

Adherence to Standard Management Procedure of Organophosphate Poisoning in Selected Health Facilities in Nandi County, Kenya

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Abstract

Organophosphate poisoning is a public health problem and an important cause of morbidity and mortality worldwide with over 300,000-350,000 deaths mostly in developing countries. Incidences of organophosphate poisoning in Nandi County has been on the rise due to widespread and increased access use of organophosphate compounds. The adherence by health care providers in Nandi County is low despite the existence of management guidelines of organophosphate poisoning. Compliance to this guidelines have been proven to improve the quality and

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outcome of the patient.

The study main objective is to determine the level of adherence to the standard management procedure of organophosphate poisoning in selected health facilities in Nandi County. A hospital based retrospective study was carried out on 166 patient records with organophosphate poisoning in Kapsabet County Referral Hospital (87 cases), Nandi Hills County Hospital (49 cases), Kaptumo Sub-County Hospital (14 cases) and Mosoriot Sub-County Hospital (14 cases), Nandi County.

Data collected was entered and analyzed using descriptive and inferential statistics. The level of significance was set at 0.05. The study findings indicated that majority of the patients were male (73.3 per cent), married (61.1 per cent), informally employed (85.5 per cent), primary level of education (64.1 per cent) and aged between 18-30 years (56 per cent) who consumed poison with the intention of dying (85.5 per cent). There was a significant association between type of organophosphate poisoning and age ($\chi^2=148.178$, $df=4$, $P=0.001$), marital status ($\chi^2=17.059$, $df=2$, $P=0.001$) and literacy level ($\chi^2=28.767$, $df=3$, $P=0.001$). Management procedures carried out were ABC assessment (96.9 per cent), gastric lavage (65.9 per cent), atropine administration (97.6 per cent) and monitoring of fluids, electrolyte (98.2 per cent), resuscitation (29.4 per cent), skin irrigation (2.5 per cent), emesis (18.5 per cent), administration of activated charcoal (10.7 per cent) and administration of pralidoxime (1.5 per cent).

Keywords: Acetylcholine, Atropine, Acute poisoning, case fatality rate, Marginal Effects, Mortality rate, Poison, Toxicity, Pralidoxime

1 Introduction

Organophosphate compounds, an agrichemical pesticides, have been popularly used worldwide for pest control. Poisoning by organophosphate agents (intentional or unintentional) continues to be a public health problem [1]. Despite challenges in establishing the exact incidence of organophosphate poisoning, during the period 2002-2005 over 3 million cases of pesticide poisoning was reported worldwide, with 76 per cent resulting from organophosphate compounds [2] [3]. In Kenya, organophosphate poisoning is most preferred method of suicide. In a retrospective study conducted in Kenyatta National Hospital on hospital poisoning admissions during 2002-2003, out of 458 cases, 43 per cent were as a result of pesticide poisoning with OP being predominant. In another research conducted in Kericho County Hospital it was estimated that out of 716 patients who attended the hospital, 5 per cent suffered from organophosphate

poisoning. In Nandi County, the prevalence of organophosphate poisoning is not well established, but most cases have been attributed to increased accessibility and availability of OP compounds at the local dealers' outlets. Standard management guidelines of organophosphate poisoning exist both internationally and nationally established by the World Health Organization, Ministry of Health Kenya and United Nation Environmental Programme. The procedures include assessing the airways, breathing, and circulation of the patient [4] [5], preventing poison absorption (gastric lavage and chemical adsorption by the use of activated charcoal), enhancing of poison elimination and preventing of re-exposure. Antidotal therapy by administering atropine and pralidoxime [6] [7]. Nandi County is an agriculture intense area with wide use of organophosphate compounds. Organophosphate poisoning management guidelines set by the World Health Organization and Ministry of health (Kenya) exists but they are not adhered to in hospitals around Nandi County. As a result, there has been an increased number of lifelong disabilities and deaths among patients in the County health facilities there-in reducing the productivity of the infected community.

