and the melons, and the leeks, and the onions and the garlic" (Num. 11:5) (Bergner

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TABLE 1

Ancient Egypt

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- Garlic as part of the daily diet
 - Medical text *Codex Ebers* gives remedies based on the use of garlic
 - Well-preserved garlic cloves were found in the tomb of King Tutankhamen
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1996). It is unlikely that garlic had religious significance for the Jews, although this possibility cannot be excluded. The Talmud, a Jewish religious text dating from the 2nd century AD, prescribes patterns of behavior, including the consumption of garlic for the treatment of infection with parasites and other disorders (Moyers 1996). Although in contemporary life one does not tend to ascribe romantic properties to garlic, its use was recommended by the Talmud to promote relations among married couples, perhaps as an aid to procreation.

Ancient Greece. As noted in Table 3, excavations of ancient Greek temples have unearthed garlic, and the palace of Knossos in Crete, dating to ~1400–1800 BC, contained well-preserved garlic when it was excavated (Moyers 1996). As with the Egyptians, garlic was associated with strength and work capacity. Garlic formed an important part of the military diet, particularly when soldiers were off to battle.

There is evidence that during the earliest Olympics, which originated in Greece, garlic was fed to the athletes before they competed (Green and Polydoris 1993, Lawson 1998), conceivably functioning as one of the first of the so-called “performance enhancing” agents used in competitive athletics. If so, one wonders whether there were prescribed doses, clinical trials and limits placed on the amounts consumed. One imagines that there must have been someone in authority supervising the activities of the athletes as they prepared themselves for the sports competition.

Hippocrates, widely regarded as the father of Medicine, made garlic a part of his therapeutic armamentarium, advocating its use for pulmonary complaints, as a cleansing or purgative agent, and for abdominal growths, particularly uterine (Moyers 1996).

As in the cultures discussed above, garlic appears to have been consumed primarily by the lower classes. It appears not to have been a favorite food item among the ruling classes and its presence in religious temples was not permitted (Meyers 1996), a proscription also found in certain Asian cultures.

Ancient Rome. As in Greece, the Romans perceived garlic as an aid to strength and endurance; it was fed to both soldiers and sailors (Green and Polydoris 1993) and was part of a ship’s manifest when it set out to sea. With the emergence of Rome as a leading power, Greek medicine and its traditions gradually were transferred to Rome. The leading medical authority was the Greek, Dioscorides (Bergner 1996, Riddle 1996), who served as the chief physician for Nero’s army (Table 4). He was the author of a five-volume treatise that

TABLE 2

Biblical

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- Garlic as part of the daily diet
 - On leaving Egypt, slaves missed their “fish, cucumbers, melons, leeks, onions and garlic”
 - Talmud recorded many benefits of garlic, and recommended it for married couples
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TABLE 3

Ancient Greece

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- Garlic found in the palace of Knossos in Crete
 - Soldiers were fed garlic to give them courage, and garlic was associated with war
 - During the first Olympic games, garlic was taken by athletes before they competed
 - Used to protect the skin against poisons or toxins
 - Hippocrates, the Father of Medicine, used garlic
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recommended garlic because it “cleans the arteries.” It should be noted that the circulation of the blood was not discovered until hundreds of years later, and contemporary beliefs held that arteries transported air throughout the body, whereas veins were known to transport blood. Clearly, the concept that cardiovascular status may be improved by garlic, presently a subject of active research, has origins in antiquity. Garlic was also recommended for disorders of the gastrointestinal tract and for treatment of animal bites and for alleviation of joint disease and seizures.

Medicine in Rome was greatly influenced by the writings of Pliny the Elder, a Greek physician who wrote the five-volume *Historica Naturalis* (Bergner 1996, Moyers 1996). Twenty-three uses for garlic were listed for a variety of disorders. Among these was that garlic was believed to confer significant protection against toxins and infections, a finding corroborated by contemporary investigations of the effects of garlic upon activities of P₄₅₀-2E1 and other hepatic degradative enzymes (Block 1985, Pinto and Rivlin 1999).

Ancient China and Japan. The use of garlic as a food and as a medicinal agent has ancient origins in Asia. The best estimate is that by or before 2000 BC, garlic was in wide use in China and formed part of the daily diet, particularly when consumed together with raw meat (Kahn 1996, Moyers 1996). Records dating from that era suggest that garlic was also used as a food preservative, as listed in Table 5.

