Insect bites and stings

How common are insect bites?[1]

Insect bites tend to be seasonal and increase during the summer months when more insects are active and more skin is exposed. Studies suggest that 56-94% of people are stung by insects such as bees, wasps or ants, at least once in their lifetime. In the UK, insect stings are the second most common cause of anaphylaxis outside of medical settings.

Insect venom induces a toxic reaction at the site of the sting. Large local reactions are due to allergy. In the UK, wasp venom allergy is more common than bee venom allergy, and biting insects rarely cause systemic reactions.

A German study found that large local reactions occurred in up to 25% of the population, and as many as 3.5% develop IgE-mediated, potentially life-threatening anaphylaxis, of which about 20 people die in Germany each year.[2]

How to identify an insect bite

The cause of a bite can often be readily diagnosed where an insect remains attached, as in ticks (small blood-sucking bugs often thought of as insects) and with bloodsuckers that are highly visible - eg, mosquitoes, midges and black flies. Others may not be so easy to diagnose because they bite at night or when the patient is asleep - eg, some mosquitoes, sandflies, bedbugs and triatomine bugs, or when it is inconspicuous and does not cause an immediately painful bite - eg, harvest mites, some fleas and biting flies. Bites typically result in single or grouped pruritic erythematous papules. Some may have a central punctum and others may be bullous.

There is often a skin reaction to an insect bite and this may lead to pruritus and urticarial papules and sometimes to secondary bacterial infection. As well as a local reaction, the bite may cause an anaphylactic reaction and may act as a vector of disease.

Human, dog, and cat fleas, as well as bedbugs, feed by biting their victims, causing acute prurigo, which is aggravated in sensitised victims (papular urticaria). Diagnosis is based on three or more bites (in most cases three) with pruritic, erythematous-oedematous papules, which are either linear or triangular, a few centimetres apart. This pattern is known as the 'breakfast, lunch, and dinner' sign.[3]

General management measures include cooling the skin, use of calamine and antihistamines to reduce itching, antibiotics for secondary bacterial infection if one develops and any specific treatment for disease transmitted as a result of the bite.

What is the treatment for insect bites and stings? [1] [4]

- If a stinger is visible in the skin, remove it as quickly as possible by scraping sideways with a fingernail or a piece of card.
- Clean the area and advise that simple first aid measures such as the use of cold compresses may help reduce local pain and swelling.
- Advise the person on prevention of secondary infections with good hygiene and avoidance of itching.
- Simple pain relief with paracetamol or ibuprofen.
- Oral antihistamines or topical corticosteroids (such as hydrocortisone 1%) may help reduce itching associated with cutaneous reactions but good-quality evidence in support of this use is lacking.
- If secondary infection develops, treat cellulitis with oral antibiotics in accordance with local prescribing protocols.
- Arrange immediate admission to hospital in the following circumstances:
    - Systemic hypersensitivity or toxic reaction to an insect sting or bite.
    - Previous systemic allergic reaction to the same type of bite or sting.
    - Severely immunocompromised and symptoms or signs of an infection.
    - Stung on the mouth, throat or tongue and is at risk of airway obstruction.
    - Stung around the eyes and is at risk of compromised vision.
    - Cellulitis that is associated with systemic effects or is worsening despite treatment in primary care.
    - Fever or persisting lesions associated with a bite or sting which occurred whilst travelling outside the UK.
    - Bitten or stung by an unusual insect or one from a tropical or sub-tropical area.

Antibiotics for insect bites and stings [5]

- Most insect bites or stings will not need antibiotics.
- First-choice antibiotic is flucloxacillin. Alternative first-choice antibiotics for penicillin allergy or if flucloxacillin is unsuitable are clarithromycin, erythromycin, doxycycline.

- First-choice antibiotic if infection is near the eyes or nose (consider seeking specialist advice) is co-amoxiclav.
- Alternative first-choice antibiotics if infection is near the eyes or nose for penicillin allergy or if co-amoxiclav is unsuitable are clarithromycin with metronidazole.
- Alternative-choice antibiotics for severe infection are co-amoxiclav, cefuroxime, clindamycin or ceftriaxone.
- Antibiotics to be added if meticillin-resistant *Staphylococcus aureus* infection is suspected or confirmed (combination therapy with an antibiotic listed above; other antibiotics may be appropriate based on microbiological results and specialist advice) are vancomycin, teicoplanin or linezolid (if vancomycin or teicoplanin cannot be used; specialist use only).

