

Herbal Antibiotics an alternate for Treating Bacterial Infections Naturally

Sheeba Shafi , Abrar Mohammed Ahmed Al-Arfaj, Huda Abdulaziz Almizraq
Department of nursing, college of applied medical sciences, King Faisal University, Al- Ahsa, KSA

Abstract

Background: With antibiotic-resistant infections on the rise, herbal remedies present a naturally effective alternative to standard antibiotics. Medicinal plants have played a very important role in the rejuvenation of worse situation created by the infection of microorganisms. In addition, many new structures of Antibiotic agents are developed using medicinal plants as the source. Plants are the oldest source of pharmacologically active compounds. In the field of Ethnopharmacology, the search for new anti-infection agents has occupied many research groups in the past few decades. According to estimation more than two thirds of the world's population relies on plant derived drugs. There are no of plant products like garlic, Aloe Vera, Croton Latex, Eucalyptus Essential Oil, Grapefruit seed extract (GSE), Usnea and etc., used as a natural antibiotics in the treatment of burns, respiratory tract infections, stimulates immune system, lowers blood pressure, severe diarrhea and etc.

Method: This study was conducted to find alternative method to treat bacterial infection by using different herbs. Detailed literature study was conducted for different herbs and their antibacterial activities.

Result: Detailed study showed as herbs can be used as alternate for treating bacterial infection naturally.

Conclusion: Herbs can be used to fight bacterial infection naturally.

Keywords: Antibiotics, Herbal Medicine, Medicinal Plants

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I. Introduction

History: Archaeological evidence indicates that the use of medicinal plants dates back to the Paleolithic age, approximately 60,000 years ago. Written evidence of herbal remedies dates back over 5,000 years to the Sumerians, who compiled lists of plants. Some ancient cultures wrote about plants and their medical uses in books called *herbals*. In ancient Egypt, herbs are mentioned in Egyptian medical papyri, depicted in tomb illustrations, or on rare occasions found in medical jars containing trace amounts of herbs (1). Among the oldest, lengthiest, and most important medical papyri of ancient Egypt, the Ebers Papyrus dates from about 1550 BC, and covers more than 700 compounds, mainly of plant origin.

Modern herbal medicine:

The World Health Organization (WHO) estimates that 80 percent of the population of some Asian and African countries presently use herbal medicine for some aspect of primary health care (2). Pharmaceuticals are prohibitively expensive for most of the world's population, half of whom lived on less than \$2 U.S. per day in 2002 (3). In comparison, herbal medicines can be grown from seed or gathered from nature for little or no cost.

Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies, including artemisinin, ^[15] opium, aspirin, digitalis, and quinine. According to the World Health Organization, approximately 25% of modern drugs used in the United States have been derived from plants (4). At least 7,000 medical compounds in the modern pharmacopoeia are derived from plants (5). Among the 120 active compounds currently isolated from the higher plants and widely used in modern medicine today, 80% show a positive correlation between their modern therapeutic use and the traditional use of the plants from which they are derived (6).

Medicinal plants are part and package of human society to fighting against diseases from the dawn of civilization. Medicinal plants are rich sources of antimicrobial agents. Plants are used medicinally throughout the world and are the source of potential and powerful drugs (7). A wide range of medicinal parts. The herbal products today indicate safety in distinction to the synthetic that are regarded as dangerous to human and environment (8).

Due to the overuse of prescription antibiotics which can lead to the development of antibiotic-resistant strains of bacteria, many medical experts are taking a new look at natural, safe antibiotic alternatives. There are a number

of natural herbal antibiotics that should be studied and kept on hand repeatedly. To battle against any kind of infection or illness, medicines prepared from the natural herbs can be used which are relatively inexpensive, and can be stored for a year or more at room temperature.

The conventional medical establishment has recently warmed up to the immense potential of using herbal medicines for fighting infections. The number of natural substances that fight infection is surprising, and the research for discovering new such substances still continues. These natural substances either contain antibiotic properties in themselves, or provide to spur the production of the body's own protection mechanisms.

