

# A REVIEW ON INSECT BITE AND HOW TO DEAL WITH THEM

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**Abstract:** An insect bite is a puncture wound or laceration caused by an insect that pierces the skin. Symptoms include pain, itching, redness and swelling. Thus, insect bites may deliver salivary antigens that initiate a cross reactive IgG4 antibody response in genetically susceptible individuals that leads to subsequent development of FS. Most insect bites and stings are mild and can be treated at home. They might cause itching, swelling and stinging that go away in a day or two. Some bites or stings can transmit disease -causing bacteria, viruses or parasites. Stings from bees, yellow jackets, wasps, hornets and fire ants might cause a severe allergic reaction (anaphylaxis). If you have an allergic reaction to an insect sting, there are a few options for treatment. Your options depend upon whether your allergic reaction is mild or severe. Severe allergic reactions are a medical emergency. They require immediate treatment and medical care. Drugs for mild allergic reactions: Antihistamines are the first line treatments for insect stings. They can help reduce itching, swelling and hives. Treatments for severe allergic reactions, such as anaphylaxis, may include epinephrine or steroids.

**Keywords:** Insects, Insect bites, Allergic reactions, Treatment and Management, Home remedies

## INTRODUCTION

Insects are diverse group of creatures that are found just about everywhere on Earth. They belong to a class of animal called Insecta, and they are divided into many different orders and families. More than a million known species make up the class of insects within the phylum Arthropoda. Some of the most common insects include ants, bees, beetles, butterflies and moths. The bites of insects may be a minor nuisance illnesses and severe allergic reactions.

Human disease can result from toxic or allergic reactions to insect venom and saliva, as well as to other insect derived substances or body parts. Reaction to an insect sting can be either local, i.e., around the site of contact, or else systemic and independent of the site of contact. The causative sting can be either from a blood sucking insect or from one with a venomous stinger. The four medically significant classes of arthropods are Chilopoda, Diplopoda, Insecta and Arachnida. Of these the insects, which represent more than half of all living organisms and the Arachnids have the greatest clinical impact on humans [1]. Erythematous and edematous along with other dermatological findings such as papules and urticaria represent the most common clinical manifestations of arthropod bites and stings. In some cases, the delivery of toxic venom can result in significant systemic reactions including autonomic instability, neurotoxicity and organ failure. The acute development of anaphylactic reactions can be rapidly fatal, most commonly due to angioedema or circulatory collapse [2]. In these cases, rapid recognition and treatment with epinephrine are critical. The most clinically significant impact of arthropod bites is their ability to serve as vector for numerous bacterial and protozoal diseases. [3]

## TYPES OF INSECTS, INSECT BITE AND ALLERGIC REACTIONS

❖ The four classes medically significant arthropods are the Chilopods, Diplopods, Insects and Arachnids. Members belonging to each class are follows:

✓ **Chilopods** : Centipedes

✓ **Diplopods**: Millipedes

✓ **Insecta**: Hymenoptera (bees, wasps, hornets and fire ants), mosquitoes, bedbugs, fleas, lice, beetles, caterpillars and moths and kissing bugs

✓ **Arachnids** : Spiders, scorpions, mites and ticks

❖ Insect bites and stings can be divided into two groups : venomous and non -venomous . A small number of spiders are also venomous .

✓ **Venomous insects (stingers)**

A sting is usually an attack by a venomous insect that injects toxic and painful venom through its stinger as a defence mechanism. venomous insects include : bee, wasp, hornet, yellow jacket and fire ant . [2]

✓ **Non -Venomous insect bites**

Non -venomous insects pierce the skin to feed on blood. This usually results in intense itching . Non -venomous insects bite include : mosquito, flea, tick, bed bug, louse, scabies, caterpillars and moths. Some caterpillars and moths have irritating hairs and sharp spines causing stinging, short lasting popular urticaria, dermatitis and allergic reactions.

## CHILOPODS

Centipedes are chilopods characterized by a cephalad sting structure connected to a venom gland. bites often produce two hemorrhagic punctures accompanied by surrounding erythema and swelling. The venom consist of biochemical mediators, including metalloproteases, which result in immediate localized pain.

**DIPLOPODS**

Millipedes are members of the class Diplopoda characterized by the presence of two pairs of legs per body segment. Millipedes inflict damage through secretion of a toxic liquid from glands on the sides of their body segments which produces a localized caustic like effect to tissues. Clinically this may present with an intense burning sensation accompanied by erythema and occasionally vesicle formation. The toxic liquid often causes the development of a localized area of hyperpigmentation, usually brown or black, which may last for months. More significant injury can occur with ocular exposure which can cause chemical conjunctivitis or corneal ulceration.