In ancient Chinese medicine, garlic was prescribed to aid respiration and digestion, most importantly diarrhea and worm infestation (Woodward 1996). As a spicy food, its regular consumption was recommended but in limited quantities. Evidence also suggests that garlic was utilized to treat sadness or depression as well. Chinese medicine has historically been associated with the use of combinations of herbs to form a healing tonic, rather than the administration of single agents. Allium was evidently frequently used in combination therapy. Fatigue, headache and insomnia were often treated with garlic. There are also indications that garlic was used to treat and improve male potency (Kahn 1996). It is believed that garlic was introduced in Japan later than in China, probably ~2000 years ago (Kahn 1996).

Ancient India. Garlic has been associated with the healing process in India from the time of the first available written records. Three ancient medical traditions, i.e., Tibbi, Unani and Auryvedic, made extensive use of garlic as a central part

TABLE 4

Ancient Rome

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- Garlic was fed to troops and to sailors for strength
 - In *Historica Naturalis* garlic was prescribed for digestion, animal bites, arthritis and convulsions
 - Later garlic was used for respiratory ailments and for parasites
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TABLE 5

Ancient China and Japan

- Garlic used as a food preservative
- Formed part of the daily diet with raw meat
- Prescribed as aid to digestion and respiration, to provide energy and lift depression
- May have been used to improve male potency

of the healing efficacy of plants (Moyers 1996). The leading surviving medical text, *Charaka-Samhita*, recommends garlic for the treatment of heart disease and arthritis 2000 years ago as listed in **Table 6** (Woodward 1996).

A later manuscript, dating to ~300 AD, advanced the use of garlic for infections, infestations and worms, weakness and fatigue, and a variety of digestive disturbances. This text, nearly as old as the *Charaka-Samhita*, is known as the Bower manuscript because, after being found in an ancient tomb, it was purchased by a British Army officer, Hamilton Bower, late in the 19th century, who then made it available to scholars.

Garlic was also observed to have a diuretic effect. It is possible that the mobilization of fluid from the extravascular space may have been due to improved cardiovascular function resulting from garlic treatment. It is now well recognized that garlic, appropriately used, will reduce blood pressure (Steiner et al. 1996), improve elevated serum cholesterol [reviewed by Rivlin (1998)], decrease platelet aggregation (Steiner and Lin 1999) and protect vascular endothelial cells from damage by LDL (Ide and Lau 1997); all of these effects are of potential cardiac benefit.

Some religious sects did not permit the consumption of garlic or onions, rather as the Greeks and Romans proscribed garlic in the temples (Moyers 1996). Garlic either was not permitted or fancied by the upper Brahmin classes, whereas in other castes, it was applied externally to help repair cuts, bruises and infections, and it comprised one of a number of perceived aphrodisiacs available from natural plant sources (Kahn 1996).

Middle Ages. Garlic became available in Europe after the Roman legions moved north. During Medieval times, knowledge of the therapeutic use of plants, particularly garlic, was gained and transmitted through the monks. Garlic was grown in the monasteries. The leading text of the middle ages was the *Hortulus* manuscript from shortly after 800 AD, as noted in **Table 7** (Moyers 1996). This volume described all of the plants growing in one cloister that were thought to have medicinal properties: Garlic featured prominently; it is interesting in that there does not seem to have been any objection to its use in a religious setting in that era, in contrast to its rejection by religious leaders in earlier cultures.

Garlic was believed to alleviate constipation when consumed with beverages. Workers outdoors were advised to consume garlic to prevent heat stroke (Khan 1996, Moyers 1996). The recommendation of garlic for those who had to do hard

TABLE 6

Ancient India

- In medical text *Charaka-Samhita*, garlic was used to treat heart disease and arthritis
- In another ancient medical text, known as the Bower manuscript (named after its discoverer), garlic was used for fatigue, parasites, digestive diseases and leprosy

TABLE 7

Middle Ages

- Christian monks preserved knowledge of benefits of plants, including garlic
- The *Hortulus* manuscript described use of garlic
- Garlic recommended raw rather than cooked by the Abbess of Rupertsberg
- The medical school of Salerno taught dietetics utilizing garlic prominently
- Garlic used as a treatment for the Great Plagues

physical labor is a recurring theme dating to antiquity. Another recurring theme is of the upper classes tending to reject garlic and not consider it fit for their consumption.

