Poisonings at Nepal Medical College Teaching Hospital

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ABSTRACT
Poisoning is an increasingly common social problem in Nepal. Studies on poisoning in semi urban areas of Nepal are minimal. Here we present a prospective study of poisoning in semi urban area of capital, Kathmandu lasting for six years duration. Altogether there were 354 cases of various poisoning, admitted in Nepal Medical College Teaching Hospital from Baisakh 2062 (April 16, 2005) to Chaitra 2067 (April 15, 2011). Male: Female ratio was 135:219 (1:1.6) and Age± SD was age 29.3± 13.8 years. Age group (20-29 years) comprised of 138 patients (38.9% followed by < 20 years age group (92, 25.9%). Brahman chhetri (150, 42.4%) and Mongolian (146, 41.2%) ethnic groups were the main sufferers of poisoning, followed by newars (41, 11.6%) patients. Deliberate self harm was the cause for poisoning in maximum number of patients (156, 44.1%), followed by depression (64, 18.1%) and accidental poisoning (42, 11.9%). Organophosphorus (152, 42.9%), medicines (71, 20.1%), and rodenticide poisoning (38, 10.7%) were common poisons. Metacid (Methyl parathion) (46, 15.5%) was the most popular brand of poisoning agent used in Nepal for suicidal purpose. The over all mortality rate of poisoning in general was 7.1% with organophosphorus poisoning topping the list (19, 12.5%). We also present mad honey poisonings in a small group of 9 (3.2%) patients with M:F 8:1, age 26.5±8.8 years. Due precaution should be undertaken during their management as some of them may go into cardiopulmonary arrest and should not be considered benign when more than 5 tablespoonful wild honey is consumed.

Keywords: Poisoning, organophosphorus poisoning, mad honey poisoning, grayanotoxin, deliberate self harm.

INTRODUCTION
Every year, almost one million people die from suicide with a "global" mortality rate of 16 per 100,000. In the last 45 years suicide rates have increased by 60% worldwide. Suicide is among the three leading causes of death among those aged 15-44 years in some countries.1

Studies on poisoning in semi urban areas of Nepal are rare.2-5 Here, we present a prospective study of poisoning in semi urban area, Jorpati village development committee, (JVDC) of the capital, Kathmandu lasting for six years duration. This may be the largest prospective study performed in poisoning in Nepal. Out of them, we also observed a small group of poisoning due to mad honey poisoning, which is considered rare and limited to few case reports in Nepal.6,7

PATIENTS AND METHODS
This was a prospective study of poisoning in semi urban area (Jorpati VDC) of the capital of Nepal. Altogether there were altogether 354 patients suffering from various poisonings during the six years observation period from Baisakh 2062 (April 16, 2005) to Chaitra 2067 (April 15, 2011) were admitted in Nepal Medical College Teaching Hospital (NMCTH) during the period, were enrolled as study subjects. Charts of the patients were used for socio-demographic assessment and clinical parameters evaluation. Ethnic group-wise distribution, age-group wise distribution, poisoning agent consumed, reason for poisoning and their out comes were evaluated. As a subgroup analysis of a small group of mad honey poisoning was also performed with the evaluation of age, gender, amount of mad honey consumed, clinical features of mad honey poisoning, treatment given and outcome of treatments.

RESULTS
There were altogether 354 patients suffering from various poisonings during the six years observation period in NMCTH. Male: Female ratio was 135:219 (1:1.6). Mean age ± SD was 29.3 ± 13.8 years.

Age and gender wise distribution of poisoning is shown in Fig. 1. Age group (20-29 years) comprised of largest number of patients (138, 38.9%) followed by < 20 years age group (92, 25.9%). Poisonings were more common in females in almost all age groups except the age group of 50-59 years (Fig. 1).

Ethnic group wise distribution of various poisonings in NMCTH is shown in Fig. 2. Brahman chhetri (150, 42.4%) and Mongolian ethnic group (146, 41.2%) were the main sufferers of poisoning followed by newars (41, 11.6%).
Poisoning agents used in NMCTH is shown in Fig.3. Organophosphorus poisoning (150, 42.4%), drugs (71, 20.1%) and rodenticides (40, 11.3%) were common poisons. Metacid (Methyl parathion) is the most popular brand for poisoning agent used in our study (61, 17.2%). Other common agents are cypermethrine (6, 4.5%), zinc phosphide (13, 3.7%) and paracetamol (21, 5.9%).

Reasons for poisoning are shown in Table-1. Deliberate self harm (156, 44.1%) was the commonest cause for poisoning, followed by depression (64, 18.1%) and accidental poisoning (42, 11.9%). Deliberate self harm was 3 times more common in females (Male: Female = 39: 117 or 3:1).

