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Study of profile, pattern and outcomes of oral poisoning cases admitted in emergency department of Janakpur provincial hospital, Nepal

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Abstract: Oral poisoning patients admitted to our emergency department between December 16, 2021 and June 15, 2022 at the Emergency department of the Provincial Hospital in Janakpur Dham, Nepal were the subject of a retrospective study. The patient files contained information regarding age, gender, occupation, type of agent, route of poisoning, clinical effects of cholinergic overactivity, laboratory findings, and mortality rate. During the study period, 220 patients were admitted to the ED with oral poisoning caused by a known agent. The estimated mean time of admission to the emergency department after exposure was 3.9 3.1 (1-14) hours. There were 131 female patients (59.5%) and 89 male patients (40.5%). 40.5% of both males and females between the ages of 15-24 were affected. Oral ingestion was found to be the most common route of poisoning (86.5%). attempted suicide was the most frequent cause of poisoning (75.9 %). The most frequently encountered oral compounds were dichlorvos, diazinon, and parathion-methyl. Miosis, respiratory system findings, tachycardia, loss of consciousness, and hypertension were the most common clinical manifestations. Twenty patients (9.1 percent) perished as a result of respiratory and cardiac arrest (45%), respiratory failure (25%), CNS depression (5%) and septic shock (25%).

Keywards: Oral poisoning, Emergency, Nepal, Janakpur

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Introduction

Oral poisoning is a serious medical emergency that can affect patients of any age group anywhere in the world [1,2,3,4]. It is also associated with a considerable risk of morbidity and mortality. According to estimates provided by the World Health Organization (WHO), poisoning is responsible for the annual loss of 7.4 million years of healthy life (years of

life adjusted for disability) across the globe. On the other hand, this cost falls disproportionately on low and middle-income nations, which are home to more than ninety percent of the world's accidental poisoning fatalities [5].

Studies have found that adults are more likely to intentionally poison themselves whereas children are more likely to accidentally poison themselves when it comes to oral poisoning [6]. Poisoning by mouth can be intentional or unintentional. Patients suffering from oral poisoning might present with a wide variety of clinical symptoms, which can make identification challenging, particularly in areas with limited access to resources [7, 8]. The fact that the drugs implicated in poisonings differ according to age group, intention, geographic region, and level of economic development [6, 9,10,11] further contributes to the high degree of clinical presentation diversity that is observed. Analgesics, cosmetics, household cleaning substances, sedatives/hypnotics/antipsychotics, and foreign bodies are the top five substance classes that are most frequently involved in human exposures, according to the American Association of Poison Control Centers [8]. This information is based on reports from poison control centers in the United States. European data suggests a different pattern, which is reflective of the fact that most poisoned patients are adults with suicidal purpose and that the most prevalent exposures are to alcohol, sedatives/hypnotics/antipsychotics, illegal drugs (mainly benzodiazepines), and carbon monoxide [10].

There are just a few studies that are hospital and morgue based, but overall there is a general dearth of data detailing patterns of oral poisoning from the Emergency Department (ED) in Nepal [12,13,14]. Oral poisoning has not been the subject of any research conducted in Nepal's emergency departments; nevertheless, it has been documented in a variety of other clinical settings. Poisoning was the most common means of suicide, with the majority of cases involving the ingestion of antimalarial medications and pesticides, according to a study of suicides carried out at the morgue of the primary tertiary referral hospital [15]. Another autopsy-based surveillance study was carried out in southern Tanzania in 2002–2003 [16], and it found that 300 people died accidentally of cyanide poisoning as a result of consuming bitter cassava during a drought that spanned the entirety of the country. Poisonings have also been observed in mining operations (occupational exposures), as well as among pregnant women who have been affected by the condition and who have presented themselves at a tertiary referral hospital [17,18,19].

Patients who have been poisoned and are treated in oral settings are known to have better results when early recognition and proper care are provided [20]. There is a potential for increased morbidity and death to result from delayed detection and sub-optimal therapy [21]. The case fatality rates are different depending on the poison and the locale. In Africa and Asia, it was revealed that the biggest number of fatalities were caused by pesticides, followed by pharmaceuticals and household items; nevertheless, in other parts of the developing world, paracetamol was found to be a substantial cause of poisoning [6].

