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Original Research Article

Evaluating the Peradeniya Organophosphorus Poisoning Scale as a Measure of Severity and Prognostic Indicator in Individuals Affected by Organophosphorus Poisoning.

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Abstract

Introduction: Organophosphorus poisoning (OPP) stands out as the predominant medical toxic emergency in India. This study aims to assess the severity of organophosphorus (OP) compound poisoning clinically through Peradeniya scale (PS).

Methods: It was a prospective research conducted in the department of general Medicine, Prathima Institute of Medical sciences, Nagunoor. The study protocol was approved by the Institutional Ethics committee. Non cooperative individuals, those taken atropine treatment, doubtful OPP, mixed poisoning, those with chronic infections, known drug hypersensitive individuals were not considered in this research. A comprehensive clinical examination, focusing on vital signs, pupil size, and assessment of the central nervous, respiratory, and cardiovascular systems, was conducted following a prescribed format. The PS was administered to all, categorizing the severity of OPP. The study population were managed with decontamination, atropinisation, Pralidoxime chloride administration as per the protocol. Chisquare test were used for statistical analysis. $P < 0.05$ was considered statistically significant.

Results: Total 60 (100%) members were included in this study. As per the PS, 39 were mild, 20 moderate and 1 severe. Whereas, as per the consumption, it was 31m 21 and 8, respectively in <30, 31 – 50 and >50 ml consumption; statistically there was significant difference. In mild category, 33 members didn't require ventilator support (VS) whereas 13 in moderate and 1 in sever category required; statistically there was significant difference.

Conclusion: The PS proves to be a valuable tool for assessing severity and forecasting outcomes in individuals exposed to OPP. This simple and cost-effective tool holds promise in predicting the requirement for VS upon admission.

Keywords: Peradeniya, Organophosphorus Poisoning, Population.

Introduction

Organophosphorus poisoning (OPP) stands out as the predominant medical toxic emergency in India. The acute poisoning with organophosphorus compounds (OPCs) serves as a crucial indication for emergency admissions in numerous hospitals across the country. [1] Initially agricultural insecticides, OPCs later became potential chemical warfare agents. Now, used as pesticides and nerve gases, their widespread availability raises poisoning risks.

In India, an agriculturally dependent tropical country with over 60% of its population engaged in farming, pesticides, especially OPCs, pose a significant hazard. Besides accidental exposure during agricultural use, these agents are commonly employed for suicide and homicide due to their ready availability, low cost, and the immediate accessibility during moments of frustration. [2]

Evaluating serum cholinesterase levels, easily estimable and typically reduced after OPP, is a common practice. However, the Peradeniya OPP scale, underexplored in the Indian context, presents a potentially straightforward and efficient method for early assessment of the need for ventilatory

support. [3] This study aims to assess the severity of organophosphorus (OP) compound poisoning clinically through Peradeniya scale (PS).

Methods:

It was a prospective research conducted in the department of general Medicine, Prathima Institute of Medical sciences, Nagunoor. The study protocol was approved by the Institutional Ethics committee. An informed written consent was taken from the participants. Consent was taken from the immediate blood relative if the individual can't submit the consent. Individuals of both gender aged > 18 years, those admitted due to OPP were included in this research. Non cooperative individuals, those taken atropine treatment, doubtful OPP, mixed poisoning, those with chronic infections, known drug hypersensitive individuals were not considered in this research. The confidentiality was also maintained and the study team assured that names were not disclosed.

A comprehensive clinical examination, focusing on vital signs, pupil size, and assessment of the central nervous, respiratory, and cardiovascular systems, was conducted following a prescribed format. This examination occurred during the initial stages of patient resuscitation and treatment. In addition the sociodemographic parameters such as age, gender educational background, occupation and so on were recorded in the study proforma.

The PS was administered to all study population, categorizing the severity of OPP into mild, moderate, and severe grades. [3, 4] From the study population, 3 ml blood sample was collected following the universal safety precautions. [5] Plasma cholinesterase was estimated by colorimetric method using commercially available kit. [6] Simultaneously the study population were managed with decontamination, atropinisation, Pralidoxime chloride administration as per the protocol. All were closely monitored throughout their hospital stay, with regular assessments of airway conditions and consideration for endotracheal intubation when necessary. Those experiencing respiratory failure underwent intubation, receiving mechanical ventilator support (VS). Survived members received psychiatric counselling. Autopsies were conducted on all deceased patients.

