

CLINICAL PROFILE OF HYMENOPTERA STING IN A TERTIARY CARE HOSPITAL IN HIMACHAL PRADESH

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ABSTRACT

BACKGROUND

Hymenoptera stings are common public health hazards worldwide. Clinical spectrum of venom allergy varies from local reaction to life-threatening and unusual delayed reaction which may be fatal.

MATERIALS AND METHODS

This retrospective study was done to assess the clinical profile and outcome of hymenoptera sting in a tertiary care hospital in Himachal Pradesh. 33 patients admitted in medicine ward were analysed.

RESULTS

Incidence of hymenoptera sting was more common among females (57.6%) as compared to males (42.4%). Majority of the wasp and bee stings were observed in the months of October to December (50%). Local inflammatory reactions were present in all the patients with wasp and bee sting. Most common complication was hepatitis (39.4%) followed by hypertension (27.3%) and acute renal injury (15.2%). Mortality rate in our study was 12.1%. Local reactions were mild and resolved spontaneously.

CONCLUSION

Wasp and bee stings result in mild reactions to life-threatening complications, which may be delayed in onset. Therefore, early anticipation of these complications by the treating physician is needed for the management of the patient.

KEY WORDS

Hymenoptera Sting, Hepatotoxicity, Acute Kidney Injury.

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BACKGROUND

Hymenoptera stings are common worldwide, especially in countries with a predominantly moderate climate. In this environment, these stinging insects are present for larger part of the year and around 56% to 94% of the population is stung at least once in their lifetime.¹ All the stinging insects belong to the order Hymenoptera of the class Insecta. Medically important hymenopterans are Apidea (Honey bee and bumble bee), Vespidae (Wasp, hornets and yellow jackets) and Formicidae (Ants). The venomous stinger of hymenoptera evolves from their ovipositor that has lost egg-laying function and modified for stinging and delivering the venom to their victims. Bee loses its barbed stinger after the sting, whereas a single wasp is able to sting multiple times because the stinger is not detached from the body after the sting.²

These stinging events occur when a single insect is disturbed while searching for food or in large swarm when insects respond to a human intruder as a threat to their colony, usually in late summer or early fall.³ These insects preferentially sting in the head and neck area. The amount of venom released during a wasp sting is upto 3 µgm as compared to 140 µgm released per bee sting.

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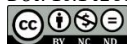
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The components of venom include enzymes such as phospholipase A1 and A2 and hyaluronidase, peptides such as melittin, amines such as histamine, serotonin and catecholamines and others such as mastoparan, apamine, acetylcholine and antigen 5.^{4,5} These components have inflammatory, direct and indirect cytotoxic (Renal, hepatic and membrane), haemolytic, vasoactive, neurotoxic and cellular anti-membrane properties resulting in local as well as systemic manifestations.⁶

Reactions to hymenoptera envenomation are classified into normal local reaction, large local reaction, systemic anaphylactic reactions and delayed unusual reactions. After the sting patient may develop minor local reaction of erythema, oedema and pain at the site of sting which is self-limiting and resolves spontaneously within 24 hours. Large local reaction is defined as an area of induration exceeding a diameter of 10 cm which lasts longer than 24 hours and then subsides. Prevalence of systemic anaphylactic reaction is 0.3% - 7.5%. These reactions are usually apparent within 15 minutes of sting and vary in intensity from mild (Urticaria, pruritis, angioedema, vomiting and diarrhoea) to life-threatening reactions (Wheeze, cough, dyspnoea and bronchoconstriction). The unusual delayed reactions are the rare clinical presentations of hymenoptera sting and include serum sickness, vasculitis, thrombocytopenic purpura, renal, neurological, cardiovascular and skin manifestations. Incidence of mortality in wasp and bee sting is low and ranges from 0.03 to 0.48 per 1000000 inhabitants per year.^{2,4,5,7}

MATERIALS AND METHODS

We, in this retrospective descriptive study, analysed 33 cases of multiple wasp and bee stings above 18 years of age

admitted in medicine ward of Dr. Rajendra Prasad Medical College, Tanda, Himachal Pradesh from July 2015 to June 2016. Data was analysed with respect to age, sex, clinical manifestations, duration of hospitalisation, complications and outcome.

RESULTS

In this retrospective descriptive study, we reviewed 33 patients of wasp and bee sting who were admitted in our hospital from July 2015 to June 2016 retrospectively. The youngest patient was of 18 years, whereas the age of the oldest patient was of 92 years. The mean age was 44.6 ± 18.1 years. Most of the patients were more than 45 years of age (51.4%). Incidence of hymenoptera sting was more common among females (57.6%) as compared to males (42.4%). The male-to-female ratio was 0.74 in the present study. Most of the wasp and bee stings were observed in the months of October to December (50%) followed by April to June (34.4%).

All the patients had local inflammatory reactions e.g. redness, pain, swelling and burning sensation at the site of sting. Myalgias were observed in 33.3% cases and body swelling in 30.3% cases. 8 (24.2%) patients had dyspnoea. Vomiting and oliguria was present in 5 patients each (15.2%), headache (12.1%), altered sensorium (6.06%) and dysphagia (6.06%). 65.6% of the patients reached hospital within 6 hours from the time of sting. Most common site of sting was head and face (57.6%). Icterus was present in 3 patients (9.09%). The most common complication was hepatitis (39.4%) followed by hypertension (27.3%) and AKI (15.2%). Out of 5 patients with AKI, 2 patients required haemodialysis, but one patient died. The hospitalisation time varied from 30 minutes to 6 days with a mean duration of hospitalisation of 3 days in the present study. 84% patients were discharged from hospital after the treatment, whereas one patient left against medical advice. 4 patients died due to hymenopteran stings in our study and in hospital mortality was 12.1%. Two patients (50%) had multi-organ dysfunction, one patient died of anaphylactic shock and another one died of non-anaphylactic shock.

