



Nursing Management of Organophosphorus Poisoning

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ABSTRACT

Organophosphorus poisoning is one of the most common causes of poisoning mainly in the agricultural based countries as India. The widespread use and the easy availability of organophosphorus compound has been contributed much in increasing the probability of poisoning with these compounds. To identify and synthesize evidence about the interventions to increase the knowledge of staff nurses regarding management of organophosphorus poisoning. This review was done on the nursing management of organophosphorus poisoning. Electronic databases were used to retrieve published literature and studies on nursing management of organophosphorus poisoning. Out of the 1218 citations 11 studies met the inclusion criteria and were selected for this review. The research articles reported that staff nurses have inadequate knowledge regarding the management of patient with organophosphorus poisoning. The review provides evidences that there is need for educational programs for increasing the competency of staff nurses so that they can provide better nursing care with better treatment outcome for the patient with organophosphorus poisoning.

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INTRODUCTION

Organophosphorus compounds are the most commonly used insecticides in India which are most commonly associated with the systemic illness. Because of its easily availability and low cost, these compounds are being used with suicidal intention. According to the WHO, every year there is an occurrence of 3 million organophosphorus poisoning cases which is due to both suicidal or accidental exposure, which results in approximately 3,00,000 death per year globally [1, 2].

In India it was reported that there was 2,30,000 suicides occur in each year, from which minimum 70,000 (30%) die from the pesticide suicide [12].

A study at tertiary care hospital in Haryana region shows that majority of poisoning found among the male laborers (25.4%) and farmers found (20.3%), house wives (28.1%) and among students (6.8%). From which organophosphorus compounds were the common chemical used for poisoning [3]. Yuri GP, Lavanya RR [4] and Mate V [5] reported that majority of subjects were male (80%) and most of them belongs to the age group of 21-40 years(66%). Organophosphorus compounds causes inactivation of the acetylcholinesterase enzyme which leads to the accumulation of acetylcholine synapses which results in overstimulation of neurotransmission in the both peripheral and central nervous system [1]. The same has been represented in the fig.1

Respiratory failure is one of the fatal complications of organophosphorus poisoning. It may occur due to excessive secretions, septicemia, neuromuscular involvement intermediate syndrome, gastrointestinal content aspiration. In cases of severe organophosphorus poisoning early recognition of respiratory failure, early endotracheal tube insertion and mechanical ventilation are life-saving. The patients require intensive care management for respiratory and a close hemodynamic monitoring [7].

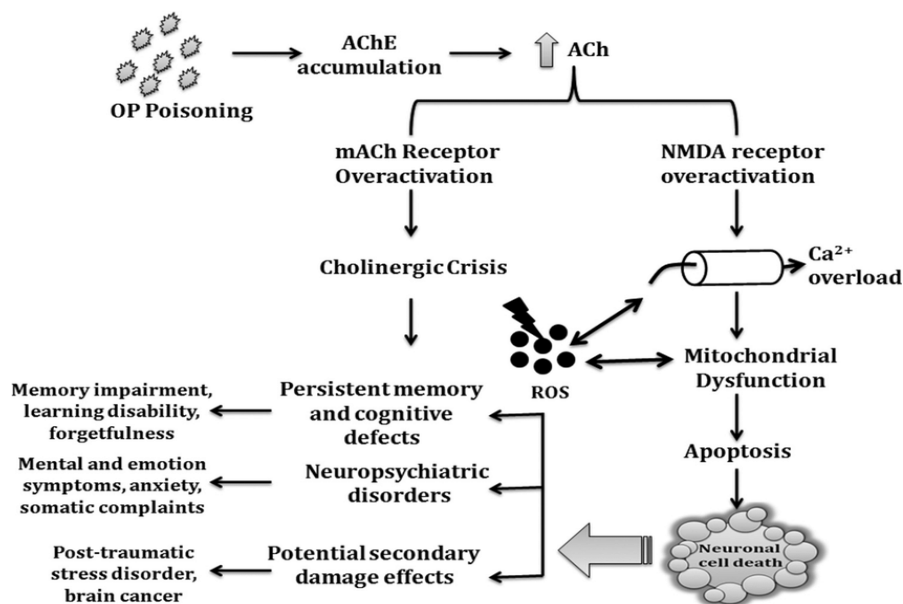


Fig.1. Mode of Action For Organophosphorus Along with its Toxicity (Extracted from) [6]