**INSECTA**

Members of the class insecta, which comprise approximately 60% of all arthropod species, include Hymenoptera (bees, wasps, hornets and fire ants), mosquitoes, bed bugs, fleas, lice, beetles, caterpillars and moths, and kissing bugs.

**Caterpillars and moths**

While most caterpillars and moths are harmless to humans, some cause cutaneous disease when contact with their protective hairs or spines occurs. The most common clinical manifestations of exposure are erythema, pruritis and the development of papules or urticaria at the site of contact. Rather than pruritis, exposure often results in local burning pain and the development of hemorrhagic purpuric papules organized in a grid like pattern.

**Bedbugs**

Bedbugs (*Cimex lectularis*) are small, oval shaped insects that primarily feed on the blood of humans and animals. They are nocturnal creatures and can be transported in luggage, clothing, bedding and furniture. They are usually found in and around sleeping areas, hiding in cracks, crevices and seams of mattresses, box springs, bed frames and headboards. Bedbug bites typically appear as red, itchy welts that often have a distinct pattern, such as a cluster or a line. People may not experience a reaction to bedbug bites initially and it can take up to 14 days for symptoms to appear. [28]

**Kissing bugs**

Kissing bugs can carry the parasite *Trypanosoma cruzi*. Bites are usually painless and present as papules with hemorrhagic puncta or vesiculobullous lesions. An area of localized swelling, erythema and induration corresponding to the sites of trypanosome entry is known as chagoma. The classic finding in acute Chagas disease is the presence of a chagoma on the eyelid, known as Romana's sign. Following the acute phase of infection, which can last for several months, patients enter the chronic phase, during which the infection may remain asymptomatic for decades. [29]

**Assassin bugs**

Assassin bugs are insects known for their predatory behaviour. Some species of assassin bugs may bite in self defense, and their bites can be painful and cause localized swelling and discomfort.

**Bees**

Bees have a stinger attached to their abdomen and they use it as a defense mechanism. The stings deliver venom, the composition of these venoms are complex, and some have the potential for cross sensitization. Local reactions to stings are most common and present with an immediate onset of localized pain, erythema and edema. Anaphylactic reactions may present with the initial symptoms of pruritis, facial flushing and urticaria which can rapidly progress to wheezing, dyspnea, angioedema and stridor, vomiting, abdominal cramping and syncope.

**ARACHNIDS****Spiders**

Spiders are carnivorous arthropods which use venom to immobilize and in some cases digest their prey.

Bites may be perceived as a sharp, stinging sensation but are often painless and cause only minor, inconsequential reactions, usually presenting as small erythematous lesions. Some bites will develop an area of cyanosis or pallor, sometimes with the appearance of hemorrhagic blisters, due to tissue ischemia. Perception of the site is usually as a sharp pinprick like sensation which may develop into dull ache or numbness at the site. Two red puncta may be visible and surrounding erythema may appear within 60 minutes of the bite.

Serious reactions may manifest as severe muscle spasms and pain in the chest, abdomen and lower back. Other clinical manifestation may include hypertension, sweating, salivation, restlessness, fasciculation, ptosis, nausea, vomiting and dyspnea. Severe symptoms usually within 1 to 6 hours and last anywhere from 12 to 48 hours.

**Black widow spider**

The venom of the black widow spider is most notable for the potent neurotoxin, alpha latrotoxin, which unlike the brown recluse, does not cause local necrosis.

**Mites**

Chiggers are tiny red mite larvae. Infestations occur when mite larvae feed on human skin, predominately in areas where they reach a constricting area of clothing such as at the ankles, thigh or waist. Bites are usually not felt initially, but an allergic reaction to the mite saliva causes the development of extremely pruritic red papules 3-14 hours later.

**Treatment and Management**

If you have an allergic reaction to an insect sting, there are a few options for treatment. Your options depend upon whether your allergic reaction is mild or severe.

Severe allergic reactions are a medical emergency. They require immediate treatment and medical care.

**Insect bites and stings : first aid**

✓ If the insect's stinger is still embedded in their skin, remove it by gently scraping a flat edged object, across their skin. Avoid using tweezers to remove the stinger, since squeezing it may release more venom.

- ✓ Wash the area of the bite with soap and water.
- ✓ Place a cold compress or ice pack on the area for about 10 minutes at a time to help reduce pain and swelling .Wrap any ice or ice packs in a clean cloth to protect their skin .Apply calamine lotion or a paste of baking soda and water to the area several times a day to help relieve itching and pain .Calamine lotioun is a type of antihistamine cream.[18]

#### Emergency treatment for a severe allergic reaction

If you suspect someone may be having a severe allergic reaction:

- ✓ Ask someone else to call local emergency services.
- ✓ Ask the person whether they carry an epinephrine auto injector .If they do ,retrive it for them and help them use it according to the label directions.
- ✓ Encourage them to reamain calm,lie down quietly with their legs elevated ,and stay still.If they start to vomit,turn them onto their side to allow the vomit to drain and prevent choking.[19]

#### ● **Drugs for mild allergic reactions**

Antihistamines are the first line treatments for insect stings.They can help reduce swelling ,itching and hives.First generation antihistamines are the easiest to find.These include:

Brompheniramine (Dimetapp),Chlorpheniramine(Chlor -Trimeton),Dimenhydrinate(Dramamine),Diphenhydramine (Benadryl,Sominex),Doxylamine(Vicks Nyquil)

First generation antihistamines that adress allergy symptoms may have a few undesirable side effects ,such as drowsiness.