Human beings have been using herbal medicines for more than 60,000 years and those herbal medicines are still used by 80% of the world's population as their primary health care (statistic from the World Health Organization). It has been estimated that in the developed countries like United States, herbal drugs constitute 25% of the total drugs, while in fast developing countries like China and India, the contribution is as much as 80% (9)

Herbal antibiotics have a very complex nature. These antibiotics are used for killing bacteria, cleansing the blood, strengthening the immune system, increasing the mucous membrane tone and increasing the functions of particular organs systems. Thus, instead of simply killing bacteria by using 'antibiotic' plants, they treat the imbalances of the whole body.

Efficiency of conventionally used medicinal plants

Since commercially available antibiotics are becoming resistant to many bacterial infections and also has many side effects, to overcome and mitigate this problem herbal antibiotics can be the ultimate solution. Since ancient times herbal medicine are being used for treating different diseases. Detailed literature re study was carried out to find the herbal antibiotics which are being used to treat bacterial infection. List of herbs were collected and their properties were studied (17).

1. Garlic:

Garlic is an easily available spice in the market. The use of garlic in treating infections is a long-standing tradition in many cultures. However, it was not until recent years the exact reason why garlic has so much antibacterial, antifungal and antiviral properties were studied (18).



Allicin is the most prominent compound found in garlic and has excellent antimicrobial functions. It is the most active compound in garlic which gives it these properties. Allicin is highly effective against MRS (Multidrug Resistance Strains) bacteria which makes it highly valuable for the medical community.

2. Echinacea:

Echinacea is a kind of daisy flower which is mostly found in the eastern and central parts of North America. This flower extracts and pastes are been used for the treatment of various infections since the early cultures. Echinacea extracts are now widely available across the globe and its antimicrobial functions are being utilized by people around the globe in a very positive manner. The immune protected aspect of this drug also makes it highly beneficial and recommended to be included in the treatment of various medical conditions (19).



3. Manuka Honey :

Manuka honey is rich in methylglyoxal, which is a rare compound that has excellent antimicrobial properties.



Manuka honey through years of plain observation has been claimed to be a broad spectrum antibacterial which has the ability to even heal wounds that are caused on legs due to ulceration caused due to antibiotic-resistant bacteria's.

4. Red Pepper:

Red pepper is mostly called as capsicum in other parts of the world. They are blessed with a lot of antibacterial properties which can help in making the microbes disappear from the site of infection(20).



Capsaicin is the compound which gives pepper the spice, it also helps in lowering the pH of the stomach and thereby prevents harmful bacteria's from growing.

5. Ginger

Ginger is filled with compounds such as ginger diol, gingerol, terpenoids, shogaol, zerumbone and zingerone along with flavonoids which gives it excellent antimicrobial properties with the ability to act against the formation of biofilms. H.Pylori bacteria which thrives in acidic stomachs can be reduced by consuming ginger which can normalize the acid production in your stomach(21).



6. Cinnamon:

Cinnamon has excellent antimicrobial and anti-inflammatory properties which are used widely by alternative medicine practitioners around the world. Cinnamon is rich in cinnamaldehyde along with compounds such as eugenol which are highly effective in treating conditions that are caused due to bacteria and virus. Cinnamon is very helpful in treating stomach conditions such as ulcers. The use of cinnamon is highly helpful in treating skin conditions caused due to fungal activities such as candidiasis(22).



7. Turmeric :

Turmeric is an Indian spice which is known for its antimicrobial properties. Curcumin is the most active component in turmeric and it adds a lot of benefits to your body. Curcumin is very effective in treating UTI (Urinary Tract Infections) as it has some very effective capabilities in reducing the activity of the microbes causing the infection. It is also effective in treating the fungus by inhibiting its protein absorption capability thereby rendering it to be effectless.



8. Cloves :

Cloves are rich in Eugenol which gives it excellent antibacterial properties which can help in making you safe from unwanted bacterial infections. Cloves also have the ability to damage the covering layers of bacterial cells thus blocking the production of protein and DNA which can prove fatal for the survival of the bacteria.



