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Review Article

A Comprehensive Study for the Pharmacological Activities of Mercurius Solubilis

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Abstract

At room temperature, mercury is a silver- colored metallic element in fluid form. Organic and inorganic mercury salts are used as antiseptic, preservative, vaccine, etc. exposure of various mammalian species to mercurial compounds can give rise to immunosuppression and auto- immunity. Merc solubilis is of mineral origin. Mercurius solubilis, *is* prepared from mercury nitrate, Hg $(NO_3)_2$. This medicine is used clinically in homeopathy for the treatment of infectious and suppurative processes. Mercurius solubilis is also used for treatment of various acute and chronic inflammatory conditions by homeopathic physicians. It is also called as Quicksilver. Mercurius solubilis is considered as a best alternative drug for acute inflammatory conditions treatment.

Keywords: Mercurius Solubilis; Mercury; Nervous System

Figure 1

Introduction

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Mercury is extracted from cinnabar ore (mineral origin), which is found in volcanic rocks [1]. Commercially it is extracted for a variety of industrial purposes. Mercury is used in thermometers and was at one stage a major ingredient in tooth fillings.

Mercury is a general poison having affinity with a wide range of tissues, notably mucous membranes, bones, salivary glands, lymph nodes, liver, kidneys, nervous system, blood and skin. Medicinally, mercury was not used before fifteen century, while the ammonium nitrate salt of mercury that was introduced by Hahnemann into

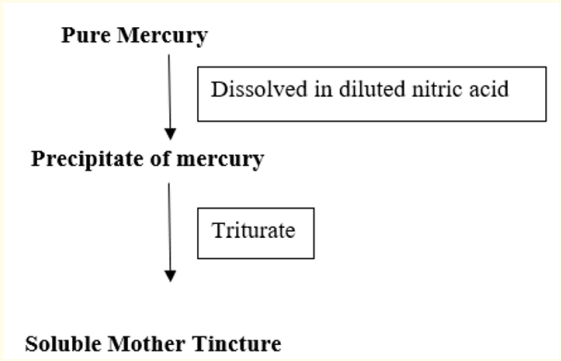

Figure 2

medicine in 1788 was called as Mercurius solubilis, that is also called as Mercurius oxydulatus niger [2].

Remedy preparation

Profile

- Used for conditions that cause excessive bodily secretions that are foul smelling, high fever and extreme perspiration.
- Swollen glands, excessive salivating, abscesses and ulcers may also be present.
- Symptoms tend to be worse at night and patients are very sensitive to cold or heat, so the moderate conditions are essential for recovery.
- Excessive salivation is the common symptom, as is constant swallowing and dribbling on the pillow at night [3].

Merc sol centesimal high dilutions (CH) and equivalent concentrations are described below [4]

Concentration(mg/ml)	Merc sol 6 CH	Merc sol 12 CH	Merc sol 30 CH	Merc sol 200 CH
Merc sol	10^{-15}	10^{-27}	10^{-63}	10^{-403}
Hg	8.21×10^{-16}	8.21×10^{-28}	8.21×10^{-64}	8.21×10^{-404}

Table 1

Reported activities of mercurius solubilis

There are many pharmacological activities of umbelliferone which are described in literature as reported by many researchers. These reported activities includes: Anti- inflammatory activity, anti leprotic activity [6], Role in immunomodulation [4], bacteriological response in alveolitis process in rats [7], Gingivitis gravidica [8], protective effect on genotoxic effects of mercurius chloride [9].

Anti- inflammatory activity

Inflammation is a local response of the living mammalian tissues to the injury, and it is a body defence reaction in order to eliminate the extend of injurious agents. Already used drugs for their anti-inflammatory activity are narcotics e.g. opioids or non-narcotics e.g. salicylates and corticosteroids e.g. hydrocortisone, but all of these possess side- effects mercurius solubilis possesses significant anti-inflammatory activity by following the mechanism.

Figure 3: Mercurius as anti- inflammatory agent [5] (Vangoory, Y., *et al*. 2013).

