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Corresponding Author

Jayaprasad Rajarajan,
Department of Medicine,
Government Thiruvannamalai
Medical College in India

Author Designation

¹⁻³Associate Professor
⁴Junior Resident

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Prospective Randomized Clinical Case Control Study of Injection Magnesium Sulphate in Organophosphorus Poisoning at Tertiary Care Centre in Tamilnadu

¹Jayaprasad Rajarajan, ²Senthil Kumaran Arjunan, ³Banugopnar Balaraman and ⁴Karthikeyan Naganathan
¹⁻⁴Department of Medicine, Government Thiruvannamalai Medical College in India

ABSTRACT

Organophosphorus compounds have a wide range and complexity of effects on human physiology. MgSO₄ inhibits the release of acetylcholine in peripheral sympathetic and parasympathetic synapses as well as in the central nervous system. By acting on the N-methyl-D-aspartate receptor, it reduces the arrhythmia brought on by OPC poisoning and atropine, reverses neuromuscular weakness in the peripheral nervous system and inhibits OPC overstimulation in the central nervous system. The is to study the effect of magnesium sulphate on outcome in organophosphorus poisoning admitted in Government thiruvannamalai Medical College and Hospital. A prospective randomized clinical control study at Department of general medicine, Government thiruvannamalai Medical College and Hospital, Thiruvannamalai in Patients admitted with organophosphorus poisoning. The study duration is 18 months. The total Sample size is 100 with People receiving magnesium sulphate: 50 (One group of people with administration of 4 grams of 20% magnesium sulphate) and Control group: 50 (One group of people without administration of magnesium sulphate). Comparison between the response after Magnesium sulphate of the case and control group were observed. The dose requirement of atropine, duration of ICU stay and requirement of intubation after 24 hrs were significantly decreased in case group than control. OPC poisoning may be effectively treated with intravenous Magnesium sulphate therapy in combination with atropine and P2AM. We find that administering Magnesium sulphate at an early stage in patients with OPC poisoning results with reduced morbidity.

INTRODUCTION

In many rural Asian countries, organophosphorus pesticide self-poisoning is a serious clinical and public health issue^[1]. Approximately 60% of the region's annual estimated self-harm deaths are thought to be the result of pesticide poisoning^[2]. Numerous studies indicate that 200 000 deaths annually, or around two-thirds of these deaths, are caused by organophosphorus insecticides^[3]. Classical cholinergic symptoms are caused by OPC's irreversible binding to acetylcholinesterase in the plasma, red blood cells, cholinergic synapses in the central and peripheral nervous systems and autonomic ganglia^[4]. Acetylcholine buildup is competitively inhibited by atropine, which acts through muscarinic and nicotinic receptors. Oximes reactivate acetylcholinesterase by removing phosphoryl group. The intermediate syndrome, which has a 15-30% incidence and is characterized by early or late neuromuscular weakness and altered consciousness, can be prevented early with oxime management^[5]. Nevertheless, oximes' contribution to the treatment of OPCP has been called into doubt by a few recent investigations and a Cochrane analysis. As a result, several medications have been tested in conjunction with oximes and atropine, including clonidine, sodium bicarbonate, fresh frozen plasma and magnesium sulphate (MgSO₄)^[6]. MgSO₄ inhibits the release of acetylcholine in peripheral sympathetic and parasympathetic synapses as well as in the central nervous system. It promotes the hydrolysis of certain insecticides and blocks the calcium channels at presynaptic nerve terminals that cause acetylcholine to be released. By acting on the N-methyl-D-aspartate receptor, it reduces the arrhythmias brought on by OPCP and atropine, reverses neuromuscular weakness in the peripheral nervous system and inhibits OPCP overstimulation in the central nervous system. Few studies evaluating the impact of MgSO₄ on ICU stay and outcome in patients with OPCP were found in the literature review. Thus, a randomised controlled trial with double blinding was conducted to investigate the effects of MgSO₄ in OPCP.

MATERIALS AND METHODS

A prospective randomized clinical control study at the Department of general medicine, Government Thiruvannamalai Medical College and Hospital, Thiruvannamalai with Patients admitted organophosphorus poisoning for the duration of 18 months.

Inclusion Criteria:

- Patients between the ages of 20-50 years.
- Patients with no co-morbidity.
- Patients with OPC poisoning with cholinergic symptoms presented within 24 hours of consumption.
- Patients were given written informed consent.

Exclusion Criteria:

- Patient presented after 24 hr of OPC consumption.
- Patient with history of multiple poisoning.
- Patient with co morbidity.
- Patient with bleeding tendency.
- Patient who refused to give consent.

With Sample Size of 100:

- **People Receiving Magnesium Sulphate:** 50 (One group of people with administration of magnesium sulphate).
- **Control Group:** 50 (One group of people without administration of magnesium sulphate).