Poison control centers are ubiquitous in high-resource environments [22], and the majority of emergency physicians who manage poisoned patients have the benefit of real-time consultation with the experienced toxicologists who staff those centers. Therefore, in the majority of emergency departments (EDs) located in affluent countries, medical professionals are able to swiftly determine the kind of poisoning and initiate appropriate care, thereby improving the possibility that the patient will have satisfactory outcomes [23]. The majority of the countries in sub-Saharan Africa, including Tanzania, do not have formal Poison Control Centres or toxicological consultation services easily available to physicians at this time. Recognizing toxic cases is still difficult in Tanzania because there are very few oral care workers with the appropriate skills to recognize the nuanced and diverse presentations of toxicological syndromes. This makes

it difficult to identify toxic cases. The lack of access to laboratory toxicological analysis is a factor that contributes to the severity of this problem.

As a result, we wanted to describe the population of patients who presented to the emergency department (ED) of a large public tertiary care hospital with suspected oral poisoning or other toxic exposure. Additionally, we wanted to characterize the signs and symptoms that these patients presented with and report on the suspected toxicological agents that were involved. It was hoped that this would increase providers' knowledge of patients who presented to emergency departments and other oral intake areas in Tanzania with suspected toxicological syndromes, thereby informing the development of diagnostic and management protocols and guiding educational and clinical initiatives to reduce the morbidity and mortality caused by toxicological disease.

Patients, Methods and Statistical Analysis

At the Emergency department of the Provincial Hospital in Janakpur Dham, Nepal, a retrospective analysis was carried out on patients diagnosed with OPP who were brought to the ED between the dates of December 16, 2021 and June 15, 2022. The study involved a total of 240 different patients. At the time of admission, patients were examined and evaluated. A comprehensive history had been gathered from either the patient or the patient's family.

Following are the criteria that were used to arrive at the diagnosis of acute OPP:

1) a history of exposure to or contact with an insecticide; 2) the typical clinical signs and symptoms of OPP; 3) improvement of signs and symptoms with atropine and oximes; and 4) decreased serum cholinesterase (sChE) activity. After doing a clinical evaluation, a series of biochemical tests, including a complete blood count, serum amylase, sChE level, and troponin level, were carried out using a Konelab 60I autoanalyzer from Thermo Clinical Labsystem in Vantaa, Finland.

All admissions were handled through the emergency department, which was also responsible for performing the preliminary decontamination operations. These included the removal of all clothing, washing the skin and hair with soap and water, and gastric lavage, cathartics, and activated charcoal for gastrointestinal decontamination; skin decontamination was accomplished by removing all clothing. All of the cases were treated with many doses of atropine administered intravenously, and some of the patients were also given oximes. The patient files were searched in order to acquire information regarding the age, gender, occupation, kind of agent, route of poisoning, clinical effects of cholinergic overactivity, laboratory findings, and mortality rate of the patients. These were recorded using standardized data collecting forms, and then analyzed using software developed by SPSS.

Results

During the time period covered by the study, a total of 220 individuals who had OPP caused by a known substance were admitted to the emergency department. During this time period, roughly 305,000 people were checked into the emergency department (ED). After the exposure, the estimated mean time of admission to the emergency department was 3.9 3.1 hours (Minimum: 1 hour, Maximum: 14 hours: 4 1.9 hours in dead cases and 3.9 3.2 hours in disc).

The demographic breakdown of our patients, broken down by age and gender, is shown in Table 1.

Table 1. Distribution of Patients According to Age and Sex

Age groups	Male		Female		Total	
	n	%	n	%	n	%
15-24	29	13.2	60	27.3	89	40.5
25-34	17	7.7	32	14.5	49	22.3
35-44	16	7.3	16	7.3	32	14.5
55-64	11	5	10	4.5	21	9.5
65-74	10	4.5	5	2.3	15	6.8
>75	6	2.7	8	3.6	14	6.4
Total	**89**	**40.4**	**131**	**59.6**	**220**	**100**

There were 131 female patients, making up 59.5 percent of the total, and 89 male patients, making up 40.5 percent; the ratio of female to male patients was 1.47. The age group of 15-24 years was the one that was impacted the most frequently in discharged patients (42 percent) and in both sexes (40.5%), although the age group of 15-24 years and above 75 years was the one that was affected the most in deceased cases (25 percent each). One hundred forty-one of the patients were married, which accounted for 67.3% of the total, and the majority of them were housewives (47.3 percent). 44.5 percent of the patients came from rural areas, while 55.5 percent were from urban areas, according to the residency distribution trends.