MANAGEMENT OF ORGANOPHOSPHORUS POISONING

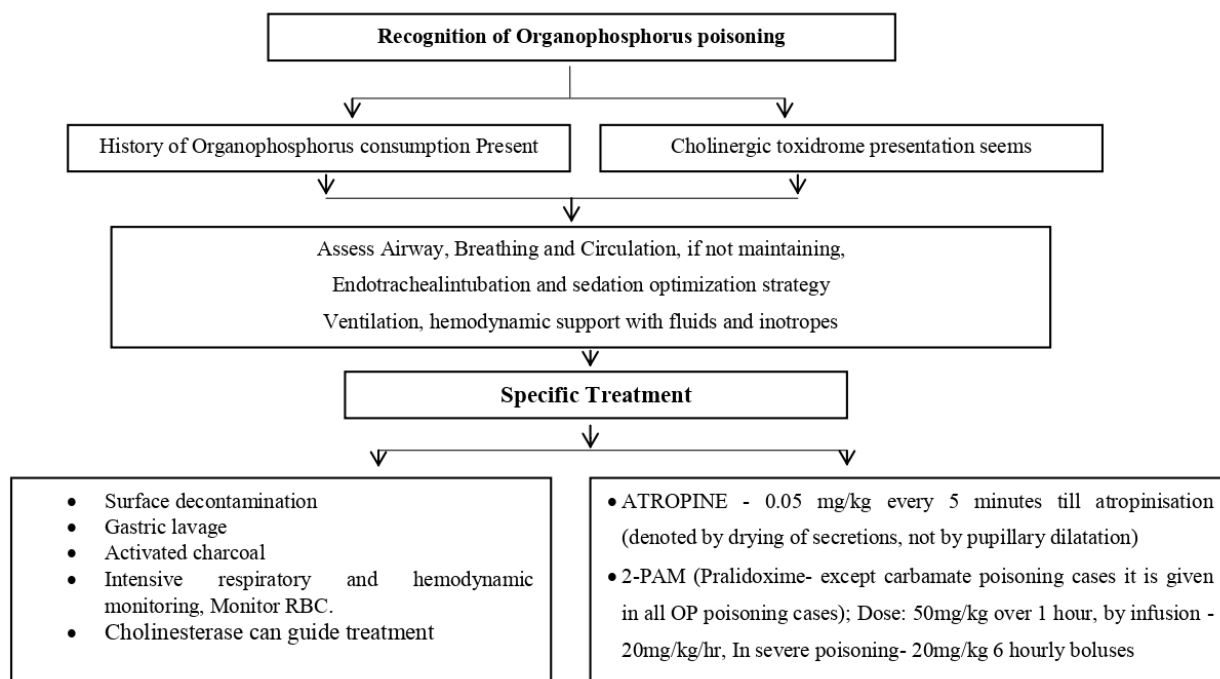


Fig.2 Flow Chart Showing the Management of Organophosphorus Poisoning [8, 9]

First Aid Management

The first step is decontamination. Clothing should be removed and destroyed because the chemical remain stays on them even after washing. If the poison is ingested, there would be symptoms such as vomiting and diarrhea, which will decontaminate the digestive system [10].

Initial Management

Identification of the poison is important before giving any antidote. Proper history taking and assessment is required for the identification of the nature of the poisoning, and then decontaminates the patient. While decontaminating, proper personal protective equipment is required. If the staff had a direct contact with

the patient's secretions, she should wash the affected area thoroughly with soap and water, within one hour of ingestion of organophosphorus agent, gastric lavage to be initiated and if the patient is awake then force emesis should be done. After that Maintain (ABC) airway, breathing and circulation. Maintain patent airway, if gag reflex is absent, intubate the patient before gastric lavage. Administer adequate oxygen through mask. If breathing is insufficient, intubate the patient immediately, SPO₂ is <90%, or Glasgow coma scale (GCS) <8. Administer injection atropine 0.05 mg/kg (2 mg in adults) every 5 min to reduce bronchial and oral secretions and make the patient fully atropinised. To replace the loss fluid volume administer IV fluids through a wide bore cannula. Monitoring of unrythmic electrical activity.

Specific Therapy: Antidotes

Atropine is the antidote of organophosphorus poisoning and is given 2 mg every 5 minutes in bolus or in infusion, in an intermittent manner. As soon as the diagnosis suspected, atropination should be done with the aim of keeping the patient airway dry [8].

Atropinisation can be assessed by dry secretion, clear lung sound, dry skin, and heart rate 100b/m and pupil reaction. As an atropine substitute Glycopyrrolate can also be used when atropine dose causes psychosis while giving it for the treatment of bradycardia. Pralidoxime (2PAM) should be administered within 24 hour of ingestion. Though some studies don't show the benefit, it is benefit for the patient with diethyl poisoning. It is not commonly preferred because of respiratory complication and high mortality. Inj. Haloperidol 5mg intravenous or intramuscular is used for atropine toxicity. Over atropine dose, hypoxemia or distress due to pain may cause agitation for that sedation would be required. A combination of morphine + lorazepam is given to the incubated patient. For pulmonary edema – Lasix will be the choice of drug, for Seizure – Diazepam 5-10mg is administered. Complication which can be seen in the organophosphorus poisoned patients are Convulsion, Aspiration pneumonia, In severely poisoned patients ventricular arrhythmia can be seen, Atropine psychosis, Partial or complete heart block, Respiratory failure [11].

