Myrrh has been used as a medicinal herb for thousands of years. It is mentioned several times in the Bible, in writings as old as Psalms and the Song of Solomon, and of course it is well known as one of the three gifts that the Magi brought to Jesus Christ.1

Despite this ancient record of use, clinical trials on myrrh were lacking until recently when a group of Egyptian scientists examined its value in the treatment of fascioliasis (liver fluke).2 Since then, a number of other clinical studies have been published that suggest the clinical use of myrrh represents a significant advance in the herbal treatment of parasites. What is particularly interesting is that myrrh seems to be active against parasites that infest deeper in the body than the gut, such as in the liver and bladder (the latter in the case of schistosomiasis).

What is Myrrh?
The name “myrrh” is probably derived from the Arabic or Hebrew word “mur,” which means bitter. Myrrh (Arabian or Somali Myrrh) is an oleo-gum resin, obtained from the stem of various species of Commiphora (Burseraceae) growing in northeast Africa and Arabia. Texts have traditionally given the principal source as C. molmol, but the chief source today is C. myrrha.3

Almost all members of the Burseraceae possess oleoresin canals in the phloem, and when cracks and fissures form in the bark, the resin exudes spontaneously. This yellowish-white viscous fluid soon hardens in the heat to reddish-brown crystalline masses. In some cases, incisions are made in the bark to encourage the resin production.3

Chemical Composition
Myrrh is composed of a volatile (essential) oil (two to ten percent), including sesquiterpenes, an alcohol-soluble resin (25 to 40%) containing commiphoric acids and a water-soluble gum (30 to 60%).4

Traditional Uses of Myrrh
Myrrh has been used in all the great traditions of herbal medicine. Traditional Western herbal uses include the following:

- mouth ulcers, pharyngitis, gingivitis, laryngitis, respiratory catarrh, the common cold, chronic catarrh, bronchitis, excessive mucous secretion, boils.5,6
- chronic gastritis, atonic dyspepsia; amenorrhea, female reproductive tract disorders accompanied by a dragging sensation and leukorrhea.6
- topically for damaged gums, wounds, abrasions, poorly healing skin ulcers, and sinusitis.5,7

Uses and properties from traditional Chinese medicine include the following:

- invigoration of the blood, dispersing congealed blood, reducing of swelling and alleviating pain, thus used to treat trauma, sores, boils, swelling, abdominal masses or pain, chest pain, amenorrhea,8
- topically, for chronic poorly healing sores.8

Traditional Ayurvedic uses include the following:

- dyspepsia, chlorosis (hypoehromic anemia), amenorrhea, uterine disorders, menstrual disorders in young girls, chronic bronchitis, tuberculosis,9
- a mouthwash for mouth ulcers and sore throat.9

In modern Western herbal use, myrrh (as noted above) has been largely relegated to a topical agent, especially for the mouth, gums, and throat. Hence, the rediscovery of the antiparasitic properties of myrrh places this herb into a completely new perspective. Rediscovery is the appropriate term since the US Eclectic text King’s Dispensatory10 mentions its use as a vermifuge, and Maude Grieve also makes mention of the same use.11

Pharmacological Activity

Antiparasitic Activity
A study on mice demonstrated that myrrh at an oral dose of 500 mg/g for five days before infection or one day after infection had a valuable schistosomicidal effect against the different maturation stages of Schistosoma mansoni.12

This is the organism that causes bilharzia. In addition, the livers of mice treated with myrrh (500 mg/g orally) for eight weeks after infection with schistosoma showed a marked reduction in degenerative changes.13 Myrrh has also demonstrated activity against S. mansoni worms in vitro.14 Not all the studies have been positive. There is one reported study where myrrh failed to exhibit any significant antiparasitic activity in mice and hamsters infected with S. mansoni.15