9. Thyme :

Thyme can be extracted of its oil and this oil is very effective to treat diseases caused due to Escheria Coli and Pseudomonas aeruginosa bacterias. It can actively prevent the functioning of these quorum sensing organisms without posing much damage to your body due to side effects. Thyme extracts are also very effective in treating conditions that are caused due to the effects of herpes viruses.



10. Lemongrass:

Citral alpha and citral beta compounds found in lemongrass are responsible for the capability it has in blocking broad spectrum bacterias in the format of lemongrass oil. Lemongrass oil is highly helpful in dealing with staph and salmonella bacterias and also e-coli without causing much side effects, unlike antibiotics which have many side effect..



11. Rosemary:

Rosemary is a very common herb that is used in the preparation of many food products around the world. Rosemary has excellent antiviral, antibacterial and anti-fungal properties which makes it highly beneficial for human consumption. Rosemary is rich in compounds like alpha-pinene, camphene, alpha-terpinol, 1 and 8 cineole and borneol. These compounds are highly effective in treating conditions such as viral infections and cancer. The antioxidizing character of this herb will help in making the consumption help in fighting the external forces of oxidation that can be harmful to your body.



12. Aloe Vera:

Aloe vera is a powerful medicinal plant used for treating and preventing infection of external wounds, especially burns. It is having a characteristic feature like stimulating cell regeneration so that they heal faster. It is effective against *Staphylococcus aureus* and *E. coli*.



13. Berries:

A number of berry plants are known to provide antibiotic benefits. In 1990's Cranberries have been used by women to prevent and cure urinary tract infections. Cranberry and blueberry contain monosaccharide fructose, which inhibits the growth of bacteria. Likewise, raspberry juice has been used as an extract; which significantly reduces the growth of several species of bacteria, including *Shigella*, *E. coli* and *Salmonella*.



14. Echinacea:

It is also known as "local bandage" A very well known herb; echinacea tincture applied

directly and frequently to the back of the throat is most effective in case of throat infections, particularly caused by *Streptococcus* sp.



15. Eucalyptus Essential Oil:

Eucalyptus oil having effective activity against number of microorganisms, mainly used for external application to wounds. It is having antibacterial effects on pathogenic bacteria in the respiratory track. (10)



16. Goldenseal:

Hydrastis canadensis is also called orange root or yellow puccoon. It is a very potent antimicrobial herb that should be used with caution in people who are thin and dry. It is useful for many infections including pneumonia, giardia, diarrhea, salmonella.



17. Propolis:

Propolis is a resinous mixture obtained from honey bees. Propolis is a powerhouse of antibacterial alkaloids. It is one of the most effective natural substances for direct application to wounds, and when squirted into the throat can stop the development of colds and tonsillitis.



18. Usnea:

Usnea is the scientific and common name for a numerous species of lichen. It has been used medicinally for at least 1600 years. It is slow-growing but productive lichen especially effective for pneumonia, throat infection and staphylococcus sp. It is also very effective as an immune stimulant. (11). Usnea was effectively used in the treatment of surface wounds when sterile gauze and new antibiotics were unavailable. In modern American herbal medicine, Usnea barbata is used as an antibiotic, primarily used in lung, urinary tract and upper respiratory tract infections. Usnea has been used as an antibiotic for gram-positive bacteria, and as an antifungal against *Candida albicans* (11). Along with those treatments some other plants were also used in the treatment of different bacterial illnesses.



II. Material and Methods

Table No 1: List of Bacterial Illnesses and Corresponding Herbal Remedies:

Detailed Literature study was carried out and following herbal antibiotics were found effective against many diseases

Diseases	Micro organisms	Plant source
Pneumonia	<i>Streptococcus pneumoniae</i> .	Goldenseal
Internal wounds and burns	<i>Staphylococcus aureus</i> and <i>E. coli</i>	Aloe Vera
Bacteremia	<i>Pseudomonas aeruginosa</i>	Large doses of echinacea, Garlic, Boneset
Gonorrhea	<i>Neisseria gonorrhoeae</i>	Garlic, Acacia spp., Large spotted spurge
Bacteremia	<i>Pseudomonas aeruginosa</i>	Large doses of echinacea, Garlic, Boneset
Diarrhea (severe)	<i>Shigella dysenteriae</i>	Goldenseal, Garlic, GSE, sage
Pneumonia	<i>Staphylococcus aureus</i>	Usnea, Garlic, Goldenseal, Eucalyptus, Boneset,
Surgical infections	Enterococcus spp	External applications of Usnea, Echinacea, Garlic
Tuberculosis	<i>Mycobacterium</i>	Garlic, Usnea, Boneset, Goldenseal, Red clover, Shizandra
Urinary tract Infections	<i>E. Choli</i>	Uvaursi, Eucalyptus, GSE, Goldenseal, Cranberry