Statistical Analysis: The data was analysed using SPSS software version 17. Chi-square test were used for statistical analysis. $P < 0.05$ was considered statistically significant.

Results

Total 60 (100%) members were included in this study; majority (38.3%; 23) were depend on agriculture followed by housewife (30%; 18). Nausea was the commonest (48; 80%) clinical presentation and tachypnea was presented in majority (70%; 42). As per the PS, 39 were mild, 20 moderate and 1 severe. Whereas, as per the consumption, it was 31m 21 and 8, respectively in <30, 31 – 50 and >50 ml consumption; statistically there was significant difference (Table 1). Out of 39 members in mild category, 33 (84.6%) didn't require VS whereas 65% (13) members in moderate and 1 (100%) sever category required; statistically there was significant difference (Ψ^2 value = 16.679; P value = 0.001).

Table 1: Gender wise distribution of study participants as per the area of living; n (%)

Severity of poisoning as per Peradeniya OPP scale	Quantity of OP consumed in ml			Total
	< 30	31 – 50	>50	
Mild	23 (59)	14 (36)	2 (5)	39 (100)
Moderate	8 (40)	7 (35)	5 (25)	20 (100)
Severe	0	0	1 (100)	1 (100)
Total	31 (58)	21 (35)	8 (13)	60 (100)
Statistical analysis	Ψ^2 value = 11.450; P value = 0.022			
	Statistically significant			

Discussion

Poisoning is a pervasive global issue affecting individuals of all ages, genders, economic backgrounds, and ethnicities. [7] Incidents can arise either accidentally or intentionally. The global toll is substantial, with over 700,000 deaths attributed to poisoning each year. This widespread phenomenon underscores its universal nature, transcending geographic, demographic, and socio-economic boundaries. [8] Vigilance and preventive measures are essential to address the diverse factors contributing to poisoning cases, emphasizing the importance of public health initiatives, education, and access to appropriate medical care to mitigate the impact of this significant public health challenge.

Majority (23; 38.3%) of the study population in this research was agriculturists followed by housewives (30%; 18). While OPP in farmers has been extensively documented, the socio environmental aspects of the vast majority of reported pesticide poisonings remain largely unknown. [9] As per Kamath Sangita D et al. [4] study, the majority of poison consumption cases were among housewives

(46%), while 26% were attributed to agricultural labourers in terms of occupation. This observation may indicate regional disparities in compound availability based on local agriculture and economic conditions. Contrastingly, Karunarathne A et al. [10] reported in India, where agriculture is the predominant occupation, the majority of cases were associated with OPP.

As per the PS in this research, 39 were mild, 20 moderate and 1 severe; as per the consumption the chemical, it was 31m 21 and 8, respectively in <30, 31 – 50 and >50 ml; statistically there was significant difference (Table 1). N Senanaayake et al. [11] developed this scale for evaluating the severity of OPP; five prevalent clinical manifestations of OPP were chosen as parameters, each evaluated on a 3-point scale ranging from 0 to 2. In studies by Chaudhary R et al. [12] ($P < 0.05$), a significantly higher total dose (mean ± SD) of OP was observed with a higher Peradeniya Score, indicating more severe poisoning.

Additionally, investigations by Vernekar PV et al. [13] Girish TS et al.[14], and Prakash M et al.[15] demonstrated a correlation between higher Peradeniya Scores and prolonged ICU stays (>7 days), aligning with our observations. Out of 39 members in mild category, 33 (84.6%) didn't require VS whereas 65% (13) members in moderate and 1 (100%) sever category required VS; statistically there was significant difference (Ψ^2 value = 16.679; P value = 0.001). VS and intensive care may be necessary for some individuals experiencing OPP induced respiratory failure. However, the limited resources and high patient load in certain settings may hinder immediate access to intensive care facilities. In a study conducted by Kavya et al., 80% of patients necessitated VS, a finding consistent with the results obtained in our study. [16] In this research statistically there was significant difference between the PS and survival rate. Similar findings were reported by Malaviya NB et al. [3] The biochemical and clinical parameters were not correlated, limitation of this research.