DISCUSSION

Of total 33 cases included in our study, most of the patients belonged to the age group of 18 - 45 years. The mean age of the patients was 44.6 ± 18.1 years. In the study done by Witharana et al,⁸ majority of the patients were from 20 - 60 years of age and mean age was 42 ± 15.1 years. 8 people in this age group are at a risk of wasp and bee stings, because this is the main working age group. Majority of people in our state live in rural setup and are agriculturist. They go out for work in early morning hours and continue late till dusk. This also increases the risk of sting due to the poor visibility.

A female preponderance was observed in our study and male-to-female ratio was 0.74. This increased incidence of wasp and bee sting in females may be due to the fact that females go to the forest for grass cutting and wood collection and also work for longer periods in a day in the fields in our state. Second reason could be the colourful clothing worn by females often attract the bee and wasp. Similar female preponderance was also observed in other studies.^{9,10}

Maximum number of wasp and bee stings in our study were observed in autumn season. Wasps become pests in

summer and autumn and sting if it is accidentally stepped on, swatted or disturbed while searching food resulting in significantly higher monthly sting rates in late summer and autumn.¹¹ Ghimire et al had reported higher incidence of hymenopteran stings during months from July to September.⁹

The most common clinical manifestations observed in our study included local inflammatory reaction (Redness, pain, swelling and burning sensation) at site of sting, myalgias, vomiting, oliguria, headache, altered sensorium, dysphagia and jaundice. Local inflammatory reactions, dizziness, nausea, vomiting, haematuria, decreased urinary output, loss of consciousness, convulsions, hypotension, arrhythmia and acute respiratory distress syndrome were common clinical manifestations observed by Cuihong Xie et al and Ghimire et al.^{9,12}

Serum bilirubin and transaminase levels were done in all 33 patients. Transaminase levels were increased in 48.5% patients. (45.5%) patients had increase in AST (Aspartate aminotransferase) levels more than ALT (Alanine aminotransferase) level, whereas one patient had increase in ALT levels more than AST levels. Total bilirubin levels were elevated in 27.3%. Tsai et al had reported a case of markedly elevated aminotransferase levels after hornet sting. Maximum level of ALT and AST were 3156 U/L and 3006 U/L respectively.¹³ In our study, two patients had markedly elevated levels of AST and ALT (4728 U/L and 1612 U/L, 2584 U/L and 1849 U/L). Mechanism responsible for hepatic dysfunction from hornet venom was studied by Barr-Nea et al in rat liver after repeated envenomation with hornet venom sac extract. Foci of hepatocyte necrosis, fat infiltration and increased alkaline phosphatase activity was observed by light microscopy and histochemistry analysis. Under the electron microscope, destruction of mitochondria in hepatocyte and damage to membrane of bile canaliculi were observed, which resulted in both hepatocellular damage and cholestasis in rat model.¹⁴ In another animal model study, Neuman et al found that hepatotoxicity associated with venom sac extract was in proportion to the dose of toxin used and the liver damage was of cholangiocellular type.¹⁵

Acute renal injury due to hymenopteran sting was found in 15.2% of cases in our study. All three patients with rhabdomyolysis developed AKI. Two patients required haemodialysis and one of them died. The mechanisms of AKI are multi-factorial in wasp and bee stings. These mechanisms include pigment induced ATN, AIN and rarely acute cortical necrosis and thrombotic microangiopathy. Rhabdomyolysis and haemolysis are caused by melittin and phospholipase present in wasp venom. Myoglobin is freely filtered in glomeruli and leads to AKI by toxic effects on tubular epithelial cells through intralobular cast nephropathy and pigment nephropathy. Myoglobin is also potent inhibitor of nitric oxide and trigger intrarenal vasoconstriction and ischaemia in patients with dehydration and acidic urine.^{16,17,18}

In our study, 5 patients developed liver dysfunction as well as renal dysfunction. Multi-organ dysfunction due to single wasp sting and massive wasp stings have been reported.^{19,20} Mean duration of hospitalisation in our study was three days.

Mortality rate in our study was 12.1%. Cuihong Xie et al had reported a death rate of 5.1% in their study.¹² There was no death due to the wasp and bee sting in studies done by

Ghimire et al and Witharana et al.^{8,9} Majority of deaths related to wasp and bee sting are the direct results of immediate hypersensitivity reaction mediated by IgE and resulting in anaphylaxis. Mortality rate due to mass envenomation ranges from 15 - 25%. Death from multiple stings results from three major mechanisms: direct venom toxicity, intravascular haemolysis mediated by melittin and profound hypotension resulting from massive histamine release.

CONCLUSION

Wasp and bee stings occur frequently. Clinical manifestations of hymenoptera sting vary from mild reactions to life-threatening complications, which may be delayed in onset. Therefore, early anticipation of these complications is needed for the management of the patients.

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