Inhalation, transdermal application, oral ingestion, and intravenous injection were the methods of administration. It was observed that oral ingestion was the most common method of poisoning (86.5 percent), accounting for 19 of the cases of fatal poisoning and 172 of the cases in which patients were released (Table 2).

Table2. The Route of Poisoning According to Age

	Inhalation		Skin		Ingestion		Intravenous		Total	
Age groups	n	%	n	%	n	%	n	%	n	%
15-24	5	2.3	2	0.9	80	36.3	2	0.9	89	40.4
25-34	3	1.4	3	1.4	43	19.4			49	22.2
35-44	3	1.4	1	0.5	28	12.7			32	14.6
55-64	3	1.4			18	8.2			21	9.6
65-74	3	1.4			12	5.4			15	6.8
>75	3	1.4	1	0.5	10	4.5			14	6.4
Total	**20**	**9.3**	**7**	**3.3**	**191**	**86.5**	**2**	**0.9**	**220**	**100**

A total of 45 patients, or 20.5 percent, had unintentional contact with the agent, while just 8 patients, or 3.6 percent, had occupational contact with the agent. But the attempt at suicide was by far the most common motive for poisoning (74.9 percent of cases) (Table 3).

Table3: The Route of Poisoning Based on Cause

	Inhalation		Skin		Ingestion		Intravenous		Total	
Reason	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Suicidal	1	0.5			164	74.5	2	0.9	167	75.9
Accidental	12	5.4	6	2.7	27	12.3			46	20.5
Occupational	7	3.2	1	0.5					8	3.6
Total	**20**	**9.1**	**7**	**3.2**	**191**	**86.8**	**2**	**0.9**	**220**	**100**

The rate of suicide attempts was 75% among those who had passed away, and it was 76% among those who had been discharged. The OPCs dichlorvos, diazinon, and parathion-methyl were found to be the most often seen. The minimum volume of exposed OPCs was 1 mL and the maximum volume was 500 mL. The average volume of exposed OPCs was 48.9 52.5 mL (the volume was 69 33 mL in deceased cases and 47 53 mL in discharged patients). Table 4 provides a summary of the clinical findings that were present upon admission.

Table4: Patients' Clinical Manifestations

Clinical Manifestations	**Affected patients**	
	N	**%**
Miosis	175	74.5
Respiratory tract findings	120	54.6
Tachycardia	78	35.4
Emesis	72	32.7
Loss of consciousness	67	30.4
Hyperhydrosis	63	28.6
Hypertension	32	14.5
Fasciculation	18	8.2
Bradycardia	11	5
Fever	10	4.5
Diarrhea or urinary incontinence	6	2.7
Convulsion	4	1.8
Hypotension	4	1.8

The clinical indicators that occurred the most frequently were miosis, abnormalities related to the respiratory system, tachycardia, loss of consciousness, and hypertension. There was an increase in the leukocyte count, as well as an increase

in blood levels of lactate dehydrogenase, glucose, amylase, and troponin. Additionally, there was an increase in the levels of serum liver enzymes (Table 5).

Table5. Patient Abnormal Laboratory Findings

Findings	Normal values	Patient values
Leukocyte count	4000-10000	13.465±5.78
Blood glucose (mg/dL)	70-110	145±68
Lactate dehydrogenase (U/L)	225-450	458.2±377.8
Aspartate aminotransferase (U/L)	0-32	37.5±72.1
Amylase (U/L)	28-100	150.6±197.3
Troponin I (U/L)	<0.1	1.3±0.2
Serum AChE (U/L) Female	5600-17600	1592.6±1735
Serum AChE (U/L) Male	4000-12000	1918.5±2155.4

Twenty patients, accounting for 9.1 percent of the total, passed away as a direct result of sudden respiratory and cardiac arrest (45%), respiratory failure (25%), septic shock (25%), and central nervous system depression (5%). (Table 6). Ninety-nine point-nine percent of the patients, or two hundred total, were discharged without any symptoms.