1.1 Conceptual Framework

Patient outcome resulting from level of adherence to standard management of organophosphate poisoning (dependent variables) has been attributed by various factors. Personal factors (independent variables) including level of education, occupation, age, gender and marital status have contributed to the incidences of organophosphate poisoning. Institutional factors (independent variables) including resuscitation and initial management at AE, availability of non-specific therapy, administering of antidotal therapy and maintenance of supportive therapy have grievously affected the level of adherence to standard management of organophosphate poisoning (dependent variables). Lastly, some variable like classification of poisoning impair compliance to standard management.

2 Materials and Methods

2.1 Management of organophosphate poisoning

2.1.1 Resuscitation and initial stabilization

Early and accurate diagnosis and management of poisoning decrease the risk of morbidity and mortality caused by organophosphate poisoning. Respiratory failure and aspiration from poor initial care and unsafe gastric decontamination are the primary cause of deaths [4] [8]

2.1.2 Non-specific treatment

Skin should be washed with copious quantities of soap and water to remove the contaminated covering. Gastric lavage is routinely performed in patients after ingestion of poison however studies do not support use of gastric lavage [4] Activated charcoal used absorbs large amount of OP because of its small particles and large surface area [9].

2.1.3 Specific therapy

Atropine is used as an antidote for organophosphate poisoning [4][8]. Atropine reverses the cholinergic features and improves cardiac and respiratory functions. Oxime such as pralidoxime (2-PAM) is administered 4-6 hourly at a dose of 1gm and it is best given in the first 36-48 hours.

3 Results

3.1 Socio-demographic characteristics of organophosphate poisoning patients

Organophosphate poisoning patients of different age brackets were included in the study, those of age bracket 30-40 years were more represented 93(56.0 per cent), followed by those within age bracket 20-30 years 27(16.3 per cent) those of age 10-20 were least 6(3.6 per cent). In terms of sex, there was a higher male patient representation 121 (73.3 per cent) than females 44 (26.7 per cent) with organophosphate poisoning. Additionally, most of the patients were married 86 (61.9 per cent), followed by those who were single 43 (30.9 per cent) and the least were those that were separated 10 (7.2 per cent). The number of patients of primary level of education 93 (64.1 per cent) were more represented in the study, followed by secondary education level 48 (33.1 per cent) and the least; college and university level of education. Patients with organophosphate poisoning were either admitted during the day or night with those admitted during the day being the majority 90(56.9 per cent) and the rest at night 68 (43.0 per cent). The total number of hospital stay involved in the study was 159. The mean number of days patients spent in the hospital was 2 days with 8 days being the highest and 1 day being the least. Majority of the patients were in informal employment 97 (92.4 per cent) and the rest were of formal employment 8 (7.6 per cent). The most pronounced type poisoning was intentional poisoning (85.5 per cent) compared to accidental poisoning which was 24 (13.3 per cent).

3.2 Type of organophosphate poisoning

The most pronounced type poisoning was intentional poisoning (85.5 per cent) compared to accidental poisoning which was 24 (13.3 per cent).

