Studies on the Anti-bacterial, Anti-fungal and Anti-microbial Activities of Unani Drug Mastagi (*Pistacia lentiscus* Linn.)

A Review

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The Unani drug *Mastagi* (Mastic) is used in Unani System of Medicine since very long. It is a resin or more correctly an oleoresin containing little oil, obtained from a cultivated variety of *Pistascia lentiscus*. The plant is an evergreen dioecious shrub and native to the Mediterranean region (France, Spain, Portugal, Greece, Turkey) and also found in North Africa. Mostly mastic is produced on the Greek Island of Chios, some is also produced in Algeria, Morocco and the Canary Island. Mastic is used in the Unani System of Medicine since long and its actions are mentioned in Unani classical literature as: attenuant, resolvent, tonic for vital organ, liver tonic, internal body tonic and appetizer etc. Recently some studies have shown its activities as anti-bacterial, anti-fungal and anti microbial.

Keywords: Tonic for vital organ, Oleoresin, Anti-bacterial, Anti-fungal; Anti-microbial.

Introduction

Mastic is a resin or more correctly an oleoresin containing little oil; obtained from a cultivated variety of *Pistacia lentiscus* in the Greek Island of Chios. The plant is an evergreen dioecious shrub. Tapping is limited by law to the period of 15 July to 15 Oct. The base of shrub is cleared of weeds, flattened and covered with a special soil to receive some of the flow. The stem and larger branches are then wounded by means of gouge like instrument, which make an incision about 2 cm long and 3 cm deep. Each plant is tapped repeatedly for about 5 or 6 weeks, receiving in all about 200-300 wounds, a special tool is used for removing the tears which are hardened on the plant and the flat plates of mastic are collected on ground[1] (Evans, 2001).

Vernacular Names

Synonym (S): Mastick Tree, Mastick, Mastix, Mastix, Lentisk[2] (Lawless, 1999[2, 3]; Pamplona-Roger, 2000).
Eng: Mastiche Tree; **Hind, Mah and Guj:** (resin) *Rumi Mastaki;* **Ben:** *Rumi-Mastungi;* **Pers:** *Kundari* or *Sakir* (rumi); **Urdu:** *Rumi mastagi;* **Aust, Belgium, Germ, Norw, Portu, Spa:** *Pistacia lentiscus;* **Swed:** Ychia Decandolle[3-5] (Warrier *et al.,* 1994; Nadkarni, 1976; Anonymous, 1997).

Mastic (*Pistacia lentiscus,* Linn.)

Habitat and Distribution

Native to the Mediterranean region (France, Spain, Portugal, Greece, Turkey) and also found in North Africa. Mostly mastic is produced on the Greek Island of Chios, some is also produced in Algeria, Morocco and the Canary Island[2] (Lawless, 1999).

Growing in countries bordering on the Mediterranean, its resin is called the mastiche and obtained by incisions made in the bark, is imported into India from Asia Minor through Persia and Afghanistan[5] (Anonymous, 1997).

Botanical Description

A small bushy tree or shrub up to 3 m (10 ft) high, which produces a natural oleoresin from the trunk. Incisions are made in the bark in order to collect the liquid oleoresin, which then hardens into brittle pea-sized lumps[2] (Lawless, 1999), shrub of the Anacardiaceae family, growing up to one meter high. Its all year green leaves are coriaceous and hairless. The fruit is a black berry, the size of a pea[3] (Pamplona-Roger, 2000), mastic occurs in yellow or greenish yellow rounded or pear-shaped tears about 3 mm diameter. The tears are brittle but become plastic when chewed. Odour, slightly balsamic; taste, mildly terebinthinate[1] (Evans, 2001).

Constituents

Leaves contain a colouring matter and tannin, fruit contains bimalate of lime, other constituents are – resin, essential oil (of fruit or leaves)[6] (Nadkarni, 1976), mainly monoterpene hydrocarbons – mostly pinenes[2] (Lawless, 1999). The resin component of mastic is complex mixture. It contains tri-tetra- and pentacyclic triterpene acids and alcohols[1] (Evans, 2001).

The chemical composition of the three essential oils obtained by steam distillation of the mastic gum, leaves and twigs of *Pistacia lentiscus* var. chia, was studied by GC/MS. Sixty nine constituents were identified from the oils. Alpha-Pinene, myrcene, trans-caryophyllene and germacrene D were found to be the major components[7] (Magiatis *et al.,* 1999).

Parts Used

Leaves resin and galls[3-5] (Anonymous, 1997; Pamplona-Roger, 2000).

