

Insecticide Spray Syndrome.

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Short Communication

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**ABSTRACT**

All the patients reporting with prolonged cough were asked for the history of household exposure to insecticide spray for cockroaches or mosquitoes, prior to the onset of their illness. Data of 31 patients could be collected whose symptoms correlated with exposure to insecticide sprays. All the 31 patients had sprayed the insecticide themselves and worked or slept in the same room for many hours after the spraying. The onset of symptoms was on the same or the next day of the exposure. In 22/31 patients; the illness began with laryngeal symptoms. The cough started within 1–3 days in all patients. 26/31 (83.87%) patients had minimal or no sputum. 10/31 (32.26%) patients had central retrosternal chest pain. 16/31 (51.61%) patients had wheezing out of which only 3 had prior history of wheezing. Fever was typically absent. The symptoms lingered for average 5.77 weeks. There was no response to antibiotics but steroid therapy lead to rapid relief from the symptoms. The syndrome appears to be a laryngotracheobronchitis. This is purely an observational study and there is a strong circumstantial evidence that suggests the causative association. Further studies are warranted to study the correlation, incidence and mechanisms responsible for this syndrome.

**INTRODUCTION**

Chronic lingering cough is always a challenge to a clinician. A diagnosis of reactive airway disease is usually considered if the illness began with a respiratory infection. Asthma is usually considered if there is history of wheezing, allergy and history of similar complaints in the past. Post nasal drip, sinusitis, GERD (Gastro–Esophageal Reflux Disease), tropical eosinophilia, Tuberculosis, COPD and ILD are other common causes of chronic cough<sup>[1]</sup>. Good clinical examination and basic investigations like hemogram, spirometry, X–ray chest and sputum examination can help the clinician to reach the diagnosis in most cases. However, absence of a conclusive history and investigations poses a considerable diagnostic challenge. Occupational history or history of chemical exposure therefore becomes important. Also, chemical exposure to insecticides and pesticides is known to trigger asthma<sup>[2]</sup>.

We observed many cases of lingering cough with normal investigations and found that onset of the symptoms many times could be correlated with household exposure to insecticide sprays used to keep the cockroaches and mosquitoes away.

**MATERIALS AND METHODS**

All the patients visiting the OPD (Out Patient Department) were asked for the history of household exposure to insecticide spray for cockroaches or mosquitoes, prior to the onset of their illness. A careful history was obtained that included history of current illness with details of all symptoms; past history of asthma, tuberculosis, GERD and sinusitis etc. Drug history was also obtained to rule out drug induced coughs. History of previous treatments was obtained to analyze the response to treatment and also to correlate additional symptoms due to their side effects<sup>[3,4]</sup>.

All the patients were evaluated with minimum hemogram, absolute eosinophil count, X-ray chest, spirometry and sputum for ZN stain. Prior Ethics Committee approval was obtained from the institute and consents were obtained from the patients.

Data of 31 patients could be collected whose symptoms correlated with exposure to insecticide sprays and no definitive diagnosis could be made from history or investigations. These 31 cases were analyzed further.

### RESULTS

A particular pattern was observed in this group of patients, enough to hypothesize a syndrome. All the 31 patients had sprayed the insecticide themselves and worked or slept in the same room for many hours after the spraying. The insecticide spray typically contained Imiprothrin 0.07%, Cypermethrin 0.2% w/w, prallethrin 1.2% w/w or d-trans allethrin 0.25% w/w in most cases. All these are Pyrethroid group of insecticides and are known to be neurotoxic to insects [5,6,7].

The onset of symptoms was on the same or the next day of the exposure in all these cases. In 22/31 patients; the illness began with laryngeal symptoms such as hacking, laryngeal pain and hoarseness of voice.

The cough started within 1–3 days of laryngeal symptoms in all patients. 26/31 (83.87%) patients had minimal or no sputum. 10/31 (32.26%) patients had central retrosternal chest pain worsening on coughing. This was sharp shooting pain, occurring on a bout of cough, suggesting tracheitis.

16/31 (51.61%) patients had wheezing out of which only 3 had prior history of wheezing. Fever was typically absent in all cases except one patient who reported mild fever on first day of illness.

History of GERD was found in 4/31 patients but 15/31 patients complained of retrosternal burning which occurred later, typically after 2 weeks from the onset of the illness; for which the patients blamed the antibiotics and other treatments that they had received for their symptoms. These patients were referred to our center averagely after 3.8 weeks of their illness.

14/31 patients had their hemogram done in the first week of their illness and 7 had mild leucocytosis (WBC count less than 11,500/ cmm) without eosinophilia. 30/31 had their hemogram done again or for the first time after first week of their illness and it was typically normal. X-ray chest and hemogram were repeated in all and were normal in all. In 25/31 patients, spirometry demonstrated mild obstruction. Refer to chart 1 which illustrates a summary of the important results.

