About 75% of world’s animal species are arthropods. Most of them usually have no interaction with humans, but a small number of medically detrimental species which possess venom can cause morbidity and mortality when humans are bitten or stung.

**Most important venomous arthropods are**

(i) The arachnids (spider, scorpions)
(ii) Insects of the order Hymenopetra (Parasitic or social) includes (a) bees, (b) yellow jackets (c) Hornets (d) Other wasps (e) stinging ants. These species inject venom during bite by fang or sting.

*Bite* describes venom injected via structures associated with the mouth such as fangs or mandibles and sting means the injection of venom via a tapered posterior structure most accurately called a sting.

Insects of the order Hymenopetra are largest in number and are the most important venomous arthropods.

**Hymenopetra**

The hymenopetra get their name from the Greek words hymen and pteron, meaning membrane and wing, respectively and this gives the first clue to identify them.

Hymenopetra stings allergies have been recognized as a world wide health hazard. Anaphylactic reactions caused by hymenopetra sting predominantly bee, wasp, paper wasp stings are common medical problem.

The first documented anaphylactic reaction of hymenopetra sting was the death of the Egyptians pharaohmens who died according to an Egyptian hieroglyph in the year 2640 BC due to a wasp sting. Except some social forms exhibit extremely fierce defense of their nest, most wasp and bees are solitary and do not defend their nests, though they will sting in defense if caught. Only a few social species have sufficiently venomous stings to be of medical significance, eg honey bees and bamble bees. It is the social hymenopetra that actively defend their nest and it is mostly these groups that cause medically significant stings. Among the ants all are social but only a few species do have medically significant stings eg fire ants.

Children’s involved in outdoor activities and sports are vulnerable to hymenopetra stings. In our country naughty children either disturb the nest of social hymenopetra or accidentally come under attack of disturbed hymenopetra & get medically significant stings.

**Components of hymenopetra venoms**

During the course of evolution the stinging insects develop venoms an injectable mixture of amines peptides and enzymes which are capable of disrupting a wide range of cell mechanisms. In addition to Histamine, serotonin, acetylcholine, kinins, protein enzymes like phospholipase A, hyaluronidases are present in the venom. These two enzymes are responsible for majority of allergic reactions.

**Honey Bee venom**

Contains Enzymes, smaller proteins, peptides and amines.

a. *Melittin* (50% of venom dry weight) it hydrolyzes cell membranes causing changes in...
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permeability and is most responsible for the pain associated with the sting. 
b. Peptide 401: Mast cell degranulating peptide, cause, release of histamine and setting up an inflammatory reaction. 
c. Enzymes: include phosphopase A2: It is the major venom allergen and is responsible for inducing IgE mediated anaplyaxis and it in concert with melittin is a major hemolytic factor. 
d. Hyaluronidase : major spreading factor. 
e. Physiologically active amines are histamine, dopamine, nor-epinephrine. 

Wasp venom contains12 
Wasp comprises the largest number in the order hymenopetra and their venoms has low mammalian toxicity and it contains enzymes, smaller peptides and amines 
b. Peptides: mastoparans which cause histamine & serotonin release by degranulating mast cells. 
c. Amines like histamine, serotonin with acetycholine affect neurons and contribute to the pain of these sting. 

Ant venom12 
Most critical component of fire ant venom are alkaloid (methyl m piperidines) which inhibit Na+K+ATPase pump of muscle cells membrane resulting in post synaptic blockade. Damage is expressed in hemolytic, cytotoxic and serologic reactions. Anaphylactic reaction may occur due to allergenic proteins. 

Reactions to venoms 
The most common reaction following hymenopetra sting is a painful wheal or hive caused by the venom. The site rapidly become pruritic and itching can last for several hours (possibly due to IgE mediated response). 

Venoms contain a variety of neurotoxins, including, small ring like peptides that insert themselves in cell membranes and causes depolarisaton of nerve cells and consequently pain.9 The most feared IgE mediated response is of course anaphylaxis. Cross linking of venom antigens to previously found IgE antibodies on basophil surfaces, releases multiple. Preformed mediators that leads to a cascade of pathophysiologic responses the best known of these mediators is histamine the clinical manifestation of histamine effect include. 

a. Diffuse urticaria  d. Laryngeal edema 
b. Bronchospasm e. Nausea, vomiting 
c. Laryngospasm f. Hypotension 

The onset of action is rapid usually within minutes of a sting though in rare cases it can be delayed for several hours. 

