

Management of simple insect bites: where's the evidence?

Many insects bite in order to obtain a blood meal and, in the process, inject the victim with saliva that may contain a number of substances, some of which can be immunogenic. The consequences of insect bites include local reactions, immune (allergic) reactions including anaphylaxis, and secondary bacterial infections (e.g. impetigo, cellulitis). Although insect bites are perceived to be common in the UK, the exact incidence is difficult to estimate since most are likely to go unreported: only those causing the more serious reactions are seen in primary care settings. Simple insect bites are those that are not accompanied or followed by anaphylactic shock or systemic infection. Many preparations for the treatment of insect bites, including antihistamines and topical corticosteroids, are available for purchase over the counter (OTC) in the UK. However, there is a lack of evidence for the efficacy of these treatments and, in general, recommendations for treatment are based on expert opinion and clinical experience. This article reviews the evidence for the management of simple bites by insects commonly encountered in the UK, but excludes ticks, mites and lice.

Background

Biting insects commonly encountered in the UK include midges, mosquitoes, biting flies, fleas and bedbugs, but the incidence and prevalence of insect bites is unknown. A study published in 2006, based on data collected in England and Wales over a 5-year period from a

sentinel GP network database, recorded a mean weekly incidence of 5.4 cases per 100,000.¹ Since this figure only relates to people who consulted their GP, it underestimates the true figure as it does not account for those who seek advice and treatment from a community pharmacist, those who self-treat, or those who do not seek treatment. Moreover, the incidence of insect bites is seasonal, with many more occurring in the summer months when more skin is exposed and insects are active.

Diagnosis and pathology of insect bites

Insect bites are diagnosed on the basis of examination of the lesions and history of actual or likely exposure to biting insects. It is also useful to

understand the mechanisms by which insects take blood from their hosts and the sequence of responses that occur.

Insects such as mosquitoes, bed bugs and fleas that are well adapted to feeding from humans have piercing mouthparts that are able to penetrate the skin with little trauma. Their bites are relatively painless and can pass undetected at the time. They keep blood flowing through the action of anticoagulant and vasodilatory compounds in their saliva. Horseflies, blackflies and midges, which lack these specialised mouth parts, take blood by biting a hole through the skin and then lapping the blood as it flows into the wound. These bites are typically more painful and in some cases may cause general symptoms including dizziness, weakness and wheezing in addition to a local reaction. Midges cause small haemorrhagic lesions that generally do not leak whereas blackflies and horseflies can leave bleeding lesions.²

Individuals can exhibit a sequence of responses to insect bites. Those who have never been bitten before are immunologically naive and do not respond beyond the trauma of the bite. However, the first bite will expose the host to insect salivary protein and can initiate an immune response within a few weeks.

If an individual is repeatedly exposed to bites from the same type of insect then sensitisation can occur. At this stage a type IV (cell-mediated or delayed) reaction typically appears 8–72 hours after the bite and results in an inflamed, itchy maculopapule. Some individuals also develop bullous reactions. The lesion can persist for several days and be a source of considerable discomfort. Secondary trauma may be caused by scratching with the added risk of secondary infection.

Continued regular exposure can result in a type I (immediate) hypersensitivity reaction. Typically this appears after 20 minutes or so, but after repeated bites can appear even earlier. These immediate reactions are characterised by weal and flare reactions associated with eosinophilic infiltration. Patients may additionally show a type IV response. Some patients may develop more severe reactions including symptoms of anaphylaxis.³

Popular urticaria (typically erythematous, intensely itchy papules) is a common reaction to insect bites in children, especially in those with a history of atopic dermatitis.^{2,4,5} Unless exposure to the insect bites is frequent or intense, most individuals in temperate countries never progress beyond this stage.²

Regular exposure to bites may lead to progressive desensitisation. In such cases, only the immediate type I response occurs, and with prolonged continuous exposure there may be no skin reaction other than the development of a puncture wound at the site of the bite.

Theoretically, immune responses are specific to the biting insect concerned but there may also be an element of cross-reactivity.²

Potential complications

The potential complications of insect bites are infections, anaphylactic shock, and triggering or exacerbation of a flare of atopic eczema, although there is no information on the frequency of these events. Insect bites can act as carriers or vectors of systemic diseases but this is beyond the scope of this article. Local infections can be minor (e.g. impetigo), or deeper and more extensive (e.g. cellulitis).