Hymenoptera stings

- Insects of the order *Hymenoptera* include bees, wasps and ants.
- Stings from these insects can cause fatal anaphylaxis.
- The insects of *Hymenoptera* most relevant in the UK are wasp (*Vespula vulgaris*) and honey bee (*Apis mellifera*). Hornets (*Vespa crabro*) are also found in Britain, more commonly in the South of England.
- Wasp venom allergy is more common in the UK. Bee venom allergy usually occurs in beekeepers, their household members or where there is occupational risk.
- The risk for systemic reactions is increased by 58% if preceded by a sting within two months, even if the first sting was well tolerated.
- Venom allergy is not more common in atopic individuals.
- Some local reactions can be large and troublesome and are characterised by oedema, erythema or pruritus.
- An area of induration with a diameter of 10 cm and which peaks between 24 and 48 hours and then subsides is referred to as a large local reaction (LLR). [6]
- LLRs occur in up to 26% of people and systemic reactions can occur in up to 7.5% of people who are stung.
- The likelihood of anaphylaxis from a future sting following an LLR is around 5%. [7]
- However, when there is a history of anaphylaxis from a previous *Hymenoptera* sting and the patient has positive skin tests to venom, at least 60% of adults and 20-32% of children will develop anaphylaxis from a future sting.

Systemic reaction to wasp or bee stings

- Venom allergy is a common cause of anaphylaxis and may be fatal.
- Food, medications and insect stings are the three most common triggers of anaphylaxis.[8]

However, anaphylaxis due to insect stings is still under-appreciated and undertreated.[9]

The main features of systemic reactions are:

- Rapid-onset generalised urticaria.
- Angio-oedema.
- Bronchospasm and/or laryngeal oedema.
- Hypotension with collapse and loss of consciousness.

Investigation of patients with bee or wasp sting allergy[10]

- All patients who experience a systemic reaction to wasp or bee stings should be referred to an allergy specialist for investigation and management.
- Minor local reactions to insect stings are normal and do not warrant allergy testing.
- Skin testing (skin prick and intradermal) is the first line of investigation.
- This is with standardised venom extracts with both bee and wasp venoms and positive (histamine) and negative controls.
- Skin testing provides greater discrimination between bee and wasp sensitisation than serum-specific IgE to whole venom.
- Skin tests are also more often positive than serum-specific IgE and correlate better with history.
- Baseline tryptase should be measured. Those with raised levels have a higher risk of severe systemic reactions.

Treatment of patients with bee or wasp sting allergy

- All patients with a history of systemic reaction should be immediately provided with a written emergency management plan, an adrenaline (epinephrine) auto-injector and education in its use.
- With children, appropriate liaison with the school is recommended.
- Venom immunotherapy (VIT) is recommended for all patients with a severe systemic reaction after a sting. It reduces the chances of a serious allergic reaction to an insect sting and improves quality of life.[11]

- VIT is the only specific treatment that is currently available for patients with a history of systemic reaction to a *Hymenoptera* insect sting.
- VIT is effective in 95% of patients allergic to wasp venom and about 80% of those allergic to bee venom.
- VIT is not often recommended for children.
- A Cochrane review found that approximately 1 in 10 people treated had an allergic reaction during their treatment.[11]
- The usual duration of VIT is three years in the UK.
- All patients should be advised of measures to reduce their risk of future stings. These include:
    - Wear light-coloured clothing.
    - Avoid strong fragrances, perfumes and highly scented shampoos.
    - Wear shoes while outdoors and cover the body with clothing and a hat; use gloves while gardening.
    - Avoid picking fruit from the ground or trees.
    - Avoid drinking out of opened drink bottles or cans to prevent being stung inside the mouth.
    - Wash hands after eating or handling sticky or sweet foods outdoors (especially children).
    - Keep uneaten foods covered, especially when eating outdoors.
    - Always contact professionals to remove bee or wasp nests.
    - Wear full protective clothing while handling bees.

Management of bee or wasp stings

- The majority of people will have a localised reaction to a sting.
- Patients should be given antihistamines. Those with large local reactions may need oral prednisolone.
- Those with infected bites or stings will need oral antibiotics, usually in addition to oral antihistamines.

Blood-sucking flies

- Worldwide, these are held responsible for the spread of a large number of diseases, including malaria, filariasis, yellow fever, dengue, onchocerciasis, trypanosomiasis, leishmaniasis and loiasis.