Outcome and Poison wise mortality rates at NMCTH are shown in Table-2.

Organophosphorus is the most common poisoning agent used in NMCTH with the maximum mortality (19, 12.7%).

Table-3 shows summary of a small group of 9 patients suffering from wild honey poisoning in Nepal Medical College Teaching Hospital. Nine patients were admitted in Nepal Medical College Teaching Hospital during Baisakh 2062 (April 16, 2005) to Chaitra 2067 (April 15, 2011). Male female ratio was 8:1 and mean age ± SD was age 26.5 ± 8.8 years. Some even attempted to consume 10 tablespoonful or more of wild honey and almost died of severe intoxication. Table-3 shows age, gender, amount of honey consumed, symptoms developed and medications given to resuscitate them.

**DISCUSSIONS**

Poisoning is an increasingly common social problem in developing countries like Nepal. Studies on poisoning in semi urban areas of Nepal are rare. This prospective study of poisoning elaborated various aspects of poisoning around Jorpati VDC situated in semi urban area of the capital, Kathmandu lasting for six years duration. This may be the largest prospective study of poisoning in Nepal.

Poisoning was noted more in females in all age groups as shown in Fig.1 with overall male: female ratio being 1:1.6. Similar higher prevalence of poisoning in females were previously reported. The reason for this finding may be that females were more emotionally unstable. They were usually economically dependent on males. They were more sufferers of domestic violence as well. Multi-marriage is quite common in Mongolian ethnic group. Indian report however, showed higher rates of poisoning of males (93:55) in comparison to females. It

**Table-1: Reasons for poisoning in NMCTH**

<table>
<thead>
<tr>
<th>Causes for poisoning</th>
<th>n</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliberate self harm</td>
<td>156</td>
<td>44.1</td>
</tr>
<tr>
<td>Depression</td>
<td>64</td>
<td>18.1</td>
</tr>
<tr>
<td>Accidental</td>
<td>42</td>
<td>11.9</td>
</tr>
<tr>
<td>Substance dependence syndrome</td>
<td>30</td>
<td>8.5</td>
</tr>
<tr>
<td>Adjustment disorder</td>
<td>28</td>
<td>7.9</td>
</tr>
<tr>
<td>Acute stress reaction</td>
<td>4</td>
<td>1.1</td>
</tr>
<tr>
<td>Psychosis</td>
<td>12</td>
<td>3.4</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>9</td>
<td>2.5</td>
</tr>
<tr>
<td>Homicide</td>
<td>9</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>354</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table-2: Poison wise mortality rates at NMCTH**