NURSING MANAGEMENT OF ORGANOPHOSPHORUS POISONING

In case of intoxication, it has been evidenced that nursing professionals carries an essential role in their professional practices which has been seen in several stages of toxicological care which include initial assessment and the treatment of both acute and chronic cases. Suthan P [12] reported that 82% subjects had inadequate knowledge on the management of organophosphorus poisoning [13]. Similar finding were reported by Abebe MA, Kassaw WM et. al. [14] and Taghreedm F [15] there was unsatisfactory level of knowledge present among staff nurses related to management of organophosphorus poisoning. Since organophosphorus poisoning cause multisystem toxicity and have a poor prognosis, nurses have to prioritize the nursing care based on the assessment findings, she collects a comprehensive history about the consumption of organophosphorus compounds such as the type of chemical consumes, the quantity, duration of the intake, details about the intention to take the organophosphorus and the clinical presentation on admission to emergency department, further more nurses need to check the GCS and level of consciousness, Blood pressure for hypotension, heart rate, decreased respiratory rate. Lab investigation plays a significant role in assessing the homeostasis of the patient's condition.

Based on the assessment finding nurses have to prioritize the nursing care. Nursing care should be targeted on maintaining airway clearance, effective breathing pattern, promoting cardiac function, maintaining electrolyte and fluid balance, prevention and treating infection, and promoting effective coping mechanisms.

Maintaining Effective Airway Clearance

The goal of the nurses is to remove excessive trachea bronchial secretion, initially check the respiratory status of the patient by assessing the respiratory rate, assess the abnormal breath sounds, ability to cough and check for symmetrical chest expansion and bilateral air entry. The Interventions should facilitate the removal of secretion, nurses can change the position frequently, for every 2 hourly as it facilitates the dislodgment or pooling of secretion, position the patient in semi-fowlers position which promotes expansion of thoracic cavity and lung expansion during inspiration. If the patient is having abnormal breath sound and oxygen saturation falls below 90% perform suctioning following aseptic precautions. Always provide oxygen therapy with humidification as it will prevent crusting or thickening of secretions. Provide adequate hydration through IV infusion, as dehydration may cause thickening of the secretion. If the patients is conscious, provide warm fluids, encourage to breathing and coughing exercises. Perform chest physiotherapy, postural draining which facilitates the removal of secretions. These are the interventions found to be effective in establishing an effective and patent airway, patient's oxygen saturation level increase above 95%, normal respiratory rate and absence of abnormal breath sound

Maintaining Effective Breathing Pattern

Patient experiences alteration in regular breathing pattern as a result of two neuromuscular impairment causes due to the organophosphorus compounds, patient may experience weakness of muscles such as neck muscles, accessory muscles and diaphragm, it is evidenced by slowness or decreased in respiratory rate. If the patient is having severe respiratory distress, patient will be on ventilator support, check the ventilator setting and change it according to the respiratory status of the patient, place the patient in semifowler position, perform suction in gas required. As the muscle weakness declines, maintains normal respiratory rate, patient will regain the normal breathing pattern and gradually weaned off from the ventilator support.

Establishing Adequate Cardiac Output

Decreased cardiac output is related conditions such as arrhythmia, electrolyte imbalance such as hypokalemia and decreased heart rate which are related to the effects of organophosphorus compound. Assessment finding reveals heart rate < 60/min, variation in BP, and ECG changes, clinical features of tissue hypo perfusion and decreased urine output. Patient requires continuous monitoring such as vital signs, ECG is monitored for arrhythmias, monitor intake and output, check the capillary refill time and skin turgor. Intervention targeting in maintaining the homeostasis, fluid and electrolyte balance, this can be achieved by careful administration of IV fluids, accurate monitoring of daily intake and output, hourly monitoring of urine output and administration of Inj. Atropine through infusion to maintain the stable pulse rate.

Balanced Fluid Volume Status

Patient will have imbalance in the fluid and electrolyte level, it is associated with fluid loss through excessive trachea bronchial secretion, vomiting, diarrhoea and sweating. It is essential to maintain normal circulatory volume which further helps to regulate normal urine output and maintain normal cardiac output and blood pressure. The interventions are directed towards the careful and continuous monitoring of vital parameters such as heart rate, blood pressure, skin turgor, urine output, blood test for electrolyte level, etc. Nurses have to maintain a strict hourly intake and output chart, to identify the urinary output. Judicious administration of Intravenous fluids and electrolytes is essential to maintain normal fluid volume and precautions to be taken to prevent acid-base imbalance. Cardiac output and heart rate is maintained by administering Inj. Atropine.

Providing Safe Environment

Safety of the patient is an at most priority of the nursing care, the environment should be safe, patient may develop injury due to self-harm or it may be due to the environment. if the organophosphorus poisoning is due to an suicidal attempt, suicide precautions should be followed, maintain a therapeutic environment which is free from hazardous sharp instrument and drugs, have a one to one monitoring, patient should be placed near to the nurses' station, explore the feeling and suicidal ideation, most of the patient have a next suicidal attempt once they regain the strength to do it, hence the nurse should be carefully observe during the recovery phase of illness. If the patient is depressed, administered anti-depressants, help to overcome crisis situation, provide psychotherapy and refer the patient for psychiatric service [11, 16].

CONCLUSION

This review provides evidences for the effective nursing management of patient with organophosphorus poisoning. Early management and early detection is required for saving the lives of patients. Proper knowledge of organophosphorus poisoning and its management is required for the nurses to deliver comprehensive for the patients.

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