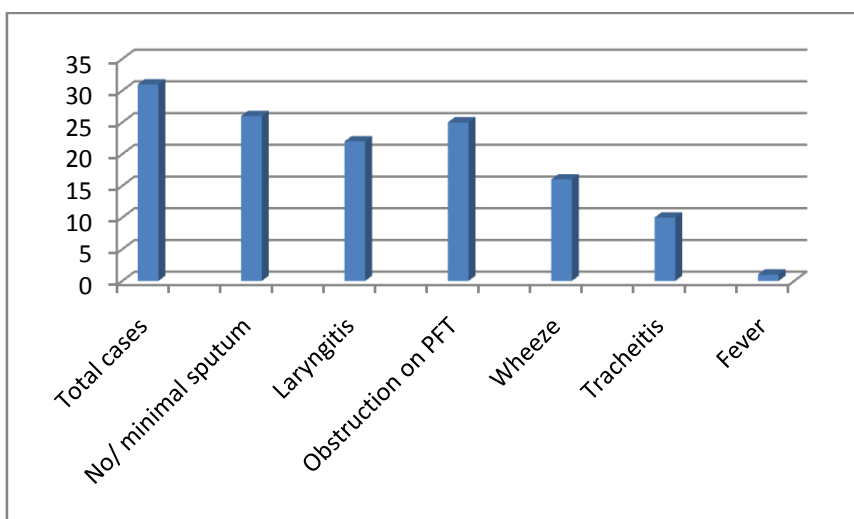


Chart 1: Distribution of symptoms and spirometry findings

The symptoms lingered for an average duration of 5.77 weeks with a range of 10 days to 26 weeks. There was no response to antibiotics but steroid therapy along with anti-reflux drugs lead to rapid relief from symptoms.

## DISCUSSION

The identified pattern suggests a laryngotracheobronchitis. Acute inflammation of larynx, trachea and bronchi is possibly as a result of chemical irritation of the airways due to heavy and prolonged exposure. The airways are known to become hyper-reactive after a chemical inflammation and the condition may last for many weeks<sup>[8,9]</sup>.

The possibility of infection in these patients was unlikely as no one had viral symptoms such as fever, bodyache or watery nasal discharge. The hemogram was normal in all cases and there was no response to antibiotics. Sputum was absent or was minimal with white sputum. This makes bacterial infection unlikely.

A possible allergic or idiosyncratic reaction is also unlikely as there were no features such as skin rash, fever, joint pains or sudden onset wheezing.

Patients of asthma are known to trigger off with chemical irritation to airways.<sup>[2]</sup> However, this does not seem to be the case as only 3/31 patients had past history of wheezy cough and none of them was a known asthmatic.

It is possible that drug induced GERD could have added to the prolongation of the cough in at least half of these cases.<sup>[1]</sup> Pyrethroids are known to cause mouth, throat or retrosternal burning but this seems unlikely in our patients as the symptoms started much later after the exposure to the insecticide.

All the study cases were exposed to insecticides from pyrethroid group. These are considered relatively safe for humans. They are predominantly neurotoxins for the insects<sup>[5,6,7]</sup>. Recently, Allethrin has also been shown to be hepatotoxic in cats<sup>[10]</sup>. Cypermethrine has been shown to have some adverse effects on bone marrow as well as reproductive system in humans<sup>[11-12]</sup>. Pyrethroids are less likely than pyrethrins to cause allergic reactions<sup>[13]</sup>. Excipients of the spray such as xylene, deodorized kerosene, perfume, surfactants and propellents may contribute the chemical irritant effect on the airways. National library of medicine, HSDB database mentions that acute exposure with Imiprothrin may cause nasal irritation and sneezing. Laryngitis, pulmonary edema, bronchospasm and hypersensitivity pneumonitis have also been reported as an acute exposure toxic effect<sup>[6]</sup>. It has also been documented that inhaling pyrethrins can cause coughing, wheezing, shortness of breath, runny or stuffy nose, chest pain, or difficulty breathing<sup>[14]</sup>.

The product inserts of household insecticide products containing pyrethroids give the instructions on how to apply them properly and how long to wait before re-entering the treated area. These need to be followed and the spray dose should not be more than the recommended amount<sup>[14]</sup>.

This is an observational study that suggests a possible acute clinical syndrome which is caused by a prolonged and heavy exposure to inhaled insecticide sprays in the household environment. There is a strong circumstantial evidence and chronological correlation with onset of symptoms and the chemical exposure, enough to postulate a syndrome. However, there are some limitations to the study design. The dose of exposure was not measured in any of the cases. None of these patients presented in the initial week of the symptoms and hence the observations had to be, to an extent retrospective. The causative association and also the factors predicting the occurrence of symptoms need to be established in a further prospective study.

## CONCLUSION

The study is a clinical observation that a close and prolonged household exposure to insecticide spray may lead to a clinical syndrome of laryngotracheobronchitis that may lead to prolonged cough and morbidity.

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