

Review Article

Antibacterial Properties of Rosemary (*Rosmarinus Officinalis*)

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Abstract: Medicinal herbs have long been used as traditional medicine to treat infectious diseases. The increasing use of synthetic antibiotics today has led to an increase in resistant strains and high side effects. In this regard, every year many researchers from this huge plant source are sending a range of secondary compounds to the consumer market for the treatment of human diseases. Therefore, the identification of herbs with antimicrobial effects can help to produce new drugs with a broad spectrum of effects. This study, based on scientific references, describes information on the antimicrobial effects of rosemary.

Keywords: Medicinal Plants, antibacterial effects, *Rosmarinus Officinalis*.

INTRODUCTION

One of the concerns and concerns in the biomedical and medical sciences is bacterial and fungal resistance to the extent that some of these bacteria are resistant to chemical drugs more than 90%. Alexander Fleming, a well-known biologist and botanist, first examined the bacterial resistance and won the Nobel Prize in 1945 [1-3]. Nowadays, in cases where drug resistance is created by changing the drug to fight against pathogenic bacteria and fungi. On the other hand, for many years, natural remedies, especially medicinal herbs, have been the basis and even in some cases the only treatment, while their raw materials have been used in the pharmaceutical industry [4]. The advent of chemistry in the early twentieth century and the development of complex organic synthesis systems led to the development of the pharmaceutical industry and the substitution of synthetic drugs for herbal remedies [5]. But as advances in the production of new chemicals and various antibiotics began to take place, the harmful effects of these drugs gradually began to appear, and since the 1950s numerous pathogenic bacteria have shown resistance to antibiotics, which is still expanding [6]. Medicinal plants worldwide are used by indigenous populations and play an important role in treating human and animal diseases [7]. One of the major problems in antibiotic therapy today is the resistance and subsequent side effects of the drug. Accordingly, after researching the effects of plants, man has used them in various industries [8]. After the discovery of penicillin in the 40s, and its use in treatment, new antibiotics were introduced every day to treat infections [9]. The result was the expansion of the clinical use of natural and synthetic antibiotics in the treatment of clinical infections [10]. The overuse of these antimicrobial drugs has led to increased drug resistance against different antibiotics in most bacteria [11-13]. This has been one of the reasons for the growing use of herbs as low-risk, affordable, and inexpensive natural ingredients in the treatment of bacterial infections compared to synthetic antibiotics [14-16]. Also, these herbal remedies are more popular with people [17-19]. The role of natural products in drug production is increasing, not only when bioactive compounds are used directly as therapeutic drugs, but also when used as a raw material for drug synthesis, or as a model the base is used for new biologically active compounds [20-22]. Studies show that only about 10% of the 250,000 species of plants studied worldwide [23]. Therefore, the use of herbal drugs as an alternative to chemical drugs and antibiotics was investigated.

Rosmarinus Officinalis

Rosemary belongs to the Lamiacea family and is popular as a spice and medicinal plant in many countries. It has anti-bacterial, antifungal, anti-cancer, anti-diabetic, anti-inflammatory, analgesic, antioxidant and endemic effects on

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the Mediterranean and Asian region [24-28]. The Lamiaceae family, or mint family, is a family of plants, shrubs and trees comprising about 200 genera and 3,200 species, many of which have a long history of drug and food use [29]. Rosemary is listed in the World Series of Weeds, but due to its popularity and therapeutic properties, it is in the top priority [30]. The antimicrobial properties of rosemary are due to phenolic compounds: carnosol, rosmarinic acid, caffeic acid, flavonoids including diosmin, luteolin, zincquanine, and monoterpenes such as camphor, cineole and borneol [31]. Rosemary is resistant to water stress and can continue to grow under drought conditions [32]. Both fresh and dried rosemary leaves are used for their characteristic aroma in food cooking or in small amounts as herbal teas, while rosemary extracts are commonly used as natural antioxidants to improve shelf life. Spoiled foods are used [33]. Rosemary is one of the spices that has the highest levels of antioxidants and can help fight bacteria and cancer. Antioxidant properties of rosemary extracts vary due to genetic and growth conditions, region and geographical origin, climatic conditions, extraction process, main plant quality and date of harvest [34]. While the immune-boosting properties of the rosemary plant are sufficiently effective, the plant also works well against bacterial infections, especially those that occur in the stomach. *H. pylori* is a common and very dangerous pathogen or pathogen that can lead to gastric ulcer, but rosemary has been shown to help prevent it from growing. Also, rosemary is associated with the prevention of Staph infection, which kills thousands every year [35].

Antibacterial Effects

Antibacterial effects of **rosemary** on Gram-negative bacteria are more than Gram-positive bacteria. Which increases with increasing concentration of bactericidal property.

Table-1: The highest antibacterial effect of rosemary in studies

Authors	Most antibacterial effect		References
	Gram-positive bacteria:	Gram-negative bacteria:	
Sienkiewicz <i>et al.</i> ,	-	<i>E. coli</i>	36
Probuseenivasan <i>et al.</i> ,	<i>S. aureus</i> <i>B. subtilis</i>	<i>K. pneumonia</i> <i>E. coli</i> <i>P. vulgaris</i>	37
ahmady-asbchin <i>et al.</i> ,	<i>S. aureus</i> <i>S. epidermidis</i>	<i>E. coli</i> <i>P. mirabilis</i>	38
Soltan Dallal <i>et al.</i> ,	<i>S. aureus</i>	--	39
Jafari-sales <i>et al.</i> ,	<i>S. aureus</i>	<i>P. aeruginos</i> <i>E. coli</i>	16
Golshani <i>et al.</i> ,	<i>S. aureus</i>	<i>P. aeruginos</i> <i>E. coli</i>	40
Zakerin <i>et al.</i> ,	<i>S. aureus</i>	<i>P. aeruginos</i> <i>E. coli</i>	41

CONCLUSION

Rosemary significantly reduces the growth of disease-causing bacteria and slows the growth of bacteria, which increases with increasing concentration of these properties. Given the importance of medicinal plants and their derived metabolites in ensuring the health of human communities and the high economic potential of these plants, as a reliable source of income, a comprehensive and comprehensive plan is needed in developing countries. Part of the agricultural biotechnology research at universities and research institutes is dedicated to identifying, industrializing and optimizing the methods of extracting pharmaceutical metabolites from these plants.

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