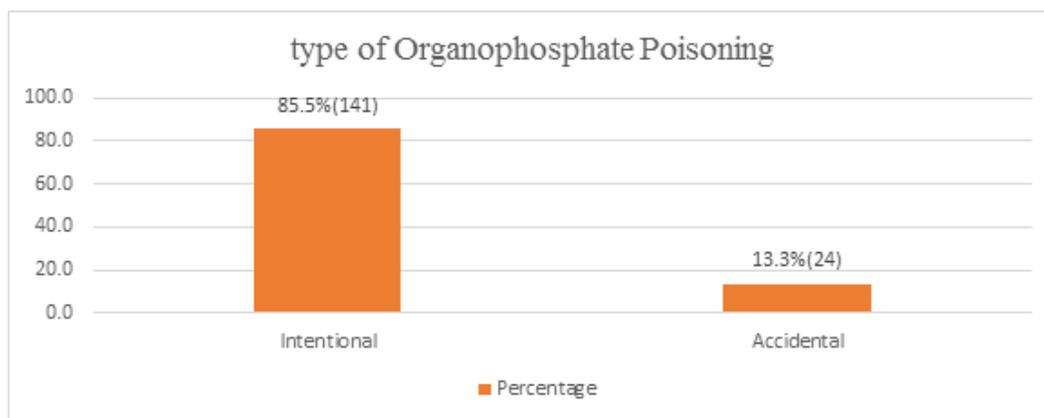


Figure 1: Specific and Supportive Therapy

3.3 Management Procedures of Organophosphate Poisoning Patients

3.3.1 Resuscitation and initial stabilisation

According to the guidelines, it is recommended the initial stabilisation and resuscitation be the first step of managing patient with organophosphate poisoning. The table below shows that a majority had ABC assessment done 158 (96.9 per cent) while the resuscitation 113 (70.6 per cent).

Table 1: Resuscitation and Initial Stabilization

Resuscitation and initial stabilisation	Frequency	Percentage)
Presence of ABC Assessment	158	96.9
Absence of ABC Assessment	5	3.1
Presence of Resuscitation	47	29.4
Absence of Resuscitation	113	70.6

3.3.2 Nonspecific treatment

Nonspecific treatment was assessed to determine if it was done with majority had gastric lavage being done alone 108(65.9 per cent). The other non-specific procedure were not done with a higher percentage being skin irritation 157 (97.5 per cent), followed by use activated charcoal 132(89.3 per cent) and emesis 142(81.5 per cent).

Table 2: Nonspecific Treatment

Nonspecific Treatment	Frequency	Percentage)
Presence of Skin Irritation	4	2.5
Absence of Skin Irritation	157	97.5
Presence of Emesis	30	18.5
Absence of Emesis	132	81.5
Presence of Activated Charcoal	17	10.7
Absence of Activated Charcoal	142	89.3
Absence of Gastric Lavage	108	65.9
Presence of Resuscitation	56	34.1

3.3.3 Specific therapy

The cornerstone of management of organophosphate poisoning is the use of atropine and pralidoxime as antidotes. In the documents reviewed, 97.6 per cent received atropine while only 1.5 per cent received pralidoxime.

Table 3: Specific Treatment

Specific Treatment	Frequency	Percentage)
Presence of Atropine Administered	160	97.6
Absence of Atropine Administred	4	2.4
Presence of Pralidoxime Administered	1	1.5
Absence of Pralidoxime Administered	64	98.5

3.3.4 Composite guideline adherence

Compliance to organophosphate management guidelines were determined by calculating the proportion of patients who had all the components of recommended guidelines being implement. This included documentation of initial stabilization, resuscitation, skin irrigation, emesis, activated charcoal, and gastric lavage, administration of atropine and pralidoxime and supportive management. Adherence rates to ABC assessment was the highest (96.9 per cent) compared to resuscitation (29.4 per cent). Adherence rate of non-specific management was represented by gastric lavage at 65.9 per cent for the other three management levels.

