Use of Propolis chemical and Asian tiger mosquito bites - case report and review

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Abstract
Propolis is a substance of variable composition which incorporates resins derived from plants and beeswax. It varies depending on the geographic location and local flora such as plant and bee species. Propolis possesses several attributes such as immune enhancement, antimicrobial, antioxidant, analgesic as well as reported anti-tumour effects.1,2 Several research efforts have focused on studying the chemical composition of propolis.3-7 The diverse biological activity probably relates in part to the significant changes in extract constituents. Propolis has been popularized in the past as a natural remedy but significant possible pharmaceutical use is envisaged. This brief review details a case of how multiple annoying localized allergic skin reactions secondary to Asian tiger mosquito bites were soothed and resolved very rapidly with the application of Propolis.

Keywords
Propolis chemical, insect

Case report
A young healthy 25 year old female sustained numerous mosquito bites during summer which were allegedly itching severely, were large in diameter and resolving very gradually compared to previous isolated mosquito bites. Five of the 12 lesions consisted of oval red elevations measuring over 1.5cms in diameter. Most lesions were situated on both lower limbs from mid-thigh downwards with a lesion on elbow of the left arm. Propolis was applied to 6 mosquito bites on the same subject yielding almost immediate symptomatic relief and visible reduction in swelling and redness of the skin lesions over first few hours when compared to a neighbouring lesion not treated with propolis. It reduced the lingering itching sensation and helped more rapid resolution of the inflammation in the skin affected by the mosquito bite. It was applied 1-2 times in the day over the affected site, not under occlusion which resulted in the need for the second application if it was wiped off the skin onto the clothing. The Asian Tiger Mosquito bite Aedes albopictus, a possible dengue fever and other exotic disease carrier was initially suspected in this individual. Although other arthropod bites were initially considered these were deemed to be not the case given the nature of the lesion and patient direct observation of the mosquito on the skin overlying the irritation in two instances, which immediately flew off when the limb was moved resulting in smaller lesions.

Three mosquitoes were killed in the household of the index case (South of Malta - Zabbar), the corpse of two of which revealed the black and white stripes characteristic of the Asian tiger mosquito. The neighbour of the index case claimed finding a swarm of such mosquitoes in his garden. The suspected insect bites treated were allegedly sustained over the same day and were the most symptomatic, however other lesions were present sustained over the preceding five days which showed relatively slow natural resolution compared to other mosquito species bites. The propolis formulation used consisted of a commercial preparation ‘Bee Health TM Liquid Propolis HFMA’
consisting of 50% high potency propolis and mono propylene glycol. The patient used the substance again three times on such lesions with similar positive results on the lesions reported, as well as noting the fact the substance may be difficult to wash off clothing.

Figure 1: Two lower limb lesions before and with propolis applied

Figure 2: Lesions after 2 and 3 hours post treatment

Discussion

PubMed search yielded 996 articles with Propolis in the title but only two titles resulted when this was combined with the abstract key word mosquito. In one of these two, the word was used out of context and in the other article the main reference was to propolis and malaria. Checking the PubMed database one week after the initial search resulted in overall 1000 article retrieval for the key word Propolis in the title.

Its properties in wound healing are widely acknowledged. The application of propolis or bee glue has been documented in Greek and Roman writings; Aristoteles in fact makes reference to its biology in Historia Animalium. Its most widespread use was in surgery and wound treatment. This was one of the premises for initially trying out this remedy empirically in the first place. Propolis has been used in surgical wound healing. It stimulates the keratinocytes and wound reepithelialisation with good penetrance.

Uncommonly Propolis may however cause contact dermatitis. Some authors also claim that it should not be recommended for therapeutic use due to propensity for hypersensitivity reactions in some individuals and implication in certain cases of renal failure. Other recent studies were carried out on the rainbow trout subjected to long term propolis, demonstrating no adverse change in biochemistry. Other safety studies were also performed on mice.

Propolis was more recently also rarely used by some as a natural remedy in mosquito bites. It may be applied to given affected areas of irritation secondary to the reaction to the mosquito’s saliva. It is however much better known for a multitude of biological and pharmacological actions.

The pruritic weals of mosquito bites vary in stages from initial presentation. Non-sedating antihistamines such as cetirizine and ebastine may be effective. Hydrocortisone creams, calamine lotion and other anti-inflammatory medication and homeopathic substances may be useful. Studies comparing effectiveness of traditional treatments with novel emerging methods are scarce and little randomised data is available on propolis and mosquito bites in particular.

Numerous studies were carried out worldwide on different geographical locations of Propolis, some by collection of ethanolic extracts. This was done in an attempt to isolate compounds responsible for its biological action. Flavanones, terpenes and phenolic substances were commonly encountered. In a variety of studies components were analysed for example using spectral properties by gas chromatography-mass spectrometry as well as high-performance liquid chromatography-diode array detection-electrospray ionization-mass spectrometry. This constituted an elucidation challenge in analytical chemistry. Basic spectrophotometric procedures were also suggested by some. Composition worldwide varied considerably with detection of esters, aromatic acids, caffeic acid, cinnamyl compound derivatives, alcoholic hydrocarbons, prenylated and non-prenylated phenylpropanoids, anthracene derivatives and supportive nutrients amongst other compounds. Flavonoids, the main bioactive species may inhibit lipid peroxidation as well as platelet aggregation and may influence the lipoxygenase and cyclo-oxygenase pathways. There is also concern that flavonoids may chelate heavy metals.

Immuno-modulatory, anti-inflammatory, vasodilator, anti-allergic, anti-viral and anti-bacterial properties have been acclaimed. For example, amongst many other actions, Brazilian green Propolis contains bioactive species in prostate cancer and acts on the tumour necrosis factor-related apoptosis-inducing ligand (TRAIL). Greek Propolis contains a diterpene, manool, which may arrest cancer cells in G2/M phase.
during the cell cycle.39

Although mosquito bites are extremely irritating they by far do not usually carry long term consequences apart from instances where they are vectors for disease. However studies on many more serious conditions have shown possible therapeutic benefit. Further studies are needed in complete profiling and characterization of chemical constituents and clinical trials on efficacy and safety profiling of individuals compounds in humans.

References