Leprosy

Leprosy is a chronic infectious disease caused by Mycobacterium leprae and affects the peripheral nerves and leads to impairment of motor, sensory or autonomic function [6]. Out of the drugs being included in MDT Dapsone, and clofazemine, both are bacteriostatic in nature, due to which the affected person does not get rid of the residual effects of the disease and dapsone has also been found to lower the CMI status of patients [10,11]. However,

Rifampicin is known to kill 99.9% of M. leprae within a month's time, instead of this, Relapses are not uncommon in these cases. Mercurius solubilis is found to save the patients from the serious consequences impairment in nerve function and the development of deformity [6]. A borderline leprosy case treated with Merc. Solubilis for 2 years, patient show improvement in signs and symptoms [12].

Figure 4: Mercurius as antileprotic agent (Chakraborty, D., *et al*. 2015).

Role in Immunomodulation

Macrophages are among the first cells to interact with foreign or abnormal host cells and their products, by virtue of their presence at the portals of entry. Depending upon the recognition receptor and the stages of differentiation, they release various products, including cytokines that mobilize and influence other resident cells in tissues and reactive oxygen species that participate in bacterial killing and are drawn in inflammation and tissue injury. Macrophages also present antigens to T and B- Lymphocytes. Macrophages have a central role in immunomodulation, by participating in mobilization, activation and regulation of all immune system [4].

Mercurius solubilis has been shown to alter macrophages function, by increasing the production of IL-4, IFN-γ, NO, H_2O_2 and probably $ONOO^{-4}$.

Bacteriological process in alveolitis

Alveolitis condition may develop subsequent to the extraction of tooth, it may be due to the presence of various species of pyrogenic

Figure 5: Mechanism of action of mercurius on macrophages.

bacteria. Alveolitis condition is accompanied by symptoms like pain, fetid odour, exposed alveolar bone, absence of tissue healing, purulent secretion, edema, lymphoadenopathy and hyperemia [7].

In the infectious process there was a decrease in gram- positive and an increase in the gram- negative bacteria. Local or systemic antibiotics were most commonly being used to treat alveolitis, but their numerous use may lead to the bacterial resistance. Homeopathic drugs are being more advantageous due to shorter duration of symptoms, lower cost and fewer side effects. Mercurius solubilis do not decrease the bacterial growth, but the microbiota is maintained.

Antibiotics ⟶ bacterial resistance

Mercurius solubilis reduces the duration of symptoms, cost as well as the adverse effects [7].

Figure 6: Mechanism of action of mercurius solubilis on alveolitis [7].

Gingivitis gravidica

Usual symptoms of gingivitis are- tendency to bleed, colour, texture, shape, size, consistency and position. Mercurius solubilis 6x is found to give a curative effect in the disease.

Figure 7: Action of mercurius on Gingivitis [8].

Mercurius solubilis action on genotoxic effects of mercuric chloride

Mercurius chloride is an tremendously toxic salt and have tendency to cause chromosomal aberrations (damaging effect), micronuclei in the bone marrow cells (small chromatin- containing bodies arising from the chromosomes that failed to incorporate into daughter nuclei following mitosis) and increased frequencies of sperm head abnormality.

Figure 8: Mechanism of action of mercurius to protect from genotoxic effects of mercuric chloride [9].

Mercurius solubilis action on memory

Merc sol 30X have strong nitric oxide scavenging activity and it also works against free radicals. Therefore, it shows antiamnesic activity.

Figure 9: Action of mercurius on memory deficits [13].

Mercurius solubilis effect on Cerebral blood flow and memory

Merc. Sol provides memory impairment protection because of it Cerebral blood flow potentiation effect. Moreover, due to its anti-inflammatory property it shows neuroprotection.

Figure 10: Action of mercurius on cerebral blood flow and memory [14].

Conclusion

Because of its effect on several parameters including lymphocyte count, cerebral blood flow, nitric oxide scavenging and many other activities, it shows its pharmacological effects.

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Volume 4 Issue 7 July 2021