Table6: The Causes of Patient Mortality

	Affected patients	
	n	%
Sudden respiratory and cardiac arrest	9	45
Respiratory failure	5	25
Septic Shock	5	25
CNS depression	1	5
Total	**20**	**100**

Discussion

OPCs have, for the most part, been put to use as pesticides in many different regions of the world (10). Because the restrictions that are supposed to control their sale are inadequate, they are easily accessible (11). Because the compounds are so readily available, there has been a progressive increase in the number of cases of accidental and intentional poisoning (9). Attempted suicide represents for at least 40–60% of all instances in several African nations, which is one of the leading causes of OPP (9). In the prior study, the rate of suicide by poisoning was found to be 75.9 percent, and the most common method of ingesting OPCs was through the mouth (86.8 percent). These high rates of suicide by poisoning and ingestion through oral means are comparable to those found in Sungur and Guven's (9) and Saadeh and colleagues' (10) research (11). It's possible that unchecked sales are to blame for these high rates. Poisoning from OPCs can happen to anyone of any age (7, 8). According to our research, the age group ranging from 15 to 24 years was the one that was impacted the most frequently, with a female to male ratio of 1.47. In this respect, the results presented here are consistent with those that have been found in the relevant research (11-14).

In contrast to the results obtained by Saadeh et al (11) and Kara et al (14), we discovered that there were significantly more married patients (67.3%) than there were single individuals (31.8 percent). However, the marriage rate among our patients was comparable to the findings of Agarwal and colleagues and Chharba and colleagues (15, 16). It's possible that this has anything to do with the sociocultural makeup of the people who are exposed in our country.

The use of over-the-counter pain relievers (OPCs) in an effort to end one's life is a significant concern, particularly in developing nations (9), and suicidal usage is the primary cause of severe instances (17-19), as well as widespread use of these agents throughout the country.

In various research, it was found that different types of OPCs served as the toxic agent that caused the poisoning. For example, fenitrothion was reported as the most common causal agent by Yamashita et al., dichlorvos was reported as the most common causal agent by Sungur and Gu-ven and Saadeh et al., and mevinphos was reported as the most common causal agent by Nouria et al (6, 9, 11, 23). Additionally, we discovered that dichlorvos was the most frequently occurring OPC that acted as the poisoning agent. We believe that this may be the result of the fact that di-chlorvos is one of the insecticides that is most widely available for purchase in Turkey.

The symptoms of OPP are related to the accumulation of acetylcholine that follows, which is typically referred to as cholinergic crisis. Effects secondary to muscarinic, nicotinic, and central nervous system re-ceptor overstimulation are one way to categorize the symptoms of overactive peripheral muscarinic and/or nicotinic and/or central nervous system re-ceptors (6). The manifestations that are seen in a patient's body are contingent on the particular agent that was involved, the amount that was absorbed, and the manner in which they were exposed (4). The miosis is the indication that occurs most frequently in OPP (12). The presence of miosis was also the most important indicator in this particular case (74.5 percent). This conclusion is supported by a number of other investigations (11, 12). Additional common symptoms included discoveries related to the respiratory system, tachycardia, emesis, loss of consciousness, hyperhydrosis, hypertension, fasciculation, bradycardia, fever, diarrhea, urine incontinence, convulsions, and low blood pressure. Thirty and a half percent of the patients had signs of loss of consciousness. According to Oz-Turk and colleagues' findings, this ratio is 25.27 percent (12). In the patients who participated in our research, we found that 35.4 percent of them had tachycardia, whereas only 5 percent of them had bradycardia. This result was comparable to those found by Ozturk and colleagues and Saadeh and colleagues (11). The effects of nicotinic receptors on the adrenal medulla and sympathetic ganglia are responsible for tachycardia, whereas muscarinic receptors are responsible for bradycardia (12).

