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Original Research Article

TO STUDY SERUM ELECTROLYTE IMBALANCE & ATROPINE MANAGMENT IN ORGANOPHOSPHORUS POISONING IN ICU AT IMCHRC

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ABSTRACT

STUDY – To study serum electrolyte imbalance and atropine management of Organophosphorus poisoning

BACKGROUND – To study about the corrections of serum electrolyte imbalance and Atropine management recovery through fluid therapies and Atropine Infusions given in Organophosphorus poisoning. It's very commonly seen in Indian Population among patients admitted in ICU setup in IMCHRC (INDORE)

Organophosphorus Compound bind irreversibly to the acetylcholinesterase in the plasma, red cells and cholinergic synapses in the CNS and the PNSwhich results in serum. Electrolyte imbalance due to vomiting and gastric lavage management

MATERIAL & METHOD– 100 patients of Organophosphorus poisoning taken from period 1st June 2022 till 31st may 2023 were included in study.

RESULT- In our study we found due to ingestion of Organophosphorus poisoning, out of 100patients mean age was 47.28years

The male: female ratio was 29:81 were found, Management correction of organophosphorus poisoning was done by fluid therapy and atropine infusion

CONCLUSION- All the patients of Organophosphorus poisoning are treated by 1.Atropine Infusion 100cc concentration for reversal of obtain activity which reduces loss of sodium(Na) in perspiration which occur in Exocrine Glands serum electrolytes imbalance corrected by appropriate amount of fluid therapies ,which causes speedy recovery and decreases the long stay of patients in ICU

KEYWORDS-Acetylcholine, atropine, serum electrolytes, Fluids, Organophosphorus.

DETAIL STUDY

STUDY-Its an observational study for Serum .Electrolyte Imbalance Of Organophosphorus Poisoning In ICU setup in IMCHRC(Indore),Period from 1st June 2022 till 31st May 2023.

1. INTRODUCTION

To Study about the correction of Serum. Electrolyte imbalance and Atropine management recovery through fluid therapies and atropine infusions given in organophosphorus poisoning[1]. It's very commonly seen in Indian population among patients admitted in ICUsetup in IMCHRC

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India being an Agriculture country. Crop Femicides, Pesticides etic are easily accessible to the general population in remote areas and in agriculture practice without any restrictions on sale, Accidental(uneducated class),Social,(mouth to mouth) publicity and Homicidal[2].

Organophosphorus compound binds irreversibly to the acetylcholinesterase in the plasma, red cells and cholinergic synapses in the CNS & the PNS, Red cell cholinesterase activity is better correlated with severity of exposure than plasma cholinesterase activity[3]. The cholinergic System-cholinergic synapses are present

For Correction of Serum. Electrolytes imbalances due to vomiting and after Gastric lavage there are chances when patients go into respiratory distress also immediate incubation is done wherever needed for removal of secretions and reducing respiratory distress[4].

ABG shows metabolic alkalosis with compensatory respiratory acidosis treated by potassium and soda bicarbonate.

Atropine Ampoules are one milliliterin quantity and contain 0.6miligrams at times total dose needed maybe more than 50ampoules to achieve optimal utopianization and oximes are also used so instead of ampoules we uses atropine IV infusions to regulate dosages and to achieve the desire effects[5&6].

Hence correction of Serum Electrolytes imbalances plays crucial role in management of all patients including infusion of atropine helps to acheieve desire effect and maintain vitals and papillary dilatations which is good for Atropinization[7&8].

AIM- To Study Serum Electrolytes imbalances and Atropine intravenous infusions in the management of Organophosphorus poisoning patients in ICUsetup IMCHRC(Indore).

OBJECTIVES- Serum Electrolyte Imbalances occur in the organophosphorus poisoning patients due to frequent vomiting by organophosphorus ingestion compound consumed or by vomiting induced to removed organophosphorus compound by self or by family members or by attending person and during time of Gastric Lavage is done.

Atropine Intravenous Infusion is given for better Atropinization,deacrese complications of Organophosphorus Poisoning .Large Dosage can be given atropine for early recovery and prevention of complications.Atropine infusion gives us the better idea of total atropine consumed for better atropinization and for exact amount of dosage which was needed for the achieve reversal in (ampoules some amount is left enhances excact amount of atropine is difficult to calculate).

STUDY CENTER – IMCHRC,Indore

2. MATERIAL & METHOD

100ptients of Organophosphorus poisoning from period 1st December 2022 till 31st May 2023 taken.