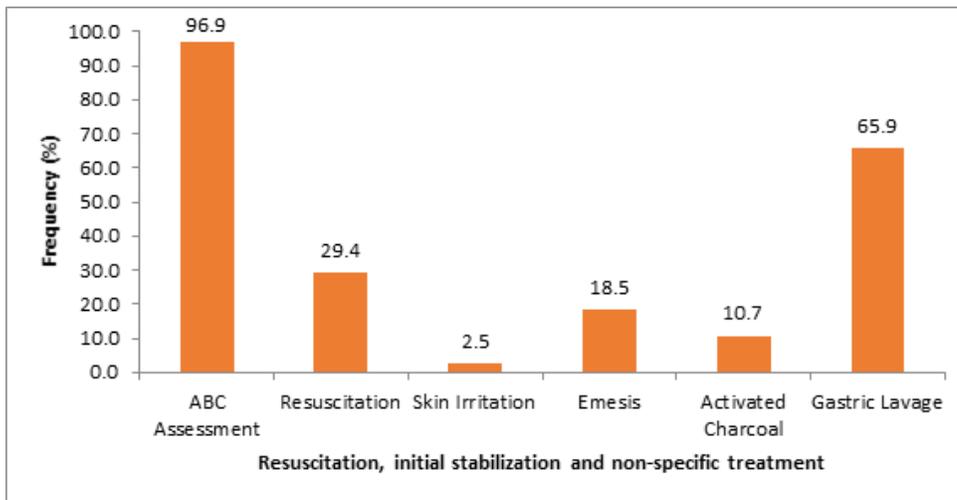


Figure 2: Specific and Supportive Therapy

3.3.5 Resuscitation, initial stabilization and non-specific treatment

Adherence to Specific and supportive therapy was assessed with adherence to monitoring of fluid and electrolyte being the highest (98.2 per cent), followed by atropine administration (97.6 per cent) For those that stated presence of seizures, administering of diazepam was at 83.3 per cent while administration of pralidoxime was lowest at 1.5 per cent.

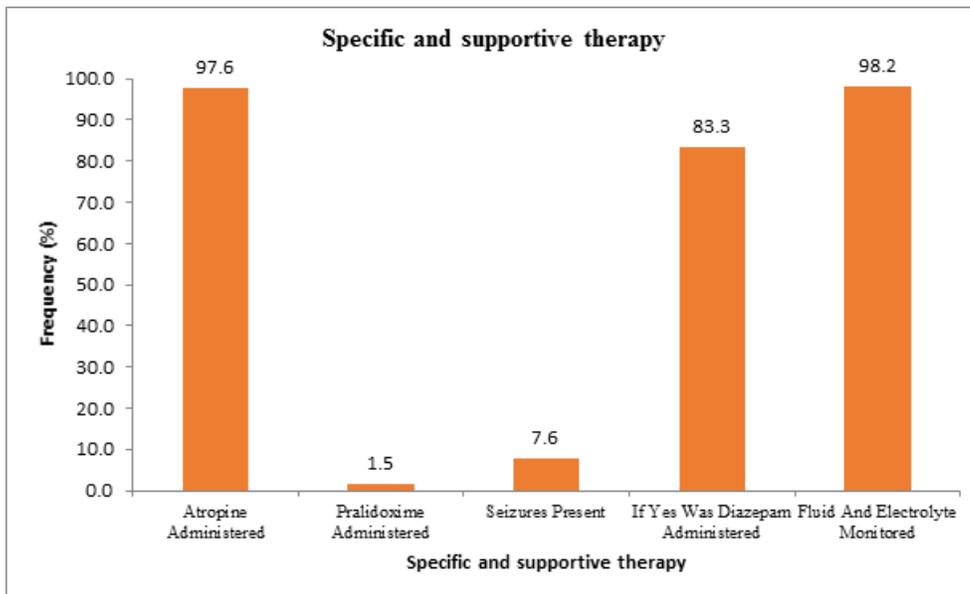


Figure 3: Specific and Supportive Therapy

After management was assessed outcome among patients with organophos-

phate poisoning was evaluated. The majority of the patients were discharged home without complications 113(73.4 per cent), 26(16.9 per cent) were discharged with complications and the rest 15(9.7 per cent) died.

3.4 Association between Socio-economic factors and classification of organophosphate Poisoning

There was a statistically significant association between usage of age and classification of organophosphate poisoning ($\chi^2=148.178$, p-value (0.001), df=4, with those who took the organophosphate poisoning intentionally were 140 (85.9 per cent) and those who took it accidentally were 23 (14.1 per cent), Marital status and classification of organophosphate poisoning ($\chi^2=17.059$, p-value (0.001), df=2, with those who took the organophosphate poisoning intentionally were 132 (95.7 per cent) and those who took it accidentally were 6 (4.3 per cent) and literacy status and classification of organophosphate poisoning ($\chi^2=28.767$, p-value (0.001), df=3, with those who took the organophosphate poisoning intentionally being 134(93.1 per cent) and those who took it accidentally were 10(6.9 per cent).