<table>
<thead>
<tr>
<th>Poisoning agents consumed</th>
<th>n</th>
<th>Death</th>
<th>Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organophosphorus</td>
<td>150</td>
<td>19</td>
<td>12.7</td>
</tr>
<tr>
<td>Rodenticides</td>
<td>40</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Medicines</td>
<td>71</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Alcohol</td>
<td>18</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>Chemicals</td>
<td>27</td>
<td>2</td>
<td>7.4</td>
</tr>
<tr>
<td>Mushroom</td>
<td>13</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wild honey</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>21</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>354</td>
<td>25</td>
<td>7.1</td>
</tr>
<tr>
<td>Case</td>
<td>Amount of wild honey consumed (1 tablespoon, 1 tbsp = 15 ml)</td>
<td>Interval between consumption of honey and appearance of symptoms</td>
<td>Symptoms and signs of honey poisoning as observed before hospitalization</td>
</tr>
<tr>
<td>------</td>
<td>------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>1. 25 M</td>
<td>10 tbsp (Half dinner, fried rice, egg after consuming honey)</td>
<td>10 minutes to 90 minutes</td>
<td>Felt nausea, burning sensation in throat, vomiting (4), shortness of breath, gaging breath, anopia, palpitation, blackout, loss of consciousness, rushed to ER in ambulance, gaging breath, with apnoic episodes loss of consciousness dilatation of pupils, not reacting to light, PR = absent ??, BP 60/?? mm Hg, SpO2 2-64%, Chest/CVS/P/A normal, ECG: ST elevation in lead II, III, aVF, suggestive of inferior wall MI in ICU, restless, pupils dilated, reacting sluggishly to light, BP 88/44, 106/78, 106/59 mm Hg Follow up echo suggestive of inferior wall myocardial infarction.</td>
</tr>
<tr>
<td>2. 24 M</td>
<td>8 tbsp (Had full dinner along with honey)</td>
<td>10 minutes to 90 minutes</td>
<td>Burning sensation in throat, flushing of face and body, Dizziness, headache, nausea, vomiting (3), blackouts, sweating, shivering, dryness of mouth and throat, loss of consciousness, vision, diplopia, pupils dilated and sluggishly reactive to light, unconscious, peripheral pulses not palpable, carotid pulse feeble and 35/min, BP not recordable. In ICU: PR = 64/min, BP 100/60 mm Hg, Sp O2 92%, pupils: dilated and reacting sluggishly to light, dizziness, diplopia, chest/CVS/P/A normal.</td>
</tr>
<tr>
<td>3. 24 M</td>
<td>5 tbsp</td>
<td>1 hour</td>
<td>Vomiting (3 episodes), diplopia, dizziness, blurring of vision, blackouts, loss of consciousness, BP 110/80 mm Hg, PR 82/min, temperature 98° f, Pupils: dilated pupils and reacting sluggishly to light, chest/CVS/P/A normal.</td>
</tr>
<tr>
<td>4. 22 M</td>
<td>3 tbsp</td>
<td>1 hour</td>
<td>Dizziness, blurring of vision, Dilated pupils which is sluggishly reacting to light, Chest/ CVS/ P/A normal.</td>
</tr>
<tr>
<td>5. 22 M</td>
<td>3 tbsp</td>
<td>1 hour</td>
<td>Dizziness, blurring of vision, vomiting bradycardia (78/min), hypotension (10070 mm Hg) temperature 97° f, Chest/CVS/P/A normal. Drowsy for 1 hour.</td>
</tr>
<tr>
<td>6. 23 M</td>
<td>2 - 3 tbsp</td>
<td>90 minutes</td>
<td>Vomiting (2 episodes), dizziness, diplopia, blurring of vision, bradycardia (48/min), hypotension (80/40 mm Hg), Pupils: dilated and reacting sluggishly to light, Chest/CVS/P/A normal.</td>
</tr>
<tr>
<td>7. 24 M</td>
<td>2 - 3 tbsp</td>
<td>90 minutes</td>
<td>Vomiting, dizziness, diplopia, blurring of vision, bradycardia (48/min), hypotension (80/40 mm Hg), Temperature 97° f, Pupils: dilated and reacting sluggishly to the light, Chest/CVS/P/A normal.</td>
</tr>
<tr>
<td>8. 33 M</td>
<td>20 ml</td>
<td>1 hr</td>
<td>Epigastric pain, dizziness, blurring of vision, weakness, chest pain, vomiting 5 times, fall on the ground, PR = 56/min, BP=90/60 mm Hg, repeat PR = 32/min, pr 112/min, BP = 150/110mm Hg after inj atropine, RR = 24/min, Chest/CVS/P/A normal.</td>
</tr>
<tr>
<td>9. 48 F</td>
<td>20 ml</td>
<td>1/2 hr</td>
<td>Vomiting, loose stool, headache, vertigo, epigastric pain, semiconscious, PR = 80/min, RR= 20 min BP = 88/66 mm Hg, PR= 84/min, BP= 60/40mm Hg, Sp O, 90 without O.</td>
</tr>
</tbody>
</table>
may be related with higher stressful lives in India than in Nepal. Presence of dowry (dahej) system draining fathers or brothers of a bride financially. This social problem may have resulted in higher abortion of daughters intrauterine and tilting the natural balance of males and females in their society.

Brahmani/chhetri (150, 42.4%) and Mongolian ethnic group (146,41.2%) were the main sufferers of poisoning, followed by newars (41, 11.6%) as shown in fig 2. Poverty and illiteracy/ ignorance could be the cause. Higher prevalence of rampant poverty, illiteracy and family problems (especially marital disharmony, early marriage, extramarital affairs, multiple marriages, were quite common among immigrant Mongolian people residing around NMCTH. Despite being quite close to mongolian communities, poisoning in newars seems a bit low probably because of better family support and economic prosperity among newars.

Organophosphorus poisoning and rodenticides were common poisoning agent used in Nepal (Fig.3). This finding is compatible with other papers from Nepal. The cause for it could be due to easy availability of organophosphorus and rodenticides in the general shops or agricultural depots. Among all poisoning agents, Metacid (Methyl parathion) was the most popular brand of organophosphorus followed by Nuvan and cypermethrine. Zinc phosphide (rodenticide) was also commonly used because of its easier access and availability. Medicinal poisoning had reached to second position (Fig.3). This finding may support the changing health scenario with increased hospitals, medical shops and easier access of various medicines to general people.

Prevention of poisoning by restrictions in access to dangerous means for suicide were likely to play an important role in reducing suicide rates in Denmark, especially for women. To prevent easy access, substances like organophosphorus and rodenticides should not be sold to younger females (up to 40 years). Rules mimicking sales of liquor banning to under age groups may be useful for controlling poisoning in younger females. Uncontrolled and unrestricted sales of almost all medicines as over the counter medicines should be closely supervised and restricted to the real needy patients with prescriptions so as to control poisoning with medicines. Limiting amount of psychotropic medicines may be beneficial to avoid poisoning or overdose of psychotropic medicines to psychiatric patients.