Delayed effects such as serum sickness, peripheral neuritis or nephrosis are probably related to antigen antibody reaction (immune complex deposition) 

Most fatalities from bee and wasp stings occur in hypersensitive individuals; death most often induced by a single sting and occurs most often within an hour after the sting. Most deaths are caused by: 
1. Respiratory dysfunction 
2. Anaphylaxis. 

Large number of bee stings can also cause death in non hypersensitive individuals. Patients may present with acute renal failure.7 

Clinical aspects2 
Reactions to venom usually occurs in atopic than in non atopic subjects. There is always some local reaction to a sting and in some cases a very marked and persistent local effects heralds a more generalized reaction to subsequent stings within 30 minutes, pruritus
and urticaria, faintness and hypotension, respiratory difficulty, nausea, vomiting, diarrhea can occur even cardiac arrhythmias have been noted in children below the age of 10 years & can die from sting anaphylaxis.

Apart from classical anaphylaxis, a number of other types of reaction have been described, including a reaction resembling serum sickness with joint pains and fever developing after some days and persisting for some weeks.

• Proteinuria is common but usually short lived.
• Hematuria is also recognized.
• Vesicular skin eruption of delayed onset.
• Peripheral neuropathy.
• Intracranial hemorrhage or oedema.
• Mental changes.
• Acute renal failure may also occur.

According to Mueller\(^8\). Sign and symptoms are classified in different grades.

**Grade I:** Urticaria, Pruritus, Malaise.

**Grade II:** Angioedema, Chest Tightness, Nausea, Vomiting, Abdominal Pain, Dizziness.

**Grade III:** Dyspnoea, Wheeze, Stridor, Dysphagia, Hoarseness.

**Grade IV:** Hypotension, Collapse, loss of consciousness, Incontinence, Cyanosis.

**Management of hymenopetra sting**

1. Avoidance of behaviour to lower the risk of resting.
2. Injectable or oral antihistamine to reduce the peripheral symptoms such as urticaria.
3. Injectable corticosteroid: The efficient drug for prevention of anaphylaxis.
5. Referral to the allergy specialist for evaluation for venom immunotherapy.

Emergency treatment of choice is still 0.5 ml of 1 in 1000 solution of Epinephrine given by deep s/c Injection and repeated in 10 minutes if necessary. Failing this a pressurized atomizer containing isoprenaline or Epinephrine can be of value\(^5\).

Antihistamins and corticosteroids provide no immediate benefit but can undoubtedly mitigate the later symptoms and speed recovery. Above mentioned drug can be used alone or in combination like:

1. Antihistamine, Corticosteroid and epinephrine alone.
a. Antihistamine & Corticosteroid.
b. Epinephrine & Antihistamine.
c. Epinephrine, Antihistamine & Corticosteroid.

**Immunotherapy:** It is safe and effective therapy and constitute an adequate model for the study of immunological changes occurring in the short and long term and for understanding the mechanism of action of venom\(^15\).

(A) **Rush SIT**\(^6\)

Is a reliable method for the treatment of anaphylactic reaction to hymenopetra venom even in less developed countries. Specific immunotherapy is done in hospitalized patient after getting complete history (age, sex, age when sting reaction happened, time of stinging, place of stings and symptoms after sting episode) Immunotherapy starts with single venom type by subcutaneous route. (first at 4th day then after 7 day, 14 day and monthly for a period of 3 years).

**Efficacy of rush SIT is well documented**\(^13\)

It enables a hospital controlled administration of venom with a success of more them 95 % cases. Adverse reactions of different grades including anaphylactic reactions have been reported up to 64% cases\(^11\).

**Venom Immunotherapy (VIT)**\(^3\)

Patient having systemic reaction to hymenopetra sting should be evaluated by allergy specialist.
for the VIT. This involves a gradual weekly then biweekly increase in venom dose over 6-20 weeks, until a maintenance dose is reached. After that periodic booster dose administered at 4-8 week interval for a period of 3 to 5 years. The individual response depend on the rise of IgG the blocking antibody and an offsetting decrease in IgE. The risk of anaphylaxis from VII is minimal (0.17%) per year and no reported deaths but local reaction can occur is 50% of patients.

**Efficacy:** Mixed vespid venom has higher efficacy then Individual one & VIT effective in 97% of cases.

**Prognosis:** Recurrence risk declines with time a. Initially 50%, b. By year 3-5:35%, c. By year 10:25%

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