INCLUSION CRITERIA – Organophosphorus poisoning suspected on clinical grounds or confirmed by container from which consumed. Age more than 18yrs with both male and females

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EXCLUSION CRITERIA – Critical ill patients, Doubtful Organo Phosphorousingestion, Consumed other substances such as Alcohol, Pregnancy and Lactating Mothers

ABSORPTION – It is absorbed by the inhalation through the skin ,mucous membrane and the Gastrointestinal Tract solvent used are Kerosene/Water which is responsible for the smell from the body,breath,Gastric content, Neurotransmitter ,Acetyl ester choline.

DIAGRAM 1
Synthesized from acetyl-coenzyme A & choline in the nerve ending cytoplasm, the reaction is catalyzed by choline acetyltransferase. Choline is actively transported into the nerve & the acetyl co-enzymeA is formed in the mitochondrial .Acetylcholine is stored in the vesicles.

1. **ACETYLCHOLINE IS THE TRANSMITTER** at -Autonomic Ganglia

   -Parasympathetic postganglionic nerve ending

   -Sympathetic postganglionic nerve ending at sweat glands

   -Blood vessels supplying in the skeletal,smooth muscles & cardiac muscles -The Neuromuscular Junction many parts of the CNS

   -Action may be broadly divided into either muscarinic or nicotinic depending on the acetylcholine receptors involved

   -Acetylcholine is hydrolyzed to choline & acetate by acetylcholine-esterase on the post-synaptic membrane

   -Other esterase also exist e.g.- plasma cholinesterase **DIAGRAM 2**

2. **MUSCRANIC RECEPTORS**-

Protein coupled receptors largely coupled to the either adenylate cyclase or phospholipase and via Gia &GQproteins, Respectively. Mediatedpostganglionic neurotransmission via parasympathetic neurons as well as sympathetic. Outflow to sweat glands.

CLASSIFICATIONS ACCORDING TO STRUCTRUAL SUBTYPES-

-M1-Gq coupled – gastric secretion and memory

-M2-Gi coupled – Heart, decrease heart rate, contractility& atrioventricular nodal conduction.

-M3-Gq coupled – Smooth muscles, increasetone, exocrineglands, stimulatory brain – CTZ

-M4/5 – Brain and adrenal medulla

Muscarinic activity more than nicotinic activity

3. **ACETYLCHOLINESTRASE INHIBITORS-**

ACH inhibitors are used for the treatment of neuromuscular disorders such as Myasthenia Gravis. Concurrent Administration of an Anti-muscarinic Agent E.g.-Atropine reduces

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unwanted effects of increased ACH concentration at the muscarinic receptors and ganglia at the low doses. Half-lives may vary from minutes to hours with metabolism by oxidations, ester, hydrolysis and combination with glutathione and excretion by liver and kidney.

4. **TOXIC –EFFECTS** –

1.**PHERIPHERAL ENZYME INHIBITIONS** –
Phosphorylation of acetylcholinesterase, maybe irreversible depending on the compound involved. Features are those of cholinergic crisis and include muscarinic

Effects (Bronchospasm, sweating, increase secretion, abdominal cramps, bradycardia, mitosis) & Nicotinic effects at large dosages (muscles twitching,weakness, Hypertension, tachycardia).Phosphorylation of enzyme E.g.-lipase, Gastrointestinalenzymes, pancreatic hepatic enzymes.

2.**MYOPATHIC EFFECTS** –
Weakness may occur within 24to96hours and can persist up to 3weeks.mainly affecting proximal muscles it is thought to involve postsynaptic dysfunction at the neuromuscular junction. Delayed polyneuropathy-usuallyfollow poisoning with non-insecticides compounds with weakness and paranesthesia can develop in 3weeks.Pyramidal signs can occur during recovery.

CNS EFFECTS-
Anxiety /Tremors/Confusion/Coma/Convulsions may occur with the EEG abnormalities. Respiratory Failure may result from increase tracheobronchial secretion proximal muscles weakness and Action on central nervous system

DIAGNOSIS- is based on history clinical examination and response to therapy. **DRUG THERAPY** –

1.**ATROPINE SULPHATE**- Anticholinergic drug (competitive antagonist at muscarinic acetylcholine receptorand ester of tropic acid and tropine, Atropine used to reduce muscarinic effects of acetylcholinesterase inhibitors Ans treatment of bradycardia due to vagal effects.

ATROPINE IV INFUSION 0.01-0.02 mg/kg is given with acetyl cholinesterase inhibitors to reduce tracheobronchial secretion and respiratory distress.

EFFECTS OF ATROPINE-
1.**CARDIOVASCULAR SYSTEM** – low dosage may cause bradycardia due to vagal stimulation then tachycardia and cutaneous vasodilatation.

2.**CENTRAL NERVOUS SYSTEM** – excitement,Hallucination,Hyperthermia

3.**RESPIRATORY SYSTEM**- Increase dead spaces,reduce secretions

4.**GASTROINTESTINAL TRACT**- reduce salivation, loweresophagealsphincter, tonemotility, gastrointestinal secretion.

