

# Study of Prevalence, Clinical Pattern and Outcome of Acute Organophosphate Poisoning Patients Admitted in Al Gamhouria Teaching Hospital and Private Hospital and in Aden City - Yemen

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## Abstract

**Background:** Organophosphates (OP) are one of the most common agents of poisoning in developing countries including Yemen. Where agriculture is a major component of the economy.

**Aim of Study:** This study aimed to describe the prevalence, clinical pattern and outcome of patients with organophosphorus poisoning admitting a private hospital and in Al-Ggamhouria Teaching Hospital in Aden city in Yemen.

**Patients and Methods:** It was a prospective study carried out in Al-Gamhouria Teaching Hospital and Private Hospital in Aden-Yemen over a period of two years, Between August 2019 to August 2021. It included 50 patients >16 years of age presented with organophosphates poisoning within 6 hours of OP exposure. Diagnosis was performed from the history taken from the patient, particular focus being given for sex, age, rural/urban background, clinical symptomatology, in addition to outcome.

**Results:** During the study period, 50 patients were recruited, mean age was  $32 \pm 10$  years, (62%) cases were females and (38%) were males, maximum of patients belonging to the age group of 21-40 years (70%), sweating was the most common clinical pattern at time of arrival, it was (92%) follow by Miosis (80%) excessive salivation (68%) bradycardia 50% muscle weakness (10%). Dead patients are (26%) of the subjects, while (74%) of patients were fully recovered.

**Conclusion:** This study concluded that young female patients are the majority of patients with OP poisoning encountered in hospitals, and sweating is the commonest presentation seen.

**Key Words:** *Organophosphorous compounds – Sweating – Excessive salivation.*

## Introduction

THIS entity of chemicals was discovered by Schrader during II world war. Organophosphorous compounds (O.P.) are widely used for agriculture,

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vector control and domestic purpose. In developing countries, these products are easily available and could lead to intentional, accidental and occupational exposure. As per literature, about 3 million exposures occur annually worldwide. As per WHO estimate O.P. poisoning is a cause of more than 2.2 million deaths annually. Countries like Srilanka and India have higher rates of exposure and mortality [1].

Organophosphorous use in Yemen is widespread in rural areas, with farming as a major occupation, especially in Al Dhalea Governorate located in southern part of Yemen, inhabitants of this government planting khat (*Catha edulis*) which contains the alkaloid cathinone, which has euphoric properties and chewing it as social custom, and use OP compounds as insecticides, it is available inside and outside their homes with easily access for all home members, so rising numbers of intoxications by (O.P) compounds from this governorate is extremely noticeable. Unfortunately There are only a few studies published in Yemen points the epidemiological background, clinical patterns of acute O.P poisoning, and its outcome.

Acute poisoning is a medical emergency. It is important to know the nature, severity and outcome of acute poisoning cases in order to take up appropriate planning, prevention and management techniques. Patients exhibit muscarinic and nicotinic symptoms depending upon the severity of compound. Muscarinic symptoms such as nausea, vomiting, diarrhoea, sweating, salivation, urination, stool in continence, lacrimation, miosis and bradycardia and nicotinic signs such as muscular weakness, fasciculation, paralysis, convulsions and coma are found.

O.P. compounds lead to acute and chronic complications. Acute complications include acute respiratory failure, acute respiratory distress syndrome, type I and II respiratory paralysis, intermediate syndrome, sudden cardiac death, aspiration pneumonia. Chronic complication include anxiety, depression, polyneuropathy paralysis and coma. Poisoning in these cases is often serious and requires treatment in intensive care unit, as they present with life threatening complications and may result in mortality. It may also affect respiration, which may endanger the individual's life [2].

### Patients and Methods

This was a prospective study carried out in a private hospital and in Al-Gamhouria Teaching Hospital in Aden city southwest of Yemen over a period of two years, Between August 2019 to to August 2021, It included 50 patients with either acute unintentional or intentional poisoning, all patients >16 years of age presenting to emergency and intensive care units within 6 hours of organophosphate poisoning. Data was collected from patients using a pre-determined questionnaire, particular emphasis being given to, sex, age, rural /urban background, symptoms at time of arrival and outcome.

