PATTERNS OF ORGANOPHOSPHOROUS POISONING ATTENDING A TEACHING HOSPITAL

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ABSTRACT

The objective of this was to study the pattern of patients of organophosphorous (OP) poisoning attending Kathmandu Medical College Teaching Hospital (KMCTH). This is a retrospective study of OP poisoning from hospital records were analyzed meticulously and data extracted. Data collected were: patient's demographics, motive for poisoning, type of OP poison, arrival time, time since ingestion, patient's vitals, predisposing factors, serum cholinesterase levels, treatment given, duration of hospital stay and mortality. A total of 47 patients of OP poisoning attended KMCTH from Aug 2003 to July 2005. 22(46.8%) cases were male and 25(53.2%) were female. The maximum number of patients were between the age of 20-40 (33-70.2%). Married patients outnumbered the unmarried (35/74.5% vs 12/25.5%). The most common motive for poisoning was suicidal, 41 cases (87.2%). Metacid (methyl-parathion) was the most commonly used OP compounds in 32 (68%) patients. Interpersonal marital relationship seemed to be the commonest predisposing factor, 23 cases (48.9%).The commonest time of presentation was between 6 pm-12 midnight. 7(57.4%) cases presented within 2 hours of ingestion of the poison. Serum cholinesterase level measured after full atropinisation was >50% of normal level in 17 cases (36.2%). 10 cases (21.3%) required respiratory support. Intermediate syndrome (IMS) was observed in 3 cases. Overall mortality occurred in 3 cases (6.4%). This study highlights the problem of OP poisoning in our region. Establishment of strict policies against the sale and availability of insecticides and pesticides which are freely available in the market is an effective way to control OP poisoning.

Key Words: Organophosphate poisoning (OPP), OP compounds, insecticides, pesticides.

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INTRODUCTION

Organophosphate (OP) compounds are a diverse group of chemicals used in both domestic and industrial settings. Pesticide poisoning from occupational, accidental and intentional exposure is a major developing world health problem.[1] Millions of people are exposed to danger by hazardous occupational practices and unsafe storage. However, it is deliberate self poisoning that causes the great majority of deaths and puts immense strain on hospital services of developing nations, particularly in Asia.[2]

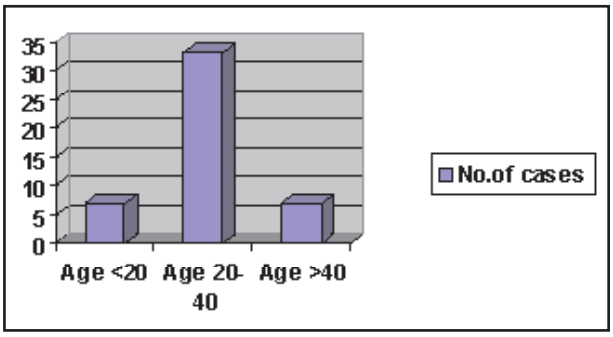

Fig. 1: Age Distribution

MATERIALS AND METHODS

A retrospective study of all the patients with organophosphorous poisoning (OPP) attending KMCTH from Aug 2003 to July 2005 was done.

The statistical analysis of the collected was analysed with SPSS 13.0.

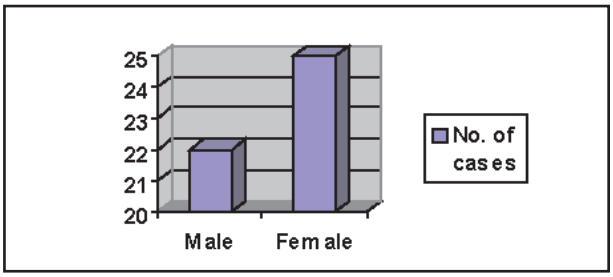

Fig. 2: Sex Distribution

RESULTS

A total of 47 cases of OP poisoning attended KMCTH from Aug 2003 to July 2005. 22(46.8%) cases were male and 25(53.2%) were female. The maximum number of cases were between 20-40 age groups i.e. 33(70.2%). Patients who were married outnumbered the unmarried (35/74.5% vs 12/25.5%). The most common reason for poisoning was suicidal, 41 cases (87.2%). Metacid (methyl-parathion) was the most commonly used OP compounds in 32 (68%) patients. Interpersonal marital relationship seemed to be the commonest predisposing factor, 23 cases (48.9%) (Table III).The commonest time of presentation was between 6pm-12 am, 24 cases (51.1%). 27(57.4%) cases presented within 2 hours of ingestion of the poison followed by 14 cases (29.8%) presenting within 2-4 hours of ingestion of the poison. 6 cases (12.8%) had bradycardia during presentation. Serum cholinesterase level measured after full atropinisation was >50% of normal level in 17 cases (36.2%). 10 cases (21.3%) required respiratory support. Intermediate syndrome (IMS) was observed in 3 cases (6.4%) of which two patients were revived. Overall mortality occurred in 3 cases (6.4%).