5.**OTHER**- Reduce sweating causes, Mydriasiscycloplegia, Reduce bladder and ureteric tone

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6.**DYSELECTROLYTAEMIA & ACID BASE BALANCE** corrections to be done

7.**HYPOVELMIC HYPOTONIC NATREMIA**

8.**HYPOKALEMIA**

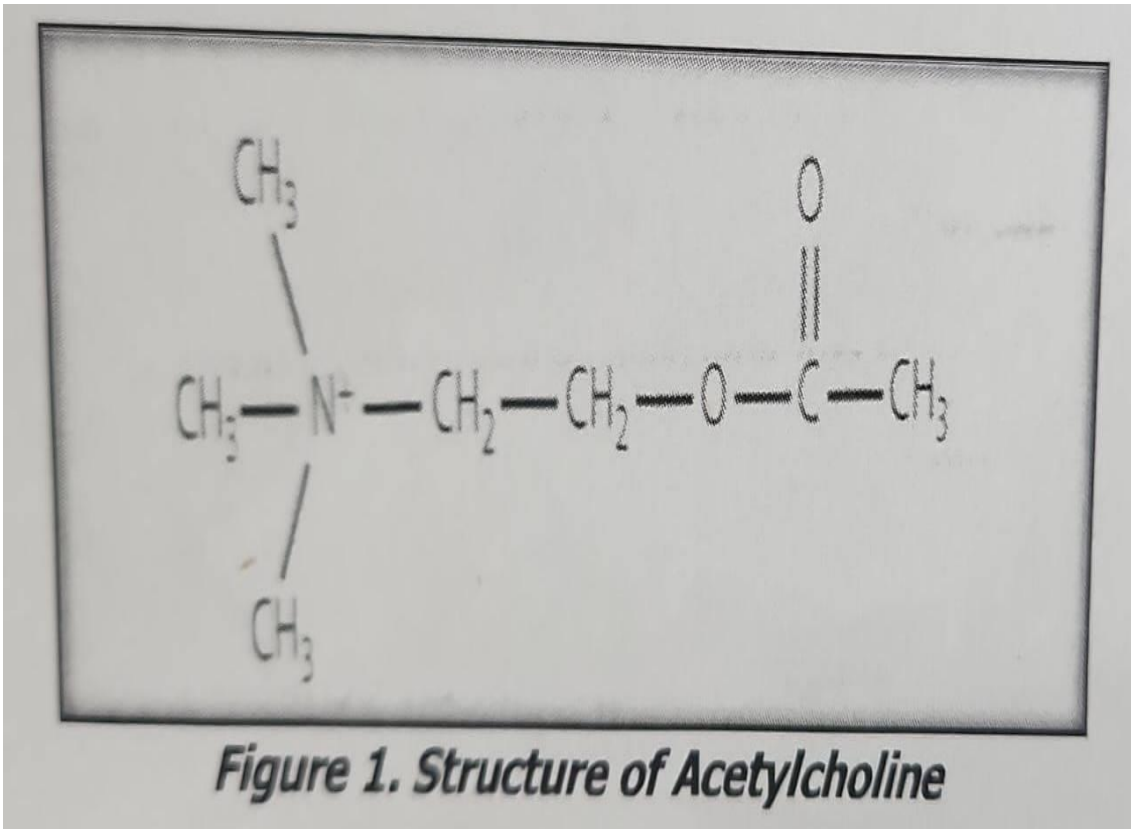

Figure 1. Structure of Acetylcholine

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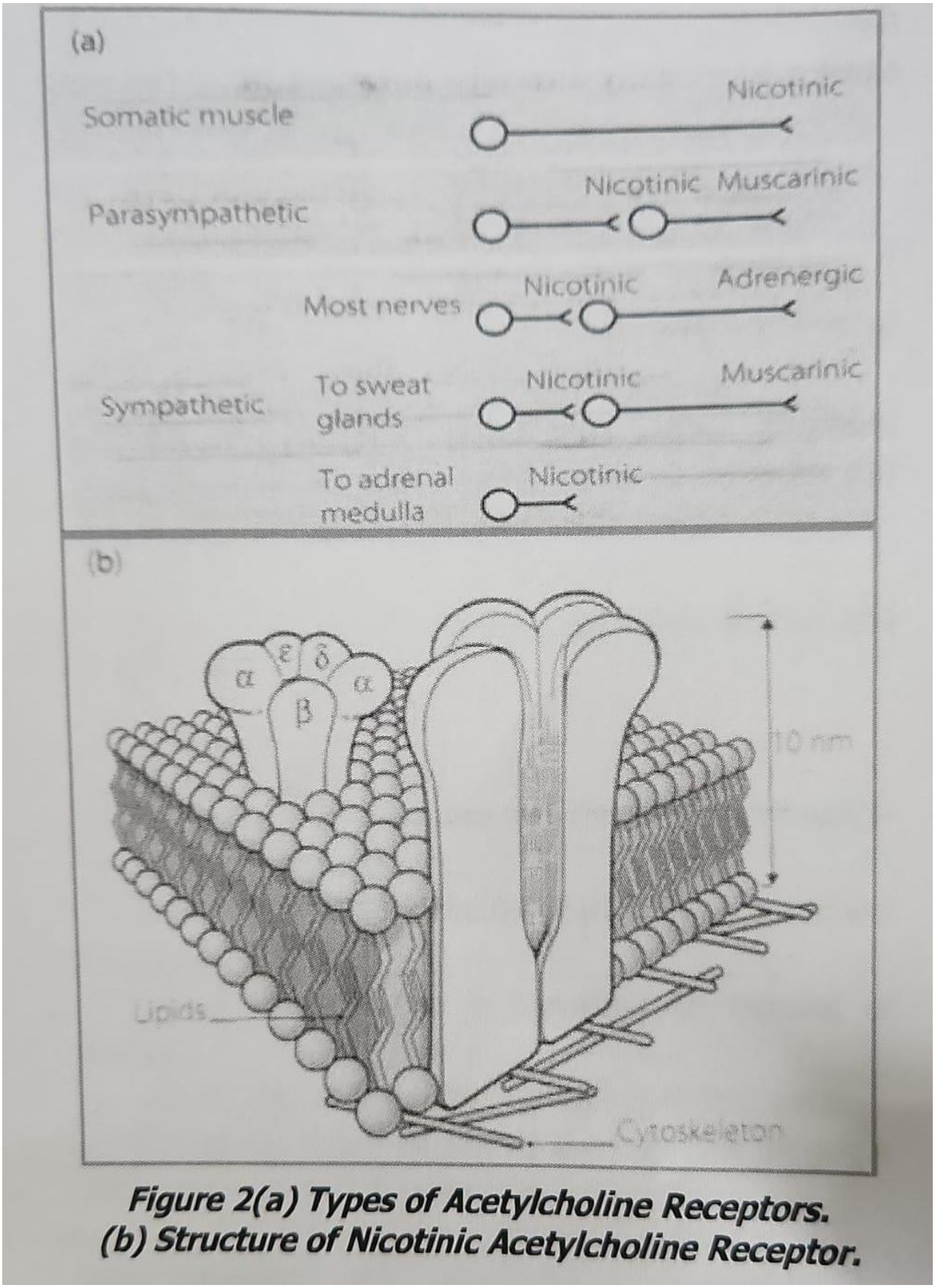

Figure 2(a) Types of Acetylcholine Receptors. (b) Structure of Nicotinic Acetylcholine Receptor.

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3. RESULT

In our study we found out 100 patients mean age was 47.28years

PRE-MEAN TREATMENT – Of Serum Electrolytes for Na,K,Cl were 128.12+-5.91,3.49+-0.78,99.06+-3.62,respectively

POST-MEAN TREATMENT –Of Serum Electrolytes for Na, K ,Cl were 138.38+-2.78,3.99+-0.37,103.12+-6.32,respectively

After calculation which signifies **p values** – less than 0.05

4. DISCUSSION

Organophosphorus poisoning is the most common poising, patients who were put ten on atropine infusions responded better and earlier at least 12-24 hours with less complications early remote and less amount of atropine medication was needed[9]. We found out that vomiting were the biggest induced causes of organophosphorus poisoning compound, it occurred due to removal of organ phosphorus poisoning from stomach by self or by others[10].

It caused marked disturbances in Serum Electrolyte imbalance for organophosphorus poisoning patients admitted in Hospital/ICU.Hence correction of Serum Electrolytes imbalances like(Hypokalemia, hypovolemia) plays crucial role in management of the patients with Atropine infusions and PAM therapy as per needed[11].

5. CONCLUSION

Serum Electrolytes corrections by normal saline/ringer lactate /DNS if used simultaneously to correct sr.electrolytes imbalances and to combat effect of organophosphorus poisoning gives earlier recovery and decrease ICU stay by 24-48hours so we concluded that infusions of atropine is easier to regulate the dosage needed and correction of serum electrolyte needed for all target organs specially heart and others.

All patients who are treated for organophosphorus poisoning for Serum Electrolyte imbalance and atropine intravenous infusions managements. They responded well and early on the fluid therapies, atropine infusions (10-20ampoules) but it even reduces loss of sodium (Na)in form of perspiration occurs in exocrineglands
causing depletions of Serum Electrolytes thereby at same time correction is done which led to speedy recovery and less stay of patients in Hospitals/ICU.

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