Molluscicidal Activity
Snails act as vectors for S. mansoni, hence molluscicidal activity can play a role in the prevention of bilharzia (schistosomiasis). The molluscicidal properties of the oil extract of myrrh were tested against the Egyptian snail species Biomphalaria alexandrina, Bulinus truncatus, and Limnaea caulliaudi. The impact of the extract on the egg clutches of B. alexandrina and L. caulliaudi was also evaluated. Snails and their eggs were exposed for 24 and 48 hours at 22°C to 26°C to various concentrations of the extract. The results showed different susceptibilities. B. alexandrina showed higher LD50 and LD90 (155, 195 ppm) concentrations than B. truncatus (50,
after 25 days compared to 50 days of treatment. Another study found that pretreatment with myrrh did not alter the biochemical and cytological effects of cyclophosphamide and did not show any additive effect. Both an extract and a fraction of myrrh stimulated phagocytosis in vivo after intraperitoneal injection.

**Veterinary Studies**

Myrrh has been tested in uncontrolled field trials for the treatment of various parasitic infestations in sheep. In sheep naturally infected with fascioliasis, doses of 300 to 600 mg of extract were administered for one to three days. A total dose of 900 to 1200 mg of extract gave a complete cure rate as assessed by stool or physical examination.

Fifteen sheep naturally infected with Dicrocoelium dendriticum (as proven parasitologically) were successfully and safely treated with two capsules of myrrh (300 mg each of extract) on an empty stomach an hour before eating for four successive days. Cure (100%) was successfully achieved as determined by stool analysis for seven days and macroscopically for detection of any adult worms.

In sheep infected naturally with Moniezia expansa, a total dose of 3600 mg of myrrh extract (as 900 mg per day for four days) or 4800 mg (as 600mg of extract for eight days) gave 100% cure rates. Response rates were assessed by microscopic and macroscopic stool examination.

**Clinical Studies**

All the studies cited below were open-label pilot studies. However, it can be reasonably inferred that a marked placebo effect in parasitic infestation is unlikely and that a true therapeutic effect was observed for myrrh. The mode of action of myrrh has not been established. Rather than exerting a direct antiparasitic effect, it could be acting via stimulation of the patient's natural immunity against parasites.

**Fascioliasis**

An open-label pilot study examined the action of myrrh in seven patients with fascioliasis. The treatment (a formulation consisting of eight parts of resin and 3.5 parts of volatile oil, all extracted from myrrh) was given at a dose of 12 mg/kg per day for six consecutive days in the morning on an empty stomach. Patients were followed for three months. The therapy proved to be effective, with pronounced improvement of the general condition of patients and amelioration of all symptoms and signs. A dramatic drop in the egg count was detected at the end of treatment. Eggs were no longer detectable in the feces three weeks after treatment and after a follow-up period of three months. High eosinophilic counts, elevated liver enzymes, and fasciola antibody titers returned to nearly normal. No signs of toxicity or adverse effects were observed. The authors concluded

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**Liver**

"The liver is the second-largest organ in the body (your skin is the largest) and is the largest gland. It performs many essential functions and you cannot live without it." - Wikipedia

"The liver is among the few internal human organs capable of natural regeneration of lost tissue; as little as 25% of remaining liver can regenerate into a whole liver again." - Wikipedia

"Medical terms related to the liver often start in hepato- or hepatic from the Greek word for liver, hepar." - Wikipedia
that the formulation of myrrh was safe, well tolerated, and effective for treating fascioliasis.

In an open-label controlled study, 68 patients were included: 30 with fasciola infection; 20 were infected with other parasites but not fasciola (infected control group); and 18 individuals were parasite-free (normal control group). For all groups, stool samples were evaluated for egg counts; circulating fasciola antigens (CFAg) and the anti-fasciola IgG4 isotype were also evaluated. Complete blood count, liver function tests, and abdominal ultrasonography were performed for all fasciola-infected patients. Patients with fascioliasis received myrrh extract at a dose of 10 mg/kg, one hour before breakfast for six consecutive days. Detection of CFAg was found to be a useful marker for assessment. No cross-reaction was observed between fasciola and other parasites by using CFAg (100% specificity). The level of these antigens correlated positively with signs of fasciola and other parasites by using CFAG (100% specificity).