Identifying the culprit

As the biting insect is rarely caught in the act, the question of how to identify the likely culprit occasionally arises. It makes little difference to

treatment unless referral to an allergy clinic is indicated, but it can have implications for individuals' behaviour or domestic arrangements. For example, mosquitoes can be avoided, but the discovery of bed bugs or fleas usually calls for de-infestation procedures.^{6,7} Knowledge of the sites of the bites, and the time and location at which they were acquired can help to eliminate many suspects.²

Differential diagnosis

A number of other skin reactions may resemble insect bites.

Insect stings (e.g. bee, wasp, ant)

Insect stings cause an immediate, painful, stinging sensation associated with the injection of venom. Symptomatic treatment aimed at reducing inflammation and immune reactions is similar to that for insect bites, but additional measures (such as removal of a bee stinger) are sometimes necessary. In sensitive individuals a sting can cause anaphylaxis with angioedema, bronchospasm, wheezing and widespread urticaria.

Plants

Stinging nettles are commonly associated with non-allergic contact urticaria. The stinging sensation is felt immediately and the pattern of weals reflects the contact with the plant and so the cause can be identified quickly. Other plants can also produce skin reactions due to irritants or allergens.

Other irritants and allergens

Contact dermatitis caused by exposure to other irritants or allergens (e.g. preservatives or perfumes in cosmetics) is likely to be more diffuse and relate to the area of contact. Avoidance of the causative agent is a necessary part of management.

Management options

Key issues in the treatment of simple insect bites are:

- What is the most appropriate intervention to prevent or treat an immediate local reaction to an insect bite?
- What is the most appropriate intervention to prevent or treat a delayed local reaction to an insect bite?
- When, if at all, is it appropriate to use antibacterial agents in the management of simple insect bites?

The management of simple insect bites is directed towards relieving the itching, pain and swelling. Although direct evidence of the efficacy of treatment for insect bites is often lacking, guidance may be justified on the basis of the established clinical effects of the drugs. Advice on the treatment of simple insect bites is given in guidelines from Clinical Knowledge Summaries (CKS)[†] and NHS Choices.^{4,5} Simple first aid includes cleaning the affected area and the use of cold compresses to relieve local pain and oedema.^{4,5} If further treatment is needed, the options include oral antihistamines, topical and oral corticosteroids, analgesics, antipruritics and counter-irritants. In addition, antiseptics, astringents and cooling agents are sometimes advocated. Systemic treatment of secondary infection may need to be considered.

[†]NHS Clinical Knowledge Summaries are not currently being updated. See <http://www.cks.nhs.uk/home> for further details

Antihistamines

Oral antihistamines are widely recommended to treat the itching associated with insect bites but few studies have been found to support this.^{4,5,8}

One review of seven double-blind studies comparing non-sedating antihistamines with placebo concluded that oral antihistamines used before and after bites appeared to be effective in reducing the immediate or early symptoms of mosquito bites in adults and children.⁹ The number of participants in each study was small, ranging from 10 to 30. The antihistamines used were cetirizine, ebastine, and loratadine. The results of these small studies showed reductions in immediate reaction but effects on delayed bite reactions were variable. Since this review was published, a further small placebo-controlled study has been published that found that prophylactic treatment with levocetirizine was effective in immediate and delayed mosquito bite reactions.¹⁰ All but one of the studies come from the same research group in Finland.

None of the antihistamines used in these studies are licensed in the UK specifically for the treatment of insect bites, and ebastine is not available in the UK.

