

# Hydrogen Cyanamide Induced Cutaneous Reactions: Occupational Pesticide Poisoning and Need for Surveillance

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## ABSTRACT

Pesticides are used widely throughout the world and is one of major cause of occupational, accidental and intentional poisoning with an estimated 3 million cases annually with reported 2,20,000 deaths worldwide. On an average 3% of agricultural workers in developing countries suffer an episode of pesticide poisoning per year. An 18 year old male patient with cutaneous reactions admitted to the medicine ward revealed to the exposure and use of pesticide (Dormex) in the agricultural field. The poison was investigated for the observed cutaneous reaction and the detailed poison information was provided. The patient was diagnosis with irritant contact dermatitis with secondary infection due to exposure to Dormex. The patient was effectively treated with corticosteroids and antihistamines. Dormex is a plant growth regulator with Hydrogen Cyanamide as an active ingredient. Hydrogen cyanamide is known to cause severe cutaneous reactions such as erythema multiform (EM), Stevens Johnsons Syndrome (SJS), Toxic Epidermal Necrolysis (TEN). Lack of awareness of its adverse effects and improper handling pose the risk of toxicity which can be prevented by taking appropriate precautionary measures against the exposure.

**Key words:** Dormex, Erythema multiform, Hydrogen Cyanamide, Pesticide.

## INTRODUCTION

Pesticides are used widely throughout the world and it was estimated that 3 million cases of pesticide poisonings occurred worldwide annually with 2,20,000 deaths. The majority of cases are intentional, but some of the cases are unintentional or occupational or accidental.<sup>1</sup> Occupational poisoning is common mainly because the use of safety equipment is impractical and expensive in the humid tropics and the instructions given on the pesticide container are often in the unfamiliar languages and many of the agricultural workers are illiterate who are not able to instruct themselves according to the given instructions.<sup>2</sup> On an average 3% of agricultural workers in developing countries suffer an episode of pesticide poisoning per year, that would mean for the 830 million agricultural workers in the developing world there are about 25 million cases of occupational pesticide poisoning.<sup>1</sup>

Dormex is a plant growth regulator with Hydrogen Cyanamide as an active ingredient, which can be sprayed on dormant grape vines that causes chemical vernalization and uniform bud break. It can be applied in a coarse large droplet spray with a 4% (v/v) dilution of Dormex® and 1/4 - 1/2% non-ionic surfactant on pruned grapevines between December and January. Hydrogen cyanamide shows 100% oral bioavailability by laboratory animals. The average absorbed dermal doses in 24 hours in humans and rats were 5.5% and 11.1%, respectively.<sup>3</sup>

Hydrogen cyanamide is known to cause severe cutaneous reactions such as erythema multiforme (EM), Stevens Johnsons Syndrome (SJS), Toxic Epidermal Necrolysis (TEN). Due to lack of awareness of its adverse effects, workers in the fields don't take preventive measures during handling

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**Figure 1: Erythema with pus and slough in the right forearm**

and usage of Dormex.<sup>4</sup>

The workers must not consume alcoholic beverages prior to, during, and 24 h following the application as alcohol can provoke adverse reaction with hydrogen cyanamide.

In case of occupational exposure, the average absorbed daily dosage for mixer/loaders would be  $11.6 \pm 4.7$  mcg/kg/day, for applicators  $5.3 \pm 3.8$  mcg/kg/day, and for supervisors  $2.6 \pm 0.5$  mcg/kg/day. The mean annual absorbed daily dosage would be 0.2 mcg/kg/day for supervisors to 0.7 mcg/kg/day for mixer/loader/applicators and the estimates for mean lifetime absorbed daily dosage would be 0.1 mcg/kg/day for supervisors to 0.4 mcg/kg-day for mixer/loader/applicators.<sup>1</sup>

## METHODS

A patient with cutaneous reactions admitted in the medicine ward of a tertiary care hospital was studied. The detailed history of present illness was taken and allergic history revealed the use of Dormex by the patient in the agricultural field. The poison was investigated and the detailed poison information was provided to assist casual relationship between the pesticide and observed skin reaction.

## CASE REPORT

An 18 year old male was admitted to the casualty ward of medicine department with the chief complaints of irritation in the right hand and giddiness since one day. Erythema with pus and slough over the right forearm was examined. The blood pressure was 120/60 mmHg

and pulse rate was 54 beats/min. Hands of the patient were pink coloured. The final diagnosis of the patient was irritant contact dermatitis with secondary infection. The patient was treated with corticosteroids and antihistamines.

## DISCUSSION

Dormex is a plant growth regulator with hydrogen cyanamide as an active ingredient. Studies have reported some dermatologic manifestations with the handling and usage of Dormex, that includes macular or papular rash, erythema/hyperemia, pruritus and caustic burns to the hand. Dormex is also known to cause eye irritation and some systemic adverse effects including tachycardia, weakness, dizziness, palpitations, headache, vomiting and/or nausea, dyspnoea and hypotension.<sup>5</sup>

In the current case, the patient was involved in mixing and sprinkling of Dormex in the grape wine yard. He didn't use any protective devices or precautions to protect his exposed body to Dormex. After 5 days interval of exposure to Dormex, he developed burning and itching sensation in the right hand and giddiness. Then, he was hospitalised in the medicine ward. On examination, it was found that he had developed Erythema with pus and slough in the right forearm. His right hand appeared to be pink coloured as shown in the Figure 1.

Secondary infection at the site of erythema was suspected and the patient was diagnosed as irritant contact dermatitis with secondary infection. Some lesions were seen over the right lower abdomen as shown in the Figure 2. He had also developed giddiness which was insidious in onset,



**Figure 2: Lesions over the right lower abdomen**

progressive, associated with swaging towards the right side.

Laboratory investigations revealed that Random blood glucose level was raised (402 mg/dl) and raised SGPT (150 u/l), ALP (381u/l) and Total leucocyte count (14,008 per mm<sup>3</sup>). The patient was treated with corticosteroids (Prednisolone 40 mg orally and Dexamethasone intravenously) and antihistamine agents (pheniramine intravenously and hydroxyzine orally). The lesions were treated topically with calamine lotion to reduce itching and burning sensation. The patient had recovered after the treatment and was discharged.

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## CONCLUSION

The findings demonstrate the need of surveillance for detecting emerging pesticide problems. Majority of the agricultural pesticide poisoning cases remain unknown due to lack of reporting, continuous surveillance by health authorities for the pesticides use helps to control and reduce occupational exposure and the occurrence of adverse effects and toxicity among the workers. National Institutes of Safety and Health (NIOSH) approved organic vapour respirator and water proof protective gear is advisable, Precautionary and proper labelling of containers with pictograms would help to provide exact information about potential hazards.