Methodology:

- After getting approval from ethical committee, I will select the patients who fulfil the inclusion criteria and get consent and willingness to participate in the study.
- 100 OPC poisoning patients will be selected out of which 50 patients were given single dose of 4 grams 20 percent magnesium sulphate i.v over 20 minutes at admission., the other 50 were kept as control.
- Results will be collected, tabulated and followed by statistically analyzed using Microsoft Excel and SPSS to detect the usefulness of magnesium sulphate in OPC poisoning.

Data Analysis: Research data will be collected in the Data Proforma Sheet and saved in Excel. Statistical Analysis will be done by SPSS-21 software. The tests will be presented in descriptive statistics with 5% level of significance and 95% confidence interval.

Statistical Analysis: Statistical analysis done mean, standard deviation and p-value are made out. A p-value <0.05 (typically ≤0.05) is statistically significant and a p-value higher than 0.05 (>0.05) is not statistically significant. Statistical Method and Data entry done with Microsoft Excel and SSPS 21 version.

RESULTS AND DISCUSSIONS

The mean atropine requirement of the patients among the groups were calculated and given in (Table 1). The p-value is 0.001 <0.05 statistically significant was observed.

Table 1: Atropine Requirement of the Patients Among the Groups

Atropine Requirement	Group M	Group C
Mean	48.04	70.4
SD	8.49	10.47
T Value	12.48	
P Value	0.001	

The intubation after 24 hours of the patients among the groups were determined. The higher no. of patients required intubation after 24 hours was observed in group C as shown in (Fig. 1). The p-value is 0.025 <0.05 statistically significant was observed.

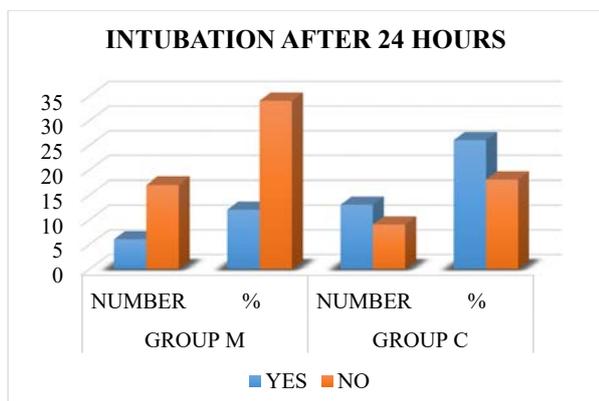


Fig. 1: Comparison of the Intubation After 24 Hours of the Patients Among the Groups

The higher mean ICU stay was observed in group C (6.18±1.57 days) was shown in (Fig. 2). The p-value is 0.011 <0.05 statistically significant was observed.

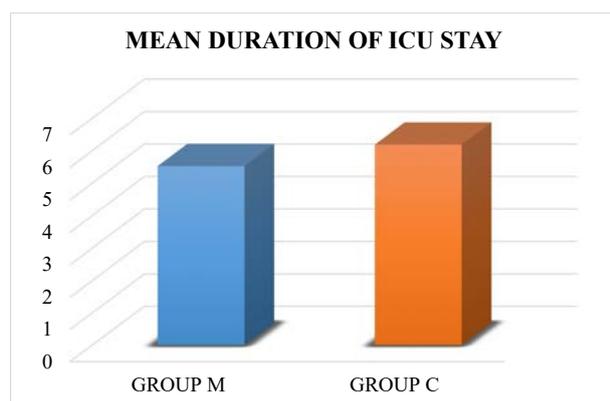


Fig. 2: Comparison of the ICU Stay of the Patients Among the Groups

Organophosphorus compound poisoning (OPCP), a significant public health issue in poor nations like India. The cornerstones of treatment continue to be atropine and oximes. In the treatment of OPCP, magnesium sulphate (MgSO₄) has demonstrated benefits. The purpose of this study was to evaluate how MgSO₄ affected the course of treatment for OPCP patients who were hospitalised to the intensive care unit (ICU). Group C had a larger demand for atropine (74.82±22.39 mg) than Group M (53.11±45.83 mg) (P<0.001). P=0.043 indicates that a total of 33 patients in Group C and 23 patients in Group M needed to be intubated. Group C experienced a mean mechanical ventilation length of 4.51±2 days, while Group M experienced a mean duration of 4.13±1.6 days (P=0.45). Group C's ICU stay was 5.36±2.018 days, while Group M's was 4.54±1.581 days (P=0.026). Given to OPCP patients within 24 hours of ICU admission, four grammes of MgSO₄ reduces the need for

atropine, the necessity for intubation and the length of time spent in the ICU. In our study the atropine dosage, need for the intubation after 24 hours of admission, stay in ICU were significantly reduced in case than the control group.

CONCLUSION

OPC poisoning may be effectively treated with intravenous Magnesium sulphate therapy in combination with atropine and P2AM. We find that administering Magnesium sulphate at an early stage in patients with OPC poisoning results with reduced morbidity.

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