A leading physician during the latter part of the 12th century, the Abbess of Rupertsberg, St. Hildegard von Bingen (Bergner 1996, Kahn 1996), gave garlic a prominent role in her medical writing. Curiously, she came to the conclusion that raw garlic was more effective than cooked garlic, perhaps because the latter has less pungency than the former. In the Medical School at Salerno, one of the most influential centers of medical learning at the time, food played an important role in the treatment of disease as well as in the preservation of good health. Garlic was classified as a “hot food” to be consumed during the winter to limit the development of pulmonary or breathing disorders (Moyers 1996). Garlic was also utilized against massive debilitation and later in the Great Plagues (Bergner 1996, Woodward 1996).

The Renaissance. With the onset of the Renaissance, increasing attention was paid in Europe to the medical uses of plants. So-called “physic” gardens were established at leading universities to grow plants of medicinal value. Garlic was one of the major plants grown for this purpose (**Table 8**). A leading physician of the 16th Century, Pietro Mattioli of Siena, wrote widely, and his work was translated into several other languages. He prescribed garlic for digestive disorders, infestations with worms and renal disorders, as well as to help mothers during difficult childbirth (Moyers 1996).

There are indications that during this time, many of the ruling classes in Continental Europe began to adopt garlic and not restrict its consumption to the working classes. It is said that King Henry IV of France in the late 16th and early 17th centuries was baptized in water containing garlic to protect him from evil spirits and probably from disease.

In England, however, garlic remained the food of the working classes, a view that did not prevent the wealthier English from enjoying the therapeutic properties of garlic, i.e., it was recommended for constipation, toothache, dropsy, animal bites and the plague. Its purported beneficial effects in treating dropsy suggest that it was thought to improve cardiovascular function, mechanisms of which are only now under study.

TABLE 8

The Renaissance

- “Physic” gardens were opened in Padua, Pisa, Zurich, Bologna and other cities
- Dr. Pietro Mattioli of Siena advised garlic for digestive disorders, kidney stones and expelling afterbirth
- Henry IV of France baptized in water containing garlic
- The English included garlic in their medicine chests, and it was used for toothache, constipation, dropsy and plague

TABLE 9

Early America

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- Native Americans used garlic in a tea to treat flu-like symptoms
 - Garlic was used in Shaker herb catalogs as a Stimulant, expectorant and tonic (1825)
 - Dr. John Gunn used garlic in the Home-Book of Health as a diuretic, expectorant and treatment for worms (1878)
 - Dr. Joseph Richardson, author of Health Remedies, used garlic for all lung diseases.
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Doctors carried cloves of garlic with them at all times to protect themselves from the odor of disease (Moyers 1996).

Early America. Moving closer to contemporary times, it is worth recalling that bulbs similar to garlic grew freely in the woods of North America and that Native Americans used garlic in their tea. It was brought to the new world by the explorers and sailors from France and Portugal. Later in the 19th century, garlic formed an important part of the Shaker medical armamentarium as a stimulant, expectorant and tonic. Garlic's perceived therapeutic properties were all accepted by large groups of the population (Moyers 1996).

The *Home Book of Health*, authored by John Gunn in 1878, featured garlic prominently; it was recommended as a diuretic, for treatment of infections, as a general tonic and for asthma and other pulmonary disorders (Moyers 1996). In the early part of the 20th century, in the volume *Health Remedies, a Complete Medical Work and Family Guide*, garlic was promoted for diseases of the lung in children and adults.

Summary

In this cursory overview of garlic in early history, several issues emerge as recurring themes. It is fascinating to observe how cultures that never came into contact with one another came to many of the same conclusions about the role of garlic in the treatment of disease. Garlic was used for laborers with a view to improving their work capacity. Garlic was recom-

mended for pulmonary and respiratory complaints. Its efficacy in dropsy is compatible with known cardiovascular functions.

Contemporary research is tending to validate many of the earlier views concerning the efficacy of garlic. Folk wisdom should not be ignored because it may teach us valuable lessons. We have much to learn from the ancients as we adopt a historical perspective and seek to elucidate the mechanisms of action of garlic and its derivatives and to establish its ultimate role in the prevention and treatment of disease.

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