

## Review Article

### Quercus Infectoria Galls : Herbal Future For Treating Gingival Diseases.

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#### ABSTRACT:

The evolution of bacterial resistance to currently available antibiotics has necessitated the research for novel and effective antimicrobial compounds. It is known that local plants have medicinal properties and this has made traditional medicine cheaper than modern medicine. The galls of the Quercus infectoria (QI) tree are traditionally believed to have great medicinal value. Pharmacologically the galls are claimed to have various biological activities such as astringent effect, anti diabetic, anti tremorine, local anaesthetic, antipyretic, anti-inflammatory, antibacterial, antiviral and many more. Globally, plant extracts are employed for their antimicrobial, antifungal and antiviral activities.

#### INTRODUCTION:

The evolution of bacterial resistance to currently available antibiotics has necessitated the research for novel and effective antimicrobial compounds. It is known that local plants have medicinal properties and this has made traditional medicine cheaper than modern medicine. Globally, plant extracts are employed for their antimicrobial, antifungal and antiviral activities. In particular, the antimicrobial activity of plant extracts has formed the basis of many applications, including raw and processed food preservation, pharmaceuticals, and alternative medicine. In fact, plants produce a diverse range of bioactive molecules, making them a rich source of different types of medicines. Plants with possible antimicrobial activity should be tested against an appropriate microbial model to confirm the activity and to ascertain the parameters associated with it.

Herbal extracts have received special attention because of being non-chemical and non-synthetic, and they have been long used in traditional medicine.<sup>1</sup>

### **QUERCUS INFECTORIA: THE SMART ALL ROUNDER**

*Quercus infectoria* (Fabaceae) is a small tree, the galls arise on young branches of this tree as a result of attack by the gall-wasp, *Adleria gallae-tinctoria*. The plant is known as Mayaphal and Majufal in Hindi. *Quercus infectoria* gall extract has the potential to generate herbal metabolites. The crude extracts demonstrating anti-dental caries activity could result in the discovery of new chemical classes of antibiotics. These chemical classes of antibiotics could serve as selective agents for the maintenance of human health and provide bio-chemical tools for the study of infectious diseases.

*Quercus infectoria* Olivier (Fagaceae) is a small tree or a shrub mainly present in Greece, Asia Minor, Syria and Iran. The galls of *Quercus infectoria* have also been pharmacologically documented to possess astringent, antibacterial, antifungal, larvicidal, antidiabetic, local anaesthetic, antiviral, and anti-inflammatory activities. The main constituents found in the galls of *Q. infectoria* are tannin (50-70%) and small amount of free gallic acid and ellagic acid. Tannins are commonly defined as water-soluble polyphenolic compounds ranging in molecular weight from 500 to 3000 Daltons that have the ability to precipitate proteins.<sup>2</sup>

The galls can be seen as abnormal growth caused by an increase in the number (hyperplasia) or size (hypertrophy) of plant cells formed as a response to the insect's stimulus caused by egg-laying, larvae, or

nymph feeding. Two kinds of galls are locally known as Mazouj and Ghalghaf in Iran and have been shown to have many medicinal properties. The Mazouj and Ghalghaf gall types are caused by two different gall-wasp species, that is, *Cynips tinctoria* and *Andricus quercustozae*, respectively.

### **ANTI-BACTERIALACTIVITY:**

Methanol and acetone extracts were found to possess the ability to inhibit growth of all oral. This indicates that the extract of galls of *Q. infectoria* contains broad-spectrum antibacterial compounds which make it a potentially good source of antimicrobial substance. Furthermore, both extracts exhibited greater inhibitory effect on Gram-positive bacteria compared to Gram-negative bacteria. Both methanol and acetone extracts showed bacteriostatic activity on *S. salivarius* and *P. gingivalis* while bactericidal activity was shown against *F. nucleatum*. High amounts of hydrolysable tannin present in the galls of *Q. infectoria* implied that tannin may be the active compound responsible for the antibacterial activity. Tannins in the galls were reported to possess antibacterial property against common pathogens such as *Enterococcus faecalis*, *Streptococcus pyogenes*, and *Bacillus cereus*. A number of mechanisms have been proposed to explain the antibacterial activity shown by tannin such as complex formation between tannin and microbial enzymes (such as cellulase) as well as membrane of microorganism due to the astringent properties of tannin, iron deprivation through precipitation and effect on bacterial metabolism through inhibition of oxidative phosphorylation.<sup>3</sup>

### **ANTI-INFLAMMATORYACTIVITY:**

Galls of *Quercus infectoria* Olivier (Fagaceae) possess pleiotropic therapeutic activities, with particular efficacy against inflammatory diseases. Oral administration of gall extract significantly inhibits carrageenan, histamine, serotonin and prostaglandin E2 (PGE2) induced paw oedemas. The extract also inhibits various functions of macrophages and neutrophils relevant to the inflammatory response.

Plaque is the primary etiological factor in gingival inflammation. Thus, control of dental plaque holds the key to halt the progression of periodontal disease. Rinsing mouth with *Quercus infectoria* reduces plaque index to a greater extent.



**Fig 1: Quercus Infectoria**

## ANTIOXIDANT & WOUND HEALING ACTIVITY:

Antioxidant property of QI is due to its ethanolic extract. Galls of *Quercus Infectoria* contain polyphenols which have great reducing power and serve as antioxidant.

Wound healing property is also due to its ability to activate antioxidant enzymes, superoxide dismutase and catalase.<sup>4</sup>



**Fig. 2 : Quercus Infectoria Commercial products**

## CONCLUSION:

The galls of the *Quercus infectoria* (QI) tree are traditionally believed to have great medicinal value. Pharmacologically the galls are claimed to have various biological activities such as astringent effect, antidiabetic, antitremorine, local anaesthetic, antipyretic, anti-inflammatory, antibacterial, antiviral and many more. These

pharmacological activities of gall extracts were reported to be due to its excellent antioxidant activity with phytochemicals constituents of phenolic and flavanoid compounds. The phenolic compounds or polyphenols can act on bone metabolism by modulating osteoblast proliferation, differentiation and mineralization, as well as osteoclastogenesis. In addition, elemental and physico-chemical analysis indicated the presence

of important minerals in QI, such as calcium, magnesium, phosphorus, oxygen, potassium, aluminium, carbon, zinc, iron, manganese, nickel and silica. Different formulations can be made in form of gels, ointments, mouthinses and powder to be effectively used for the treatment of gingival diseases.<sup>5</sup>

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