

## Case Report

## A Case of Suicide attempt with Rat Poisoning presented at THQ Hospital Emergency Room, Sambrial, Sialkot

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### Abstract

A female of 31 years old presented at the THQ hospital emergency room. She was exhibiting symptoms of abdominal cramps, sweating, tachycardia, involuntary urination, constricted pupils, muscle weakness, and excessive salivation with a medical history of depression. She was admitted to the hospital for further treatment. Upon getting a history and examining the patient carefully, it was diagnosed that she had taken the rat poison to attempt suicide due to financial conflicts at home, and symptoms were showing organophosphate poisoning. Current studies have shown that suicide attempts in Pakistan are gradually growing, while more common methods of suicide are taking poison, hanging, and using weapons.

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### Introduction

Pakistan is one of the most populated countries in the world, ranking 5th in terms of population. The country is mainly dependent on agriculture, and as per the 2017 National Census, approximately 64% of the total population of 207 million is categorized as rural.<sup>1,2</sup> Pakistan does not have a system for recording vital events, such as deaths by suicide, and, as a result, does not have accurate data on the number of people who die by suicide each year.<sup>1</sup> In 2017, the worldwide suicide mortality rate per 100,000 individuals, including both genders, was recorded as 9.98 for every 100,000 people in Pakistan, an estimated 4.4 people die by suicide each year.<sup>3</sup>

In 2012, around 804,000 people worldwide died by suicide. This means that for every 100,000 people in the world, 11.4 people died by suicide that year. The incidence of suicide was found to be greater among men (15.0 per 100,000) in comparison to females (8.0 per 100,000).<sup>4</sup>

### Case Report

The emergency department received a female patient, aged 31, who presented with a preexisting medical condition of depression, along with a multitude of distressing symptoms. The patient presented with a conste-

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llation of symptoms, including abdominal cramps, profuse diaphoresis, tachycardia, urinary incontinence, miosis, muscular asthenia, and hypersecretion of saliva. The historical account of the current ailment indicates that the patient had consumed a substance commonly used for exterminating rats within a domestic setting. This action was ascribed to her enduring state of financial turmoil. The manifestation of these distressing symptoms, in conjunction with her documented medical background of depressive episodes and exposure to harmful substances, precipitated her decision to seek professional medical assistance.

The patient had tachycardia, with a pulse rate of 120 per minute, as discovered after a complete physical examination. The person under consideration had a blood pressure reading of 130/90 mmHg. A 24-bpm breathing rate was observed in the patient. The individual exhibited a notable increase in perspiration and presented with pupils displaying signs of constriction. The auscultation findings indicated that her lungs were clear. The patient's abdominal region exhibited palpable softness and an absence of tenderness.

A laboratory blood sugar analysis discovered hyperglycemia (200 mg/dL). A substantial increase in WBC count was seen in the blood (about 12,000/L). Based on the symptoms<sup>5,6</sup> and historical account provided by

the attendant, the present case can be identified as one of Organophosphate poisoning.

In order to prevent the patient from choking on her own stomach contents, she was kept in the left lateral position, with her head lower than her feet.

2 mg bolus of atropine was administered to the patient, followed by the initiation of a normal saline infusion. The vitals of the patient, including pulse rate, blood pressure, pupil size, sweat production, and chest sounds, were assessed five minutes subsequent to the administration of atropine.

The patient exhibited signs of progress as her condition began to ameliorate, accompanied by stabilization of her heart rate. The patient underwent continuous monitoring to detect any potential recurrence of cholinergic crises, which can be attributed to the liberation of fat-soluble organophosphorus compounds from adipose tissue reservoirs. These crises may manifest for a duration ranging from several days to weeks after the consumption of certain organophosphorus compounds.<sup>7</sup>

Following the patient's stabilization, an evaluation of her PHQ-9 score was conducted, yielding a result of 18, indicative of a severe depressive state that precipitated her suicidal attempt.

## Discussion

Organophosphates (OPs) are commonly used as rodenticides to exterminate household rodents, for example rats. The mechanism of action involves the inhibition of carboxyl ester hydrolases, resulting in the inhibition of the enzyme acetylcholinesterase (AChE). This enzyme is responsible for reuptake of acetylcholine (ACh) and its subsequent breakdown into choline and acetic acid. The toxicity of organophosphates gives rise to serious medical events that if not expeditiously addressed can cause mortality.

Acetylcholine is ubiquitously distributed throughout the central and peripheral nervous systems, also in neuromuscular junctions and red blood cells (RBCs). The process of phosphorylation is responsible for the inactivation of acetylcholinesterase (AChE) which is specifically targeted and modified by organophosphates at the serine hydroxyl group located at its active site. This leads to the detachment of an organophosphate leaving the group and the formation of an irreversible bond with AChE, resulting in a phenomenon known as ageing.

Upon the inactivation of acetylcholinesterase (AChE) there is a gradual postsynaptic accumulation of acetylcholine (ACh) within the nervous system. This accumulation leads to excessive stimulation of both muscarinic and nicotinic receptors. The resulting clinical manifestations of these effects could be observed through the

activation of both the muscarinic and nicotinic receptors which results in abnormal stimulation of the parasympathetic nervous system.

The diverse range of manifestations observed can be attributed to the accumulation of acetylcholine which occurs as a consequence of cholinesterase inhibition. These manifestations include abdominal cramping, excessive perspiration, tachycardia, uncontrolled micturition, miosis, muscle weakness, and hypersecretion of saliva.<sup>8,9</sup>

The prevalence of suicide by organophosphate compounds in commonly used household rodenticides has been identified as a significant contributing factor to the high incidence of suicide attempts in Pakistan.<sup>10</sup> Organophosphates emerged as the predominant substance of choice across various age cohorts.<sup>10</sup> Research conducted in India and Pakistan has consistently identified organophosphates as one of the commonly employed drugs for both suicide and homicidal purposes, albeit at varying periods.<sup>11,10,12</sup> Organophosphates possess high mortality rates and if not treated carefully, can cause death. In 2019 research was conducted in a tertiary care center in Pakistan and 204 poisoning cases were screened in which the leading cause of death by poisoning was organophosphate.<sup>10</sup>

## Conclusion

In summary, the incidence of suicide attempts connected to organophosphate exposure represents a significant public health issue in Pakistan because these harmful poisons are readily available on streets where anyone can get access regardless of their intentions. It is imperative for the country to promptly implement measures aimed at limiting the availability of these perilous substances, enhancing public consciousness, and offering assistance to persons experiencing distress.

The primary finding of this study revealed that the patient had symptoms of severe depression, as indicated by the PHQ-9 scoring technique. This condition was identified as the underlying cause of the suicidal attempt. There is a pressing need to implement mental health assistance programs and undertake comprehensive initiatives aimed at mitigating the loss of invaluable lives.

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