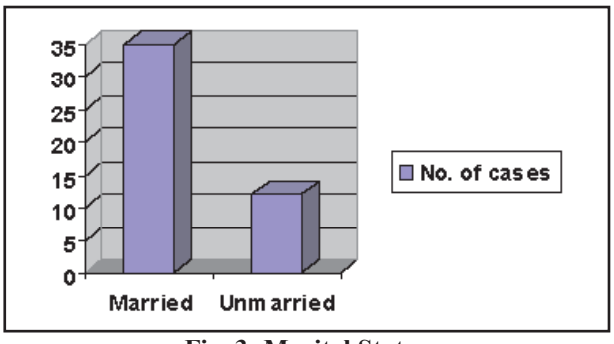

Fig. 3: Marital Status

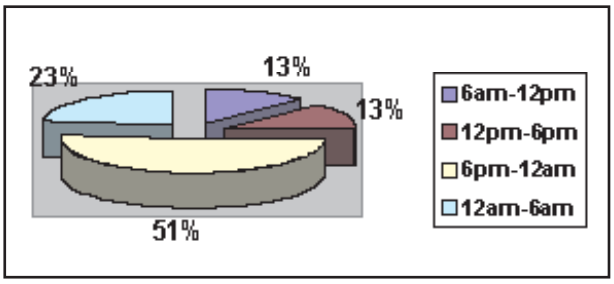

Fig. 4: Time of Presentation

Table I: Ethnicity

Ethnicity	No. of cases	Percentage
Aryan	29	61.7%
Mongolian	18	38.3%

Table II: Duration of Hospital Stay

Duration	No. of cases	Percentage
<7 days	20	42.6%
7-15 days	17	36.2%
>15 days	10	21.3%

Table III: Predisposing Factors

Factors	No. of cases	Percentage
Interpersonal/Marital relationship	23	48.9%
Family issues	4	8.5%
Psychiatric illness	10	21.3%
Others	10	21.3%

DISCUSSION

The organophosphorus compounds have been known since the early 1800s when Lassaigne synthesized these compounds by reacting alcohol and phosphoric acid.[3] However, the earliest description of the synthesis of an organophosphorus compound, tetraethylpyrophosphate, was given at a meeting of the French Academy of Sciences in 1854 by Phillipe de Clermont, who even tasted it without any toxic effects.[3]

Nearly 80 years later, in 1932, it was Willy Lange and his student G. von Krueger4 who synthesized these compounds at the University of Berlin and documented their effects.

In 1936, Gerhard Schrader,[6] a chemist at IG Farbenindustrie (now Bayer AG, Leverkusen, Germany) and now known as the father of modern organophosphorus compounds, synthesized a large number of these compounds in his search for insecticides.

According to the WHO, one million serious accidental and two million suicidal poisonings due to insecticides occur worldwide every year, of which 200,000 patients die with most deaths occurring in developing countries.[1] In India, organocompounds (OPCs)-organophosphates and organocarbamates are the commonest pesticides used and due to their easy availability, there is widespread abuse of these compounds with suicidal intent.[7,8,9,10] A study performed by Pathak et al in 2000-2001 reported that half of all poisoning cases were OP poisoning, which was also the commonest cause of poisoning as reported in other studies in our region.[24]

OP compounds inhibit acetylcholinesterase at neuromuscular junction, in autonomic and central nervous system resulting in accumulation of acetylcholine (ACh) and over stimulation of ACh receptors resulting in acute cholinergic crisis which is characterized by bradycardia, bronchorrhoea, miosis, sweating, salivation, lacrimation, defecation, urination and hypotension. In addition, there occurs muscle weakness and fasciculations. The CNS involvement results in alteration in sensorium and seizures. Following resolution of cholinergic crisis, some patients may develop intermediate syndrome i.e. cranial nerve palsies, proximal muscle weakness, respiratory muscle weakness. In our study 3 patients had developed Intermediate syndrome (IMS). The incidence of IMS in different studies has been reported to be between 20-68%.[23] Some may develop peripheral neuropathy (OPIPN) at a later stage.[11]

Poisoning occurs as a result of unintentional ingestion, occupational exposure, and attempted

suicide.[12,13,14,15,16,17,18,19,20] In a study of OP poisoning in India, Agarwal found that 67.4% of patients had suicidal intentions, 16.8% of the poisonings were caused by occupational exposures, and 15.8% of patients were poisoned accidentally.[13] In our study suicidal intention was the reason for poisoning in 87.2%. Another study of OP poisoning in Australia, performed by Emerson found that only 36% of patients had suicidal intentions compared to 65-75% in developing countries.[16] A recent study demonstrated that 14% of all deaths amongst 10-50 year old women in Bangladesh were due to poisoning, the majority following suicidal ingestion of pesticides.[21]

Mild poisoning is defined as depression in cholinesterase activity to 20-50% of normal. Moderate poisoning occurs when activity is 10-20% of normal. Severe poisoning occurs at less than 10% of cholinesterase enzyme activity. Small short-term exposures can depress cholinesterase activity to very low levels with minimal symptoms. Levels do not always correlate with clinical illness. The level of cholinesterase activity is relative and is based on population estimates. Neonates and infants have baseline levels that are lower than those in adults. However, most patients do not know their baseline level, the diagnosis can be confirmed by observing a progressive increase in the cholinesterase value until the values plateau over time.

The mortality depends on multiple factors e.g. inherent toxicity of the poison, time taken to bring the patient to health care facility, amount ingested and facility of good medical treatment. Worldwide studies report mortality rates from 3% to 30%[12,13,14,15,16,17,18,19,20] and in our study the mortality rate was 6.4%. The mortality rate for poisoned patients who require ventilation is as high as 50%.[14,18] Up to 70% of patients with OP poisoning have a high incidence of respiratory failure.[12,14,16,18,22]

CONCLUSION

This study highlights the problem of OP poisoning in our region. OP poisoning cases are increasingly common because of its cheaper cost, easy availability, rapid onset of action and highly lethal effect. Hence, there should be strict policies against the sale and availability of insecticides and pesticides which are freely available in the market. There should be public awareness campaign about poisoning. Establishment of management protocol for all health care professionals will help in reduction of overall mortality.

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