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Diagnosis of *Vespa affinis* venom allergy: use of immunochemical methods and a passive basophil activation test

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Abstract

Background: Allergy to *Vespa affinis* venom is common in the Asia Pacific region. Venom preparations for diagnosis are not commercially available for this species.

Methods: The prominent allergens in *V. affinis* venom were identified using immunochemical methods. Use of ImmunoCAP of *Vespula vulgaris* crude venom/its components and a passive basophil activation test (BAT) in the diagnosis of patients who had anaphylaxis to *V. affinis* venom ($n = 30$) were also accessed. The IgE double-positivity rates (positive to both hornet and honeybee) in ImmunoCAP and the passive BAT were determined.

Results: High IgE reactivity was seen with the five allergens in *V. affinis* venom; 96% (29/30) for 34 and 24 kDa, 93% (28/30) for 45 kDa and 90% (27/30) reactivity for the 100 and 80 kDa respectively. IgE cross-reactivity was low with ImmunoCAP using *V. vulgaris* venom (43%; 13/30) and Ves v1 (3%; 1/30), but relatively high with Ves v5 (73%; 22/30). All patients (100%) were positive to *V. affinis* venom in passive BAT. In ImmunoCAP, a high double-positivity rate (76%; 23/30) was detected while no double-positivity was detected in passive BAT.

Conclusions: High IgE reactivity for five allergens of *V. affinis* points to the potential of using these allergens in component resolved diagnosis (CRD). The passive BAT has shown its importance as a promising diagnostic tool with high accuracy. It would be particularly useful in cases with doubtful double-positive results of other diagnostic tests.

Keywords: CD63, IgE cross-reactivity, Insect venom allergy, Passive basophil activation test, *Vespa affinis*

Background

Vespa affinis Linnaeus (English: Lesser Banded Hornet, Sinhalese: Debara and Tamil: Kuḷavikalai) is a hymenopteran insect of the family Vespidae, native to Sri Lanka and the Asia Pacific region [1, 2]. The distribution of *V. affinis* is confined to a small part of the world compared to *Vespula vulgaris*, the wasp prevalent in Western countries [3, 4]. IgE mediated hypersensitivity reactions to *V. affinis* stings is common in rural areas of Sri Lanka and is second only to *Apis dorsata* (Giant Asian

Honeybee) among insect venom allergies in the country [5]. Unfortunately, in low income countries such as Sri Lanka, the incidence of stinging insect venom allergy is poorly documented and thus its adverse impact on the quality of health of the population may be underestimated [6–10]. In Sri Lanka, 6.7% of the patients ($n = 30$) had an anaphylactic shock after *V. affinis* sting [5]. A large case series from Vietnam has reported 16.3% of refractory hypotension and 6/43 (14%) of deaths after hornet sting allergic patients ($n = 43$) [8]. Fatalities due to anaphylaxis following *V. affinis* stings have been reported in Sri Lanka [11–13] and South East Asia [2, 14–17]. Several case reports of *V. affinis* allergy and envenomation have also been reported from India [18–20], Nepal [21, 22] and Bangladesh [23, 24].

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