- In the UK, these are usually only a nuisance. Discomfort of a bite is followed in sensitive individuals by pruritus with scratching and possible secondary infection.
- Where possible, the problem can be minimised by wearing clothing that covers the skin, and with use of insect repellents.

True bugs (Hemiptera)

- In the UK, the only medically significant species is bedbugs (*Cimex lectularius*).
- There is no evidence that they transmit disease. They may cause sleeplessness and bites may be painful and swollen. Bedbugs hide during the day and feed at night. They are found by searching the bedding at night or their hiding places during the day.
- They superficially resemble lentils and can live for six months without feeding, becoming paper thin. Control is by removal or steam cleaning of infected mattresses and treatment of the room with insecticide.
- In South America, triatomine (reduviid) bugs transmit trypanosomiasis.

Ticks (Ixodoidea)

- Worldwide, tick bites are responsible for the transmission of both rickettsial and viral infections and Lyme disease.[12]
- In America, Rocky Mountain spotted fever, Colorado tick fever and Lyme borreliosis.
- In Australia, Q fever, tick paralysis, Queensland tick typhus and worldwide tick typhus.
- Soft ticks are widely distributed and can cause endemic relapsing fever.
- Ticks attach to the skin and feed with a barbed hypostome and then detach when engorged.
- The bites are usually painless but can cause local sensitisation and secondary infection.
- In the UK, most common ticks on humans are sheep tick (*Ixodes ricinus*), a vector of Lyme disease, and hedgehog tick (*Ixodes hexagonus*).
- Where there is tick infestation, bites can be avoided by tucking trousers into boots and the body should be searched after leaving the area to allow prompt removal of ticks, which can reduce risk of disease transmission.

Treatment and management of tick bites

- There are many suggested ways for removing ticks, including, but not limited to, heat, alcohol, and Vaseline®. None of these methods is recommended and they may, in fact, agitate the tick - in the case of the paralysis tick, this can cause more toxin to be expressed into the victim.
- A method that works well and minimises further expression of tick fluids is to lay small forceps along the skin with the ends either side of the tick's head, press down into the skin and firmly grip the head of the tick. Then steady traction can be applied perpendicular to the skin, without twisting, until the tick is finally released. The aim is not to break the tick so that mouth parts are left in the wound. If remnants do get left behind use local anaesthetic and scrape them away carefully with a scalpel blade.
- In an area of significant Lyme disease incidence, doxycycline for ten days is the antibacterial of choice for early Lyme disease. Amoxicillin, cefuroxime or azithromycin are alternatives if doxycycline is contra-indicated.
- If there is significant paralysis then tick antivenom can be administered in addition to supportive care.

Harvest mites (Trombiculidae)

In Britain during late summer, larvae of the harvest mite (*Neotrombicula autumnalis*), which are tiny and often not noticed, may attach under tight-fitting clothes, feed and then detach causing itchy lesions that are sometimes bullous.

What are the complications of insect bites and stings?[1]

- Local skin trauma.
- Allergic reactions:
    - Small local reactions, causing erythema, swelling, itching and pain.
    - Large local reactions, with larger areas of oedema, erythema, and pruritus.
    - Systemic reactions, which range from mild to life-threatening and include urticaria and angio-oedema, bronchospasm and upper airway obstruction, arrhythmias, coronary artery spasm, hypotension and shock, nausea, vomiting, diarrhoea, and abdominal pain, and seizures.
- Systemic toxicity: multiple bee or wasp stings can precipitate hypotension, diarrhoea, vomiting, headache, and shock.
- In rare cases, serum sickness, vasculitis, neuritis, encephalitis, and nephrosis have been reported after insect stings.
- Transmission of infectious disease such as Lyme disease.
- Secondary bacterial infection such as cellulitis and impetigo.

- Exacerbation of atopic eczema.
- Psychological distress from infestations such as bedbugs and scabies.

Further reading

- Venom anaphylaxis - immunotherapy pharmalgen; NICE Technology appraisal guidance, February 2012
- Insect Bite Reaction; DermIS (Dermatology Information System)
- Juckett G; Arthropod bites. Am Fam Physician. 2013 Dec 15;88(12):841-7.
- Singh S, Mann BK; Insect bite reactions. Indian J Dermatol Venereol Leprol. 2013 Mar-Apr;79(2):151-64. doi: 10.4103/0378-6323.107629.

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