To determine their role in the immunopathogenesis of fascioliasis in relation to treatment with myrrh, a study was designed to evaluate total IgE and the in vitro production of IL-1 beta and IL-4 by peripheral blood mononuclear cells. A total of 35 patients with chronic fascioliasis with an age range from nine to 45 years were included in the trial. In addition, ten healthy subjects with matched age and sex served as controls. Serum IgE and in vitro IL-1 and IL-4 were estimated by enzyme immuno-assay (ELISA) before and three months after therapy. Results revealed significant elevation of IL-1 beta in patients before treatment compared to controls (p<0.001), but this decreased significantly after therapy (p<0.001) to reach the control level (p=0.16). In contrast, IL-4 was significantly lower than controls before therapy (p=0.04) and increased significantly after treatment (p<0.001) to reach control levels (p=0.059). Total IgE was significantly elevated in patients before treatment (p<0.001), and it did decrease significantly with treatment (p<0.001), although it remained significantly higher than the control level. The authors concluded that myrrh is an effective fasciolicidal drug. IL-1 may be involved in disease immunopathogenesis and depressed IL-4 may be a phenomenon of parasite immune suppression.

A field trial was conducted in Egypt to assess the efficacy and safety of a myrrh extract (1200 mg per day for six consecutive days) for the treatment of human fascioliasis. Evaluation of 1019 individuals revealed the presence of fascioliasis in 17. Cure rates in these patients were 88.2% and 94.1%, respectively, at two and three months following treatment.

A total of 21 children with fascioliasis (eight males and 13 females) with a mean age of 10.4 years and eight children infected with Schistosomiasis mansoni (six males and two females) with a mean age of 11.37 years were treated with myrrh extract in an open-label trial. Also, ten healthy matched children were utilized as controls. Diagnosis was based on the detection of Fasciola hepatica or Schistosoma mansoni eggs in stool samples. Myrrh extract was given as 10 mg/kg/d one hour before breakfast for three consecutive days in schistosomiasis and for six days in fascioliasis. Clinical evaluation and stool analysis were done initially and at two, four, and 12 weeks post-treatment to evaluate cure. Rectal snip was done for responding schistosomiasis cases to confirm recovery. The cure rate was 90.9% in fascioliasis and 100% in schistosomiasis at four weeks post-treatment. After a second course of treatment, those fasciola patients who remained positive were cured. Total IgE was significantly higher in fasciola and schistosoma patients before treatment compared to controls (p < 0.001; 0.005, respectively) and decreased significantly with therapy (p = 0.001; 0.036). IL-1beta was higher in both patient groups than controls (p < 0.001; 0.003) and decreased significantly 12 weeks after therapy to control levels (p < 0.001; 0.017). IL-5 was high before treatment in both groups (p = 0.041; 0.027) and decreased significantly 12 weeks after therapy (p = 0.005; 0.012). IL-4 did not differ from control before therapy (p = 0.58; 0.79) but increased significantly after treatment in both patient groups (p = 0.04; 0.02). It was concluded that myrrh is an effective fasciolicidal and schistosomicidal treatment.

Schistosomiasis

As well as the trial described above, other studies conducted in Egypt have investigated the activity of myrrh extract in schistosomiasis. An open-label trial was conducted on 204 patients suffering from this infestation. Myrrh extract was given at a dose of 10 mg/kg for three days and found to effect a cure rate of 91.7%. Retreatment of the nonresponsive cases with the same dose for six days increased the overall cure rate to 98%. Myrrh was observed to be well tolerated, and side effects were mild and transient. Twenty cases provided biopsy specimens six months later, and none showed living ova.

Among 1019 individuals parasitologically examined in an open-label field trial, the prevalence of S. haematobium and S. mansoni were 4.2% and 2.4%, respectively, and the geometric mean egg count were 33.2 eggs/10 mL urine and 113.3 eggs/gram stool.