Newer antihistamines that have fewer or no such side effects and are non sedating are available over the counter (OTC) and recommended by many doctors.OTC antihistamines that are non sedating or less likely to cause drowsiness include : Cetirizine (Zyrtec),Desloratadine(Clarinex),Fexofenadine(Allegra)Levocetirizine(xyzal),Loratadine (Alavert ,Claritin).[17]

#### ● **Drug for severe allergic reactions**

Treatments for severe allergic reactions,such as anaphylaxis may include epinephrine or steroids.

#### Epinephrine

Epinephrine is a hormone that increases heart rate ,contracts blood vessels and opens air passages.It's more commonly known as adrenaline.According to the American college of allergy ,Asthma & immunology,epinephrine is the primary treatment for an emergency allergic reaction such as anaphylaxis.If you have an insect sting allergy ,you should carry an auto injection epinephrine kit whenever going anywhere in nature.An epinephrine auto injector is a combined needle and syringe that make it easy to deliver a single dose of the medication.Common brands of auto injection epinephrine are Anapen and Epipen.Anapen is available in countries such as Ireland.Epipen is available in countries such as United states and Canada.In2016,the company Mylan introduced an authorized generic version of the Epipen.It's important to remember that epinephrine is a resue medication only.It's effects are relatively short lived.In most cases ,further therapy is necessary to prevent a recurrence of the life threatening condition.According to the Mayo clinic,anyone who experiences an anaphylactic reaction to an insect sting should see a medical professional immediately ,whether or not they've been given a dose of epinephrine.[6]

#### Steroids

A severe reaction may also require a course of oral or injected corticosteroids.corticosteroids that may be used to treat allergies include cortisone and prednisone(Rayos)These agents have anti-inflammatory properties and cause profound and varied metabolic effects.In addition ,these agents modify the body's immune response to diverse stimuli.Prednisone and methylprednisolone are typical drugs of this class.Oral bio availability is generally similar to parenteral;administer oral prednisone when indicated if a patient is not in extremis and can comfortably take it orally;administer parenteral steroids when indicated for a patient in more severe circumstances.

#### Prednisone

Prednisone is believed to ameliorate delayed effects of anaphylactic reactions and may limit biphasic anaphylaxis.Doses are general for usage ;dosing is highly individualized.

#### Methylprednisolone (Solu-Medrol,Depo-Medrol)

Methylprednisolone is useful for treating inflammatory and allergic reactions.By reversing increased capillary permeability and suppressing PMN activity,it may decrease inflammation.A multitude of corticosteroid preparations is available.Methylprednisolone is widely available in the ED because of it's other uses (ie.acute asthma,spinal cord injury ) and is supplied in both parenteral and oral formulations.[8]

#### Topical Corticosteroids

Creams or ointments containing corticosteroids can help reduce inflammation ,itching and discomfort.Hydrocortisone cream is a commonly used option.

#### Pain relievers

Over the counter pain relievers such as acetaminophen (Tylenol) or ibuprofen (Advil,Motrin) can help relieve pain and reduce inflammation associated with insect bites.[9]

- **There are several home remedies that can help alleviate the discomfort and itching caused by insect bites.Here are a few :**  
Usually clean the stung area with soap and water .It helps relieve quite a bit of irritation.Then apply a calamine lotion or hydrocortisone cream to relieve itching.

Ice packs can be useful for treating insect bites to help alleviate pain and reduce swelling .Applying an ice pack or cold compress to an insect bite can help constrict blood vessels and reduce blood flow to the area.This can help reduce swelling and numb the area ,providing relief from pain and itching.It's recommended to apply the ice pack for about 10-15 minutes at a time .Avoid applying the ice directly to the skin ;instead,wrap it in a thin cloth or towel to prevent frostbite.You can repeat the ice pack application every hour or as needed ,especially during the first 24 hours after the bite.Don't apply ice for too long ,as prolonged exposure can potentially damage the skin .Also ensure the ice pack is not too cold to avoid skin injury .[12]

**Aloe vera:** -The anti inflammatory properties possessed by aloe help alleviate itch. Storing your aloe in a cold environment before applying can also reduce the swelling and itchiness of the mosquito bite. You can apply this to the affected area several times a day or until relieved.