Constitution

Hot Dry (Ashraf, ynm) Hot[2] Dry[2, 8-13] (Najmul Ghani, 1926; Kabiruddin, 1937; Ibn Hubl, 1943; Khan, 1895; Ibn Sina, 1930).

Actions

Stimulant, diuretic; Mastic gum is acid and astringent[5] (Anonymous, 1997), anti-microbial, antiseptic, antispasmodic, astringent, expectorant, stimulant[2] (Lawless, 1999).

Attenuant, resolvent, tonic for vital organ[8-13]. (Ashraf, ynm; Najmul Ghani, 1926), stomachic, promotes digestion, sexual stimulant[13] (Najmul Ghani, 1926), liver tonic, carminative, desiccant (Kabiruddin, 1937), internal body tonic, resolvent, appetizer (Ibn Hubl, 1943), diuretic[10-11] (Kabiruddin, 1937).

Therapeutic Uses

It is used in catarrhs of the respiratory and urinary passages. Gum mastiche is applied as a paste to the chest in catarrh and pulmonary affections. Galls are used in emulsion in cough mixtures. They are also used in the form of decoction as gargle for sore mouth, bleeding gums[3]. (Anonymous, 1997). Mastiche is used as a masticatory in tooth affections. It is useful in general and sexual debility as an aphrodisiac. Galls are used in emulsion in cough mixtures[6]. (Nadkarni, 1976). It is useful in diarrhoea in children and is chewed as masticatory. It is useful in whooping cough, bronchitis, catarrh, leucorrhoea, urethritis, cold, neuralgia[2] (Lawless, 1999).

It is useful in intestinal ulcers, haemoptysis, inflammation, hepatitis, gastritis, diarrhoea[14] (Khan, 1313 H); useful in cold and excessive phlegm[11] (Najmul Ghani, 1926); useful in functional debility of the stomach, in amnesia and cough[13] (Kabiruddin, 1937).

Pharmacological Activities

The *in vitro* antimicrobial activity of the three types of essential oil and of the resin (total, acid and neutral fraction) against six bacteria and three fungi is reported[7] (Magiatis *et al.,* 1999).

A double-blind clinical trial was carried out on thirty-eight patients with symptomatic and endoscopically proven duodenal ulcer to compare the therapeutic responses to mastic (1 g daily, twenty patients) and placebo (lactose, 1 g daily, eighteen patients) given orally over a period of 2 weeks. Symptomatic relief was observed in sixteen (80%) patients on mastic and in nine (50%) patients on placebo, while endoscopically proven healing occurred in fourteen (70%) patients on mastic and four (22%) patients on placebo. The differences between treatments were highly significant (P less than 0.01). Mastic was well tolerated and did not produce any notable side effects. It is concluded that mastic has an ulcer healing effect but further studies are needed to establish its role in treating peptic ulcer[10] (Al-Habbal *et al.,* 1984).

The effect of mastic, a concrete resinous exudate obtained from the stem of the tree *Pistacia lentiscus,* has been studied on experimentally – induced gastric and duodenal ulcers in rats. Mastic at an oral dose of 500 mg/kg produced a significant reduction in the intensity of gastric mucosal damage induced by pyloric ligation, aspirin, phenylbutazone, reserpine and restraint + cold stress. It produced a significant decrease of free acidity in 6-h pylorus-ligated rats and a marked cytoprotective effect against 50% ethanol in rats, which could be reversed by prior treatment with indomethacin. The protective effect was not seen when it was given intraperitoneally in phenylbutazone and restraint + cold stress models. The reduction in the intensity of ulceration in cysteamine-induced duodenal ulcers was not found to be statistically significant in mastic-pretreated rats. The results suggest that mild anti-secretory and a localized adaptive cytoprotective action may be responsible for its anti-ulcer activity. These observations support the results of an earlier study on the clinical effectiveness of mastic in the therapy of duodenal ulcer[15] (Al-Said *et al.,* 1986).

The aqueous extract (15 micrograms ml-1 medium) of 22 plants used in folkloric medicine in Palestine were investigated for their antifungal activity and minimum inhibitory concentrations (MICs) against nine isolates of *Microsporum canis, Trichophyton mentagrophytes* and *Trichophyton violaceum.* The extract of the different plant species reduced colony growth of the three dermatophytes by 36 to 100% compared with the control treatment. Antimycotic activity of the extract against the three dermatophytes varied significantly ($P<0.05$) between test plants. *Pistacia lentiscus* was one of the most active extracts (90-100% inhibition) against *M. canis, T. mentagrophytes* and *T. violaceum.* The MIC's of the most active plants ranged from 0.6 to 40 micrograms ml-1. The three dermatophytes differed significantly with regard to their susceptibility to plant extracts[16] (Ali-Shtayeh and Abu Ghdeib, 1999).