Poisoned cases are usually diagnosed on the basis of history of exposure or contact and characteristic clinical picture specially presence of sweating, salivation, meiosis, Bradycardia. And muscle weakness. The bottle of consumed OP compound often accompanies the patient to the Emergency Department. If a patient did not present with a clinical history or clinical features consistent with OP poisoning, they were excluded from the study. The result was calculated manually, and presented as means, percentages and tables as appropriate

*Ethical consideration:* Verbal informed consent was obtained from all participating subjects; the study design was approved by the research and ethics committee in the Faculty of Medicine, University of Ade.

### Results

A total of (50) subjects were included in this study, they were presented within 6 hours of OP ingestion or inhalation, Their age range from 17 to 62 with a mean value ( $32 \pm 10$ ) SD years.

The sex distribution in (Table 1) showed a prominence of female gender (62%) versus (38%) being male. All patients came from Al Dhalea Governorate.

Table (2) showed maximum of patients belonging to the age group of 21-40 years (70%).

Table (3) demonstrated the Clinical Manifestation of organophosphorus poisoning and showed sweating was the most common manifestation at time of arrival, it was (92%) follow by Miosis (80%) excessive salivation (68%) bradycardia (50%) muscle weakness (10%).

More than one clinical manifestation was presented in one patient.

Table (4) revealed the final outcome of subjects enrolled in this study (26%) of the subjects dead, while (74%) of patients were fully recovered.

Table (1): Distribution of patients according sex.

Sex	Number (%)
Female	31 (62%)
Male	19 (38%)

Table (2): Distribution of patients according age.

Age group	Number (%)
<20	2 (4%)
21-40	35 (70%)
41-60	11 (22%)
>60	2 (4%)

Table (3): Clinical Manifestation of organ phosphorus poisoning at time of arrival.

Clinical pattern of organophosphorus poisoning at time of arrival	Number (%)
Sweating	46 (92%)
Miosis	40 (80%)
Salivation	34 (68%)
Bradycardia	25 (50%)
Muscle weakness	5 (10%)

Table (4): Distribution of patients according outcome.

Outcome	Number (%)
Fully recovered	37 (74)
Dead	13 (26)

### Discussion

Organophosphates poisoning (OP) is a major health problem all over the world, particularly in the developing countries due to widespread usage and application of pesticides in agricultural and environmental pest control [3].

Easy availability and excessive popularity of its use as insecticides and pesticides has increased the incidence of ingestion, resulting in increasing suicidal and unintentional poisoning [4].

A total of 50 subjects were included in this study, all patients came from Al dhalea governorate it is a governorate famous with rising qat, The majority of subjects were female (62%). This preponderance of female over males may be due to increased incidence of suicide in females being more sensitive and can be affected easily by emotional conflicts, and females sharing males in spraying insecticide in their farms in Yemeni countryside, the result was in agreement with Adinew et al., study conducted in University of Gondar Teaching Hospital, Northwest Ethiopia where Out of the 90 cases studied 60% (54) were female, [5] also two studies in Nepal made by Chataut et al., [6] and Banerjee et al., [7] where female constitutes 58% of included patients, This study result was not in agreement with the findings of D.M. Amin et al., [8] study conducted in Zagazig University Hospital, in Egypt where 60.53% was male 39.47% was female among 76 study subjects.

The majority of patients were related to the age group of 21-40 years (70%) Approximately near the result mentioned by Selvaraj et al., [9] in his study carried out in Tamilnadu in India where 67% of poisoning cases where in the age group 21-40 years, The mean age was  $32 \pm 10$  years close to the The mean age of the patients in Kumar et al., [10] study which published World Journal of Pharmacy and Pharmaceutical Sciences which was  $31.73 \pm 10.90$ .