Hyperglycemia has been reported numerous times in the scientific literature; hence, alterations in serum glucose levels in OPP are typically clinically significant (12). (9). Hyperglycemia was found in 67.7 percent of these patients, according to our findings. The secondary release of catecholamines from the adrenal medulla is thought to be the cause of the rise in serum glucose, which has been attributed to this phenomenon (9).

Additional abnormalities found in the laboratory include leukocytosis with a left shift, which is rather common (24), as well as poor liver function tests and elevated blood amylase levels (12, 25, 26). According to the findings of our research, leukocytosis was present in 68.7 percent of the patients, and elevated serum amylase was present in 36.1 percent of the patients. These findings were consistent with previous research (9, 25).

We found elevated levels of aspartate aminotransferase in 33 percent of the patients, which is quite unusual, according to the available research (27). It's possible that this is because OPCs include a variety of organic solvents. It has been suggested that elevated levels of lactate dehydrogenase are related with oxidative tissue damage caused by OPCs (28), and we found that this level was elevated in 29.8 percent of our patients.

A history of exposure and a blood test that measures red cell and plasma cholinesterase are necessary components in the diagnostic process for acute OPP (29). Although red blood cell cholinesterase is a real cholinesterase, it is not an enzyme that can be easily quantified in a quick and routine manner. In the event of an emergency, sChE can be tested in a short amount of time despite being a pseudocholinesterase. The clinical signs of OPP typically become apparent

after an inhibition of sChE of more than 50 percent and become quite severe when an inhibition of sChE of 90 percent or more is achieved (23). According to the findings of our research, at the time of admission to the emergency department, 69.6 percent of the male patients and 74.1 percent of the female patients had sChE levels that were depressed by at least 50 percent.

Decontamination, the reversal of muscarinic symptoms by the use of atropine, the regeneration of acetylcholinesterases with the use of oxime compounds such as pralidoxime (2-PAM), and supportive pulmonary care are the components of the current treatment for OPPS (30). By competing for the same binding sites on muscarinic receptors, atropine is able to counteract the effect of acetylcholine, which is the excessive activation of the parasympathetic nervous system (29). Treatment recommendations include administering numerous boluses of atropine or receiving infusion therapy until pulmonary secretions are reduced to a minimum, followed by endotracheal intubation if required (30). Inadequate atropinization is the most common factor that contributes to unsuccessful treatment (4). It is possible that inadequate atropinization is a contributing factor in the high rates of both aspiration pneumonia and death (7). Pralidoxime is a biochemical antidote for OPP; its positive effects include reactivation of cholinesterase by cleavage of phosphorylated active sites, direct response and detoxification of unbounded OPCs, and an endogenous anticholinergic effect. Pralidoxime is a biochemical antidote for OPP (5). This treatment for OPP also applies to the emergency treatment for sarin, which is a typical substance used in chemical weapons that are used to kill large numbers of people (31). Within the scope of this particular research project, emergency department (ED) treatment with atropine and pralidoxime was administered to 58.6 and 43.6 percent of patients, respectively. The remaining patients received their treatments at the intensive care unit of the hospital.

The mortality rate associated with acute OPP ranges anywhere from 10 to 20 percent, and the cause of death is typically respiratory failure (6). The first respiratory symptoms, which are mentioned above, as well as RF, always appear during the period of cholinergic crisis, which often begins during the first twenty-four hours after an individual is exposed to OPCs (5). Both the causes of death and the mortality rates of the present patients (9.1 percent) were consistent with what was found in the relevant published literature. We suspect that advanced age may be one of the significant factors affecting death because patients who were over 75 years old made up 25 percent of the dead cases in our study. One possible explanation for this is because aged people have diminished physiological reserves. In conclusion, it is undeniable that OPP is still a significant public health issue in Turkey, as it is in other countries, and that it mostly affects those who are in the reproductive age range. The act of suicide is the driving motivation behind each of these poisonings. We believe that the incidence of OPP can be reduced by making appropriate use of these chemicals, educating the general population about the negative consequences of these compounds, and enforcing legal rules that prevent the uncontrolled selling of these compounds.

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