The *in vitro* antimicrobial activity of *Pistacia lentiscus* L. extract was determined. *Pistacia lentiscus* L. extract was tested on bacteria (*Sarcina lutea, Staphylococcus aureus* and *Escherichia coli*) and fungi (*Candida albicans, Candida parapsilosis, Torulopsis glabrata* and *Cryptococcus neoformans*). Of the different plant extracts and decoctions showed the best antibacterial activity but the activity against fungal cells appeared to be much more interesting[17] (Lauk *et al.,* 1996).

Side Effects

Harmful for urinary bladder[8-18] (Ashraf, ynm; Khan, 1895); also lungs (Khan, 1895).

Correctives

Rose, Tragacanth, gum Acacia, Coriander[13-11] (Najmul Ghani, 1926); and vinegar, (Kabiruddin, 1937).

Dose

1 gm-2 gm[11-8 13] (Kabiruddin, 1937); 3 gm (Ashraf, ynm); 3 gm-7 gm (Najmul Ghani, 1926).

REFERENCES

1. Ali-Shtayeh, M.S. and Abu Ghdeib, S.I., (1999). Anti-fungal activity of plant extracts against dermatophytes, *Mycoses,* 42(11-12), pp. 665-672.
2. Al-Said, M.S., Ageel, A.M. and Parmar, N.S., (1986). Evaluation of mastic, a crude drug obtained from *Pistacia lentiscus* for gastric and duodenal anti-ulcer activity, *J. Ethnopharmacol.,* 15, pp. 271-278.
3. Anonymous, (1997). *Hamdard Pharmacopia of Eastern Medicine* (Ed. Hakim Mohammed Said), Sri Satguru Publications, Delhi, India, pp. 310-411.
4. Ashraf, M., (ynm). *Makhzanul Mufradat Mae Murakkabat Wa Khwasul Advia,* Rizvi Kutub Khana, Urdu Bazar, Lahore, Pakistan, pp. 142-263.
5. Evans, W.P., (2001). *Pharmacognosy,* W.B. Saunders Company Limited, London.
6. Najmul Ghani, M., (1926). *Khazainat-ul-Advia,* Vols. I, II, and III, Matba Munshi Nawal Kishore, Lucknow, India.
7. Huba, G.J. and Melchior, L.A., (1996). Staff of The Measurement Group, and HRSA/HAB's SPNS Cooperative Agreement Steering Committee on Module 22: Quality of Life Form, Available: www.TheMeasurementGroup.com. The Measurement Group, Culver City, California.
8. Iauk, L., Ragusa, S., Rapisarda, A. and Franco, S., (1996). *In vitro* anti-microbial activity of *Pistacia lentiscus* L. extracts: preliminary report, *J. Chemother.,* Jun., 8(3), pp. 207-209.
9. Ibn Hubl, (1943). *Kitabul-Mukhtarat,* Dairat-ul-Ma'rif Usmaniyah, Hyderabad, India.
10. Ibn Sina, (1930). *Tarjumae Qanoon Shaikh -bu-Ali Sina* (Translated by Maulana Hakim Syed Ghulam Husain), Matba Munshi Naval Kishore, Lucknow, India.
11. Kabiruddin, M., (1937). *Makhzanul Mufradat, Khwasul Advia,* Aijaz Publishing House, New, Delhi, India.
12. Khan, M.A., (1895). *Muheet-e-Azam,* Vols. I, II, III, Nizami Press, Kanpur, India, pp. 80-306.
13. Lawless Julia, (1999). *Complete Essential Oils,* Element Books Limited, Shaftes Bury, Dorset, Great Britain, 202 pp.
14. Magiatis, P., Melliou, E. and Skaltsounis, A.L., (1999). Chemical composition and antimicrobial activity of the essential oils of *Pistacia lentiscus* var. chia., *Planta Med.,* 65(8), pp. 749-752.
15. Pamplona-Roger, G.D., (2000). *Encyclopedia of Medicinal Plants,* Vol. I, Editorial Safeliz, Spain.
16. Warrier, P.K., Nambier, V.P.K. and Raman Kutty, C., (1994). *Indian Medicinal Plants,* Vol. I, Orient Longman Limited, Hyderabad, India, pp. 292-293.