Occupational immediate-type reactions to locusts—A possible cross-reactivity between desert locusts (*Schistocerca gregoria*) and migratory locusts (*Locusta migratoria*)?

Igor Hrgovic, MD, Anneli Messerschmidt, MD, Roland Kaufmann, MD, and Eva Valesky, MD
Frankfurt, Germany

Key words: cross reactivity; locusts; occupational immediate-type reactions.

INTRODUCTION

Exposure to locusts, which belong to the arthropod phylum, is an underestimated health problem, especially among workers in research facilities exposed to laboratory animals. We describe a rare case of an occupational immediate-type reaction to locusts with a possible cross-reactivity between desert locust (*Schistocerca gregaria*) and migratory locust (*Locusta migratoria*).

CASE REPORT

In February 2016, a 33-year-old male zookeeper employed in a research facility first presented to our department. The occupational duties of our patient included the feeding of various reptiles with desert locusts. He reported a 2.5-year history of recurrent episodes of wheals, pruritus, erythema, and cough upon contact with desert locusts. The symptoms developed after 10 to 15 minutes of contact with desert locusts. Our patient was completely symptom free on weekends and during vacations. He was otherwise well and his family history was negative for atopic dermatitis, allergic rhinoconjunctivitis, and asthma. A skin contact test with a dead desert locust was strongly positive (22/40 mm) (Fig 1). Total serum IgE level was normal at 84 U/mL. Enzyme-linked immunosorbent assay (ELISA) testing (ImmunoCAP, Thermofischer) showed specific IgE antibodies to American house dust mites (*Dermatophagoides farinae*) (0.37 IU/mL, carrier polymer-system 1), but not to European house dust mites (*Dermatophagoides pteronyssinus*) and tropomyosin. Currently, there are no useful in vitro test systems available for the detection of desert locust–specific IgE. Taking into account that cross-reactivity between different locust species may exist,[1] a specially developed ImmunoCAP (Phadia, Uppsala, Sweden) for the quantifaction of migratory locusts-specific IgE was used for this case. Surprisingly, the ELISA testing found elevated specific IgE antibody levels to migratory locusts (1.45 IU/mL, carrier polymer-system 2) (Table I). These findings (skin contact test, ELISA) were consistent with an immediate-type allergy to desert locusts. For a better control of the symptoms, our patient was advised to take antihistamines, and an occupational disease assessment procedure was initiated. Furthermore, we recommended him to use protective equipment during work to reduce allergen exposure. Additionally, we referred him for further examinations to a pulmonologist.

Abbreviation used:

ELISA: enzyme-linked immunosorbent assay

DISCUSSION

There is growing evidence that exposure to arthropods could contribute to work-related allergic symptoms among laboratory workers and

From the Department of Dermatology, Venereology and Allergy, Goethe-University Hospital, Frankfurt (Main), Germany.
Funding sources: None.
Conflicts of interest: None declared.
Correspondence to: Igor Hrgovic, MD, Klinik für Dermatologie, Venerologie und Allergologie, Klinikum der J. W. Goethe-Universität, Theodor-Stern-Kai 7, Frankfurt am Main D-60590, Germany. E-mail: igor.hrgovic@kgu.de.

JAAD Case Reports 2018;4:484-5.
2352-5126

https://doi.org/10.1016/j.jdcr.2017.11.027

Fig 1. Skin contact test with a desert locust.

zookeepers employed in research facilities. Burge et al[2] reported that exposure-related allergic symptoms occurred among laboratory workers in a research facility where locusts were bred. For respiratory disorders, rhinitis, and urticaria, the estimated prevalences were 26%, 35%, and 33%, respectively. Additionally, they found that atopic workers handling locusts had occupational asthma more often and more quickly than similarly exposed nonatopic workers, whereas other studies failed to show such an association. Furthermore, they found a correlation between positive reaction to locust and Dermatophagoides antigens.[1,2] Such a correlation was also seen in our patient. Recently, a rare case of an occupational immediate-type allergy to locusts in a zookeeper without any cross-reactivities was published.[3] Several epitopes have been identified as primary allergen source in migratory locusts. In the study of Tee et al,[4] a peritrophic membrane present in the gut that is excreted in feces was characterized as an allergen source. Additionally, other epitopes were found in the wings and body of locusts.[2] Relevant cross-reactivities may exist between locusts, shrimps, and house dust mites, but further molecular studies on the allergens responsible for cross-reactivity were recommended.[1,4,5] It is well known that patients with occupational allergies have long-term socioeconomic and health problems. Therefore, the management of rare allergies should include not only the prevention, but also the diagnosis and treatment. Taken together, we found a rare case of occupational immediate-type allergy to desert locusts with possible cross-reactivities to migratory locusts and to American house dust mites.

Table I. Results of the specific IgE measurements

	Concentration	CAP-class
D farinae	0.37 IU/mL	1
D pteronyssinus	<0.10 IU/mL	0
Tropomyosin	<0.10 IU/mL	0
Locusta migratoria	1.45 IU/mL	2

CAP, Carrier polymer-system.
Total IgE, 84 U/mL (<100). Specific IgE antibodies (ImmunoCAP, Thermofischer/Phadia).

REFERENCES

1. Lopata AL, Fenemore B, Jeebhay MF, et al. Occupational allergy in laboratory workers caused by the African migratory grasshopper Locusta migratoria. *Allergy*. 2005;60:200-205.
2. Burge PS, Edge G, O'Brien IM, et al. Occupational asthma in a research centre breeding locusts. *Clin Allergy*. 1980;10:355-363.
3. Rauschenberg R, Bauer A, Beissert S, et al. Occupational immediate-type to locusts in a zookeeper. *J Dtsch Dermatol Ges*. 2015;13:157-158.
4. Tee RD, Gordon DJ, Hawkins ER, et al. Occupational allergy to locusts: an investigation of the sources of the allergen. *J Allergy Clin Immunol*. 1988;81:517-525.
5. Ayuso R, Reese G, Leong-Kee S, et al. Molecular basis of arthropod cross-reactivity: IgE-binding cross-reactive epitopes of shrimp, house dust mite and cockroach tropomyosins. *Int Arch Allergy Immunol*. 2002;129:38-48.