III. Discussion

The use of herbal remedies is more prevalent in patients with chronic diseases such as cancer, diabetes, asthma and end-stage kidney disease (12,13,14). Multiple factors such as gender, age, ethnicity, education and social class are also shown to have association with prevalence of herbal remedies use.

A survey released in May 2004 by the National Center for Complementary and Integrative Health focused on who used complementary and alternative medicines (CAM), what was used, and why it was

used. The survey was limited to adults, aged 18 years and over during 2002, living in the United States. According to this survey, herbal therapy, or use of natural products other than vitamins and minerals, was the most commonly used CAM therapy (18.9%) when all use of prayer was excluded (15,16).

Herbal remedies are very common in Europe. In Germany, herbal medications are dispensed by apothecaries (e.g., Apotheke). Prescription drugs are sold alongside essential oils, herbal extracts, or herbal teas. Herbal remedies are seen by some as a treatment to be preferred to pure medical compounds that have been industrially produced.

Herbal medicines contain active ingredients. The active ingredients of many herbal preparations are as yet unknown. Some pharmaceutical medications are based on a single active ingredient derived from a plant source. Practitioners of herbal medicine believe that an active ingredient can lose its impact or become less safe if used in isolation from the rest of the plant.

For instance, salicylic acid is found in the plant meadowsweet and is used to make aspirin. Aspirin can cause the lining of the stomach to bleed, but meadowsweet naturally contains other compounds that prevent irritation from salicylic acid.

According to herbal medicine practitioners, the effect of the whole plant is greater than its parts. Critics argue that the nature of herbal medicine makes it difficult to give a measured dose of an active ingredient.

Herbal medicine aims to return the body to a state of natural balance so that it can heal itself. Different herbs act on different systems of the body. Some herbs that are commonly used in herbal medicine, and their traditional uses

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Echinacea is a kind of daisy flower which is mostly found in the eastern and central parts of North America. This flower extracts and pastes have been used for the treatment of various infections since the early cultures. Manuka honey is rich in methylglyoxal, which is a rare compound that has excellent antimicrobial properties.

Red pepper is mostly called as capsicum in other parts of the world. They are blessed with a lot of antibacterial properties which can help in making the microbes disappear from the site of infection.

IV. Conclusion

Development of resistance to antibiotic agents shown by the microorganisms appears to be a continuous process. So every antibiotic has certain life span regarding its efficacy. Scientists have realized an immense potential in natural products from medicinal plants to serve as an alternate source of combating infections in human beings which may also be of lower cost and lesser toxicity. Further work on isolation and characterization of active principles from medicinal techniques would be highly beneficial to human beings. Scientists from divergent fields are investigating plants with an eye to their antimicrobial usefulness. We conclude that herbs can be as an alternate for treating bacterial infection naturally .