**Onion** :- Cut a raw onion directly on the sting or insect bite. Onion has been known and used for its medicinal properties since ancient time. Onion can also be used as a natural treatment for insect bites. Onion has anti inflammatory properties which help to reduce the swelling and redness and soothes the skin. It also has antibacterial and antimicrobial properties which prevent infections from the bite.

**Apple cider vinegar (ACV):** -Few drops of apple cider vinegar apply on the affected area with cotton ball or pads. Use diluted ACV to prevent any risk of skin irritation. Do not use this if you sensitive skin. ACV known for its healing properties. Apple cider vinegar can reduce itchiness, swelling and redness on the skin. [13]

**Tea tree oil:** -Tea tree oil serves as anesthesia. Dilute a few drops of tea tree oil with a carrier oil, such as coconut oil and apply it to the bite. Tea tree oil has anti inflammatory and antimicrobial properties that can help reduce itching, swelling and infection.

**Turmeric Powder:** -The active component of turmeric is curcumin. Curcumin possesses anti inflammatory and soothing properties that can relieve the symptoms of an insect bite. Additionally, it also has insect repellent properties. These remedies can definitely help alleviate the symptoms of bug bites.

Apply a paste of one teaspoon of turmeric and olive oil on a spider bite.

**Turmeric and sandalwood:** -Turmeric and sandalwood to soothe your wound as sandalwood has certain cooling properties, and turmeric will help in speeding up the healing process. [13]

**Eucalyptus oil:** -Dilute a few drops of eucalyptus oil with carrier oil, such as coconut oil and apply it to the affected area. Eucalyptus oil is an excellent insect repellent. It is also one of the best home remedy to treat insect bites. It has antibacterial, antiseptic, antispasmodic and anti inflammatory properties. It is very effective in reduce swelling, redness and itchiness.

**Oatmeal:** -Gluten present in oatmeal may help soothe mosquito bites. Oatmeal powder is mixed with warm water apply this paste directly to the mosquito bite.

**Basil** :- Basil contains camphor and thymol which are responsible for its antimicrobial properties. Basil is also a cooling agent. Basil reduce the swelling, redness and itchiness caused by the insect bite. It also prevents further infection.

**Rubbing alcohol** :- Rubbing alcohol is used topically to relieve the itching caused by insect bites and prevent any further microbial infections at the affected site.

**Neem oil** :- Neem oil and other neem formulations are quite popular insect repellents, especially in the case of mosquitoes. Its anti inflammatory properties can also soothe the swelling and inflammation caused by insect bites.

**Baking soda** :- baking soda or sodium bicarbonate is an age old home remedy to relieve insect bites. Its alkaline nature can help relieve the itchiness and inflammation in the affected area.

**Chamomile tea** :- Chamomile flowers are rich in chemicals like flavanoids and triterpenoids. These chemicals may show antioxidant and antihistamine properties. These properties may help reduce pain, inflammation and itchiness of mosquito bite. Take a chamomile tea bag and put in water. Wait till the water turns golden brown. Tea bag can be pressed directly against the mosquito bite for sometime to get relief.

**Camphor** :- camphor have antiseptic, antipruritic, analgesic and anti inflammatory properties. Camphor stimulates nerve endings that reduce symptoms like pain and itching when topically applied to the skin. When used as a lotion (0.1 to 3%) camphor may act as a soothing anti-itch remedy and provide a gentle cooling sensation. [11]

**Potato** :- Potatoes are an excellent for spider bites. Potatoes are rich in a variety of anti inflammatory components such as resistant starch, fiber, phenolic acids, anthocyanins and carotenoids. If a spider bite generates a burning sensation, immediately cut a potato and put it on the injured region. This immediately helps to minimize swelling and pain. Repeat this practise two to three times a day by leaving the potato on the affected area for few hours. [12]

### **Prevention**

Using structural barriers such as window screens or netting

Avoiding wooded, brushy and grassy areas.

Avoiding heavily scented cosmetics and bright coloured clothing.

Covering drinks and garbage cans.

Wearing long sleeves and long pants, tucking these into shoes or socks, and wearing a hat.

Checking containers for stagnant water, as this provides a breeding ground for mosquitoes.

Using insect repellent.

Be cautious when drinking or eating outside. [24]

### **CONCLUSION**

In conclusion, this review article highlights the diverse and often intricate interactions between insects and humans through their bites. By examining the mechanisms of venom injection, immune response and potential therapeutic avenues, we gain a deeper understanding of the complexities surrounding insect bites. As researches continue to explore these topics, it is evident that a comprehensive knowledge of insect bites can lead to improved prevention strategies and enhanced medical treatments.

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