Conclusion

The PS proves to be a valuable tool for assessing severity and forecasting outcomes in individuals exposed to OPP. This simple and cost-effective tool holds promise in predicting the requirement for VS upon admission.

References

1. Kaur S, Chowdhary S, Kumar D, Bhattacharyya R, Banerjee D. Organophosphorus and carbamate pesticides: Molecular toxicology and laboratory testing. Clin Chim Acta. 2023; 551: 117584.
2. Bhat V, Nayak P, Bakkannavar S, Udupa P. Evaluation of paraoxonase I and hemoglobin levels in farmers and agricultural workers in relation to organophosphorus and carbamate levels in their blood and urine samples: A cross sectional study. F1000Res. 2023; 12: Chem Inf Sci-478.
3. Malaviya NB, Parikh R, Pancholi K, Belim OB. Assessment of the Peradeniya Organophosphorus Poisoning Scale as a Severity and Prognostic Marker in Patients With Acute Organophosphorus Poisoning Presenting to an Emergency Medicine Department. Cureus. 2023; 15(6): e40277.
4. Kamath Sangita D, Gautam Vinit K. Study of organophosphorus compound poisoning in a tertiary care hospital and the role of Peradeniya Organophosphorus Poisoning scale as a prognostic marker of the outcome. J of Family Med. Prim. Care. 2021; 10(11): 4160 – 7.
5. Fiseha T, Ebrahim H. Prevalence and Predictors of Cytopenias in HIV-Infected Adults at Initiation of Antiretroviral Therapy in Mehal Meda Hospital, Central Ethiopia. J Blood Med. 2022; 13: 201 – 11.
6. Patel P, Patel VP, Patel H, Rathod GB. Study of prognostic value of serum and RBC acetyle cholinesterase level in organophosphorus poisoning and its correlation with the outcome. IAIM. 2016; 3(3): 147 – 57.
7. Woyessa AH, Palanichamy T. Patterns, Associated Factors, and Clinical Outcomes of Poisoning among Poisoning Cases Presented to Selected Hospitals in Western Ethiopia: Hospital-Based Study. Emerg Med Int. 2020; 2020: 5741692.
8. Aina Roca Barcelo, Helen Crabbe, Rebecca Close, et al. Spatial and temporal trends and risk factors for intentional carbon monoxide poisoning hospitalizations in England between 2002 and 2016. J. Of Affec. Dis. 2023; 329: 168 – 75.
9. Sinha SN, Kumpati RK, Ramavath PN, et al. Investigation of acute organophosphate poisoning in humans based on sociodemographic and role of neurotransmitters with survival study in South India. Sci Rep. 2022; 12: 16513.
10. Karunarathne A, Bhalla A, Sethi, A, et al. Importance of pesticides for lethal poisoning in India during 1999 to 2018: a systematic review. BMC Public Health. 2021; 21: 1441.
11. Senanayake N, De Silva HJ, Karalliedde L. A scale to assess severity in organophosphorus intoxication: POP scale. Human & experimental toxicology. 1993; 12(4): 297 – 9.
12. Chaudhary R, Bhandari R, Malla G, Poudel M, Lamsal M. Correlation of clinical score and serum acetylcholinesterase in emergency ward of

a tertiary hospital J BP Koirala Inst Health Sci. 2019;2:19–27
13. Vernekar PV, Shivraj K. Peradeniya organophosphorus poisoning scale (POP) as a predictor of respiratory failure and mortality in organophosphorus poisoning. Sch J Appl Med Sci. 2017; 5: 1841 – 4.
14. Girish TS, Reddy YV. To assess the severity of organophosphorus compound poisoning clinically by using Peradeniya Score. Indian J Appl Res. 2016; 6: 617 –9.
15. Prakash MV, Ram O, Harsh DS. Acute organophosphorus poisoning and clinical admission score association among patients admitted in emergency ward of a tertiary teaching hospital of cedical College. J Pharm Biomed Sci. 2012; 17:1 – 5.
16. Kavya ST, Srinivas V, Chandana Chandana, Madhumati R. Clinical profile of patients with organophosphorus poisoning in an intensive care unit in a tertiary hospital. Int J Clin Cases Investig. 2012;4: 24–31.