Among patients enrolled in this study, sweating was the most encountered manifestation, it was (92%) in agreement with the result obtained by Ojha UK et al., [11] which was 98% and higher than figure mentioned by Gagarin in his study which sweating constitute 60% of symptoms.

This study reported that excessive salivation constitutes (68%) close to the result mentioned by Chintale et al., [12] Which reported that excessive salivation was the most common symptom observed (72.05%).

Higher than the the result made by Jumaan, et al., [13] study carried out in King Fahd Hospital in the Kingdom of Saudi Arabia Where 11 cases from total of 50 subjects recruited (22%) had excessive salivation.

This study reported that Miosis was (80%) among enrolled subjects, it was in agreement with Noshad et al., [14] observation, which was (82%).

Our study reported that muscle weakness was (10%) close to Divekar S et al., [15] study where weakness was (7.9%).

Bradycardia constitutes (50%) in our study, comparable to results conducted by Chintale et al., [12] where bradycardia was (57.35%).

Mortality rate in our study was 26%, which agreed to results reported by GV Rao et al., [16].

Where mortality rate of (27%) was observed and close with result made by Gagarin P.Y. et al., [17] study conducted in India where dead cases constitute 25% of the subjects.

And higher than result obtained by D.M. Amin et al., [8] (11.53%) of the 76 patients died.

Shah et al., [18] in their study observed complete recovery and mortality rate as 66.47% and 16.47% among cases respectively.

*Recommendations:* Lack of rules and regulations for the sale of pesticides resulted in wide spread use of Organophosphate as one of the most common poison used for deliberate self-harm.

This data suggests that it is essential to strengthen Yemeni regulatory policy concerning the availability of OPCs. Additionally, it will be important to design an appropriate health education program for the prevention of both suicidal and accidental OPPs for the benefit of the public at large.

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## دراسة لانتشار والصورة النمطية السريرية وحصيلة المخرجات عند مرضى التسمم بالفوسفور العضوي المودعين في مستشفى الجمهورية التعليمي ومستشفى خاص في مدينة عدن اليمن

المقدمة: مركبات الفوسفات العضوية تعتبر الأكثر شيوعاً للتسمم في الدول النامية بما فيها اليمن حيث الزراعة عنصر أساسي في الاقتصاد.

الأهداف: تهدف الدراسة لوصف الانتشار والصورة النمطية السريرية وحصيلة المخرجات لمرضى التسمم بالفوسفات العضوية المودعين في مستشفى الجمهورية التعليمي ومستشفى خاص في مدينة عدن اليمن.

الأساليب: دراسة مستقبلية أجريت في مستشفى الجمهورية التعليمي وإحدى المستشفيات الخاصة في مدينة عدن خلال عامين من أغسطس ٢٠١٩ إلى أغسطس ٢٠٢١ شملت خمسين مريض تجاوزت أعمارهم ١٦ عام وتسمموا بالفوسفات العضوية خلال ٦ ساعات من التعرض، تم التشخيص عبر التاريخ المرضي من المريض مع التركيز على جنس وعمر المريض والخلفية الحضرية/الريفية والأعراض السريرية النمطية بالإضافة إلى حصيلة المخرجات.

النتائج: شملت الدراسة ٥٠ مريض وكان متوسط العمر  $32 \pm 10$  شكلت الإناث نسبة ٦٢٪ والذكور ٣٨٪ أغلب المرضى ينتمون الفئة العمرية ٢١-٤٠ عام ٧٠٪.

شكل التعرق أكثر الأعراض السريرية النمطية شيوعاً في وقت الوصول ٩٢٪ يليه تضيق بؤبؤ العين ٨٠٪ الإفراط في فرز اللعاب ٦٨٪ تباطؤ نبضات القلب ٥٠٪ وهن العضلات ١٠٪.

عدد المرضى الذين توفوا ٢٦٪ بينما الذين تعافوا بشكل كامل ٧٤٪.

الخلاصة: خلصت الدراسة إلى أن الإناث هم أغلبية المرضى والتعرق كان أكثر الأعراض شيوعاً.