Table 4: Association between Socio-economic factors and classification of organophosphate Poisoning

Socio-Demographic Factors	N	χ^2 (p-value),df
Age	163	148.178($p=0.001$),4
Sex	163	2.127(0.127),1
Occupation	104	2.860(0.215),3
Marital Status	138	17.059($p=0.001$),2
Literacy Status	144	28.767($p=0.001$),3
Time Of Admission	156	0.453(0.332),1

3.5 Association between Standard management procedure and Outcome

To assess the relationship between standard management procedure and outcome a chi-square analysis was done. There was a statistically significant association between usage of resuscitation and outcome ($\chi^2=14.740$, p-value = 0.039, df =1), emesis and outcome ($\chi^2=15.097$, p-value = 0.036, df =1), gastric lavage and outcome ($\chi^2=21.290$, p-value 0.001, df =1) and diazepam administered and outcome ($\chi^2=21.000$, p-value = 0.019, df =1).

Table 5: Association between Standard management procedure and Outcome

Standard Management Procedure	N	χ^2 (p-value),df
Resuscitation	149	14.740(0.039),1
Skin Irritation	151	3.267(0.195),1
Emesis	152	15.097(0.036),1
Activated Charcoal	149	2.190(0.335),1
Gastric Lavage	153	21.290($p=0.001$),1
Atropine Administered	153	1.504(0.472),1
Pralidoxime Administered	65	0.207(0.831),1
Seizures Present	147	2.087(0.352),1
If Yes Was Diazepam Administered	11	21.000(0.019),1
Phenobarbital	3	0.750(0.667),1
Fluid And Electrolyte Monitored	152	0.749(0.688),1

4 Discussion and Recommendation

4.1 Discussion

The main circumstance of organophosphate poisoning was intentional. This is attributed to easy access to organophosphate poisoning pesticides, economic and social challenges, alcohol misuse, domestic misunderstanding and physical and psychosocial abuse. Accidental poisoning was mostly seen among children.

Management procedure of organophosphate poisoning in Kapsabet County Referral Hospital, Nandi Hills County Hospital, Mosoriot Sub-County Hospital and Kaptumo Sub County Hospital was characterized by poor adherence. These included initial stabilization and resuscitation, non-specific management, specific management and supportive management as stipulated by management guidelines. Most of the health care providers assessed airway, breathing pattern and circulation as stated by the guidelines but rarely did resuscitation to the patients. Patient who presented with altered level of consciousness required ICU services which was not available hence ending up being referred for further management. In non-specific management of organophosphate poisoning, gastric lavage was the most adhered to procedure. Skin irritation, administration of activated charcoal and emesis were hardly done. Atropine was largely used as recommended by the guideline but administration of oxime (pralidoxime) was ignored. The importance of oxime (pralidoxime) is still debatable. Fluids and electrolyte were monitored in accordance with the guidelines though diazepam and phenobarbital were rarely used. This exacerbated psychiatric complication associated with organophosphate poisoning. This greatly affected treatment outcome of patients who would otherwise be discharged without complications.

Most of the healthcare providers were not trained on the organophosphate guidelines hence their knowledge of organophosphate poisoning was generally low. Despite this, most of them relied on past experience and training from college education. There was a gap on availability of printed management guidelines in the three facilities except Kapsabet County Referral hospital. The study revealed that most patients with organophosphate poisoning were managed and discharged home without complication. There was a significant association between outcome of organophosphate poisoning and resuscitation, emesis and gastric lavage.

4.2 Recommendation

The county public health officers and community health volunteers should liaise with pest control product board to ensure proper labeling, educate the community on suicide risk associated with organophosphate poisoning, educate the community on emergency management in the event of poisoning at homes and mentor on stress coping strategies among households. The county department of agriculture should educate the public on proper storage and handling of poisonous substances.

The pharmacy and poisoning board and the County department of health should train all the health care providers on organophosphate poisoning and recommended management guideline, incorporate management of organophosphate poisoning in continuous medical education and together with the ministry of education spearhead post-graduate training of health care provider's cadres on clinical toxicology. This will have a significant impact on management of poisoning by the health care providers.

The pharmacy and poison board should develop local poison information centres to provide trainings, provide organophosphate poisoning management guideline, distribute organophosphate poisoning guidelines to all facilities and provide information to clinicians in case they encounter difficulties during management.

The county department of health also should work on establishing an intensive care unit to reduce complication associated with poisoning during referrals. Additionally, the county department of health should ensure adequate medical supply of drugs used in management of poisoning.

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