Most of the patients with hematobiasis and mansoniasis were 15 years (56.4% and 53.8%) and males (56.4% and 53.8%). All cases were treated by myrrh extract as two capsules (600 mg) on an empty stomach an hour before breakfast for six consecutive days and were followed up clinically and parasitologically by urine and stool analysis. The parasitological cure rate after three months was 97.4% and 96.2% for S. haematobium and S. mansoni cases, respectively, with no major side effects. Patients not completely responding to a single course of treatment showed a marked reduction of egg levels.

A more recent trial was again open-label design, but with the important inclusion of randomization and an active control group. The results for myrrh were less impressive than the above, but the trial dosage used was either lower or for less time than in previous clinical evaluations (600 mg per day for three consecutive days). One hundred and four individuals infected with Schistosoma mansoni were randomized in two groups, one for myrrh and the second for praziquantel. Treatment, whether myrrh or praziquantel, was given twice with a three-week interval. The cure rate with myrrh was very low, 15.6% after the first treatment and 8.9% after the second treatment. Egg reduction among uncured persons was also very low, being 17.2% after the first treatment and 28% after the second treatment. The praziquantel cure rate was 73.7% and 76.3%, and individuals still passing S. mansoni ova after praziquantel treatment showed a substantial reduction in the geometric mean egg counts (84% and 88.2% after the first and second treatments, respectively). Similarly, another trial comparing myrrh with praziquantel found low cure rates for myrrh (around 9%), but again a lower dose than that used in previous trials was employed (300 mg of extract per day for three days).
Toxicology

The LD₅₀ for an oil of myrrh was given as 1.65 g/kg in rats. Doses of an ethanolic extract given by mouth at 1000 mg/kg to male Wistar rats for two weeks led to depression, jaundice, ruffled hair, hepatonephropathy, hemorrhagic myositis, and death, accompanied by increases in serum ALP and ALT activities, bilirubin, cholesterol, and creatinine concentrations; decreases in total protein and albumin levels, and macrocytic anemia and leucopenia. In acute toxicity testing, myrrh oil and gum resin exhibited no visible signs of toxicity, and no mortality was observed up to 3 g/kg in mice. A decrease in locomotor activity was noticed at 3 g/kg. In chronic oral testing (100 mg/kg/day, 90 days), there was no significant difference in mortality compared to controls. At the end of treatment, there was a significant increase in weight of testes, caudae epididymides, and seminal vesicles, and in red blood count and hemoglobin levels in the myrrh-treated group.

Death occurred after consumption of between 5 g and 16 g plant resin/kg/day in goats. Entero-hepatonephrotoxicity was accompanied by anemia, leucopenia, increases in serum ALP activity and concentrations of bilirubin, cholesterol, triglycerides, and creatinine, and decreases in total protein and albumin. The oral dose of 0.25 g plant resin/kg/day was not toxic.

Prescribing Information

Actions
Astringent, antimicrobial, antiparasitic, anti-inflammatory, vulnerary

Potential Indications
Based on appropriate evaluation of the patient, consider prescribing myrrh in formulations in the context of the following:

- parasitic infestations
- chronic bronchitis, the common cold, chronic catarrh; inflammation of the mouth and throat
- gastritis, dyspepsia; amenorrhea, leukorrhea
- topical treatment for inflammations of the mouth and throat, skin inflammations, wounds, abrasions
- In Germany, the use of myrrh topically to treat mild inflammations of the oral and pharyngeal mucosa is supported by the Commission E.
- ESCOP recommends myrrh for the topical treatment of gingivitis, stomatitis (mouth ulcers), minor skin inflammations, and minor wounds and abrasions, and as a supportive treatment for pharyngitis and tonsillitis.

Contraindications
Known allergy. According to traditional Chinese medicine, myrrh is contraindicated in pregnancy and in cases of excessive uterine bleeding.

Warnings and Precautions
Depending on the level of dilution of the tincture, a transient burning sensation on the skin or mucous membranes may be experienced from the topical application of myrrh. Myrrh should not be ingested for prolonged periods (more than a few weeks at a time) because of the potential for allergic contact dermatitis and other allergic reactions.

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