CKS recommends the use of non-sedating oral antihistamines during the day and sedating antihistamines at night if the reaction interrupts sleep.⁴

Topical antihistamines are generally not recommended. One poor-quality trial of a topical antihistamine has been published.¹¹ The British National Formulary (BNF) states that local antihistamines are only marginally effective, occasionally cause sensitisation, and that their use for longer than 3 days is not recommended.⁸

Corticosteroids (oral and topical)

Topical corticosteroids are recommended by the BNF and CKS although no studies have been found to support their use specifically for insect bites.^{4,8} They should be applied sparingly and for a short time to reduce the risk of unwanted effects. Topical corticosteroids are contraindicated if the bite is infected or was not inflicted by an insect. Topical hydrocortisone cream is licensed for the treatment of insect bite reactions and 1% cream is commonly recommended to reduce inflammation and itching after an insect bite or sting. The OTC products are contraindicated for use on the face or on broken skin, and since the skin around itchy bites is often broken by scratching, this restriction may limit their usefulness for self-medication. OTC products typically contain hydrocortisone 1% (or equivalent). A combination product containing hydrocortisone 0.25% and crotamiton 10% is also available.⁸

People with atopic eczema who find that insect bites trigger or exacerbate their eczema should use topical corticosteroids of appropriate potency for the area of skin involved and the severity of eczema, in the usual way.

Oral corticosteroids are recommended by CKS for the management of severe local reactions and systemic reactions such as widespread urticaria.⁴ No published evidence to support the use of oral corticosteroids was found. In view of the potential adverse effects, the lowest effective dose should be used for the shortest time.

Analgesics and local anaesthetics

Simple analgesics such as paracetamol and ibuprofen are recommended by CKS and NHS Choices for the management of painful insect bites, although no published evidence was found to support this.^{4,5}

Topical anaesthetics have been commonly used, and are included in a number of OTC products (e.g. lidocaine or benzocaine alone or in combination with antihistamines and antiseptics) that are sold for treatment of insect bites.³ The BNF advises that topical anaesthetics are only marginally effective and occasionally cause sensitisation.⁸

Antipruritics

Crotamiton is recommended by CKS and NHS Choices but no trial evidence was found to support its use. The BNF notes that it is of uncertain value.^{4,5} A double-blind study in 31 patients found that 10% crotamiton lotion was no more effective as an antipruritic than its vehicle.¹² Calamine preparations are said to be of little value in insect bites and are not recommended.^{4,8}

Counter-irritants

One trial in 25 people examined the use of a counter-irritant (dilute ammonium solution) in relieving the symptoms of type I mosquito bite reactions caused by *Aedes aegypti*.¹³ The study was randomised, double-blind and placebo-controlled. The ammonium solution was applied after bite reactions were confirmed by patients as itching and/or pain or burning. All participants treated with ammonium solution experienced complete or partial relief of symptoms for up to 90 minutes whereas in the placebo group no patients experienced complete relief and 48% of patients experienced partial relief for up to 30 minutes.

Other

In addition to those discussed above, other OTC and prescription products are available for the management of insect bites. Among those listed by NHS Choices are antiseptics (e.g. chloroxylonol, phenol/chlorhexidine) and astringents (e.g. aluminium sulphate) but they have not generally been included in treatment guidelines as evidence of their efficacy is lacking.⁴

One epidemiological study suggested an association between insect bites and impetigo. The authors commented that further study of the role of antiseptics in minimising the risk of impetigo following insect bites was merited.¹

Topical preparations may themselves cause allergic or sensitivity reactions that can exacerbate the original symptoms of the bite. A good medical history is important to exclude this possibility when a patient presents with deterioration of their original symptoms.

Management of complications

Referral to an allergy clinic should be considered if an insect bite has caused generalised symptoms, or if there is a large local skin reaction, with redness and swelling over 10 cm in diameter.⁴

The management of secondary infection should follow standard local protocols on the use of antibacterials. The CKS guideline recommends empirical treatment with an oral antibacterial.⁴

Severe systemic reactions should be treated urgently as for anaphylaxis. Adrenaline should be administered if available and the patient admitted to hospital.⁴

Conclusion

There is little direct evidence for the efficacy of treatments for simple insect bites. Guidelines are generally based on expert opinion. The symptoms are often self-limiting, and in many cases no treatment may be needed. For mild local reactions, the area should be cleaned and a cold compress applied. Oral analgesics can be given for pain, and a mild corticosteroid cream applied to reduce inflammation and itching. Large local reactions can be treated with an oral antihistamine. Non-sedating antihistamines are preferred during the day, but a sedating antihistamine can be of use at night if sleep is disturbed. Antibacterial treatment is not required for simple insect bites, but secondary infections should be treated with an oral antibacterial agent in accordance with local guidelines.

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