References

- [1]. Sivastava J, Lambart J, Vietmeyer. Medicinal plants, an expanding role in development word bank technical paper No.320.
- [2]. .Mouli KC,Vijaya Rao SD.Phytoresources as potential therapeutic agents for cancer treatment and prevention.J Glob Pharm Tech 2009 1(1):4-18.
- [3]. Hammond-Kosack, KE, Jones JG. Resistance gene- dependent Plant defense response. Plant cell. 1996; 8:1773-1791.
- [4]. Salari MH, Amine G, Shirazi MH, Hafezi R, Mohammadypour M. "Antibacterial effects of Eucalyptus globulus leaf extract on pathogenic bacteria isolated from specimens of patients with respiratory tract disorders." Clin Microbiol.Infect. 2006; 12(2):194– 19
- [5]. Health effects of garlic American Family Physician by Ellen Tattelman. July. 2005.
- [6]. Groppo F, Ramacciato J; Motta R; Ferraresi P; Sartoratto A. "Antimicrobial activity of garlic against oral streptococci". Int J Dent Hyg. 2007; 5 (2): 109–115.
- [7]. Sims Judith.. Gale Encyclopedia of Alternative Medicine. Available in e-book format. Thomson Gale. 2001.
- [8]. Tilford Gregory L. " Usnea Lichen" Edible and Medicinal Plants of the West. Mountain Press Publishing. 1997. pp. 146–147.
- [9]. Cabrera C. "Materia Medica - Usnea spp.". European Journal of Herbal Medicine.1996; 2(2): 11–13.
- [10]. Zamiska N. On the trail of ancient cures. *Wall Street Journal* November 15, 2006: B1, B12.
- [11]. *Novartis eyes traditional Chinese medicine* United Press International. Available from: <http://www.upi.com/NewsTrack/view.php?StoryID=20061106-022125-5205r> [accessed on 1 August 2007].
- [12]. Zaslawski C. The ethics of complementary and alternative medicine research: a case study of Traditional Chinese Medicine at the University of Technology, Sydney. *Monash Bioeth Rev.* 2005;24:52–60. [PubMed] [Google Scholar]
- [13]. Nyika A. Ethical and regulatory issues surrounding African traditional medicine in the context of HIV/AIDS. *Developing World Bioeth* 2006. Available from: <http://www.blackwell-synergy.com/toc/dewb/0/0> [accessed on 1 November 2006]. [PubMed]
- [14]. Emanuel EJ, Wendler D, Killen J, Grady C. What makes clinical research in developing countries ethical? The benchmarks of ethical research. *J Infect Dis.* 2004;189:930–7. doi: 10.1086/381709. [PubMed] [CrossRef] [Google Scholar]
- [15]. Miller FG, Emanuel EJ, Rosenstein DL, Straus SE. Ethical issues concerning research in complementary and alternative medicine. *JAMA.* 2004;291:599–604. doi: 10.1001/jama.291.5.599. [PubMed] [CrossRef] [Google Scholar]
- [16]. Chong W. *China launches traditional medicine safety research* Science and Development Network; 2006. Available from: <http://www.scidev.net/en/news/china-launches-traditional-medicine-safety-research.html> [accessed on 1 November 2006].
- [17]. Pefile S. *South African legislation on traditional medicine* Science and Development Network; 2005. Available from: <http://www.scidev.net/en/policy-briefs/south-african-legislation-on-traditional-medicine.html> [accessed on 11 December 2006].

- [18]. White J. Public address: *Overview of NCI's TCM-related research presented at Traditional Chinese Medicine and Cancer Research: Fostering Collaboration; Advancing the Science, April 10, 2006* Office of Cancer Complementary and Alternative Medicine (OCCAM).
- [19]. Serbulea M. *Old meets new in West Africa's medicine mix* Science and Development Network; 2005. Available from: <http://www.scidev.net/en/features/old-meets-new-in-west-africas-medicine-mix.html> [accessed on 31 January 2007].
- [20]. Adelaja A. *Nigeria boosts research into traditional medicine* Science and Development Network; 2006. Available from: <http://www.scidev.net/en/news/nigeria-boosts-research-into-traditional-medicine.html> [accessed on 15 February 2007].
- [21]. Linde K, Jonas WB. Evaluating complementary and alternative medicine: the balance of rigor and relevance. In: Jonas WB, Levin JS, eds. *Essentials of complementary and alternative medicine* Baltimore: Lippincott Williams & Wilkins; 1999 pp. 57-71. [Google Scholar]
- [22]. Turner RB, Bauer R, Woelkart K, Hulsey TC, Gangemi JD. An evaluation of *Echinacea angustifolia* in experimental rhinovirus infections. *N Engl J Med.* 2005;353:341–8. doi: 10.1056/NEJMoa044441. [PubMed] [CrossRef] [Google Scholar]

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