Causes for poisoning in NMCTH is shown in Table-2. Almost all cases of poisoning were related to some psychiatric illnesses or susceptibility towards them. Deliberate self harm (156, 44.1%) was the commonest cause of poisoning in NMCTH. Similar report has been reported from western Nepal. Poisoning (89.6%) was the most preferred method of deliberate self-harm. 11 Deliberate self harm was 3 times more common in females (Male: Female = 39: 117 or 3:1)

Depression (64, 44.1%) and adjustment disorder (28, 7.9%) were other causes for poisoning. Depression and psychosocial stress were previously reported as important causes of suicide. Psychiatrist consultation and support is hence very crucial in the management of poisoning in Nepal. Homicidal poisonings (9, 2.5%) were mainly confined to the efforts made by robbers to rob people by giving some juice mixed with unknown substance to drink or some sweets mixed with unknown substance to eat. Accidental poisoning was found in a significant number (42, 11.9%).

Mortality rate due to poisoning has been reported to be only 1% to 2% in developed countries but in developing countries it is 15% to 30%. Mortality rate of acute poisoning in NMCTH was 7.1%. It is a bit higher in comparison to previous report of 5.5% and 5.6%. The reason may be due to poverty and ignorance of the local inhabitants. Mongolian ethnic group (e.g. Tamangs) immigrated from rural area (e.g. Sindhupalchokw) to the nearby locality of NMCTH for working in local carpet factories. They may have rampant poverty and social ignorance, resulting in delay in treatment of poisoning and many times, leaving hospital without medical advices are quite common. Other hospitals are located in more affluent societies. Organophosphorus had the maximum mortality (Table 2). Mortality in organophosphorus poisoning is still higher than other reports. This finding may probably due to rampant poverty, social ignorance, disorganized traffic jams and lack of efficient ambulance facilities resulting in the delay to rush for emergency management of poisoning and many times leaving hospital without medical advice even after hospitalization.

![Fig. 3. Poisoning agents used in NMCTH](image-url)
Higher mortality rate observed in patients intoxicated with alcohol (Table-2) may be due to other concomitant disease with poor prognosis such as cirrhosis of liver. This finding is not strange in the background of excessive alcohol consumption in the Mongolian people residing around the NMCTH.

Honey has been used since ancient times for several of its nutritive and therapeutic properties. It is an effective antitussive,12 improves glycemic control,13 has cardio protective and vasoactive properties.14 It has hepatoprotective, renoprotective effects as well15 as gastroprotective effect.16 It has antioxidant effect with better radical scavenging activity.17,18 It has antibacterial effects as well19,20 Honey is found to be useful in wound healing.21, 22 Honey enhances immune function and has anti tumor activity.23,24

Wild honey intoxication, also called as rhododendron poisoning or mad honey poisoning, is caused by the consumption of honey produced from the nectar of rhododendrons.25 It is usually seen in the Black Sea region of Turkey.26-29 Mad honey poisoning causes especially various cardiac effects such as hypotension, bradycardia, complete heart block, nodal rhythm.30-34 They can be managed with short observation in emergency department or intensive care unit.32 Sometimes it can also cause acute myocardial infarction.33

Honey intoxication in the land of rhododendron should be common, however, their reporting in hospitals of Nepal is not common and are limited to few case reports only.6,7 Our report of 9 cases of mad honey poisoning (Table-3) may be the largest number of mad honey poisoning in Nepal. Male female ratio was 8:1 and mean age ± SD was age 26.5 ± 8.8 years. Majority of patients were few adventure seeking young medical students who despite warning of the possibility of getting drowsy just like alcohol, consumed wild honey in unusually large amount at the peak time of hunger just before having their dinner after whole day of heavy physical exertion during the festival of colors (Holi). Some even dared to consume 10-15 tablespoonful of wild honey and almost died of severe intoxication. After 10 to 90 minutes, patients developed various symptoms ranging from mild gastric irritation to extreme bradycardia, hypotension and loss of consciousness. They had to be resuscitated with cardiopulmonary resuscitation and some emergency medicines such as atropine, adrenaline, dopamine infusion, intravenous fluids. Some of the extremely symptomatic patients were initially considered to have suffered from anaphylactic reaction to wild honey by the emergency on duty doctor and treated accordingly. Later on, they were treated with atropine along with parenteral fluids and other symptomatic treatments.

Luckily all patients could be saved as they reside near the hospital and were immediately brought to hospital emergency department. Some patients with minimal poisoning with 2-3 tablespoonful mad honey could be simply resuscitated with just parenteral fluid therapy alone.

Wild honey poisoning may be dangerous if is consumed 5 tablespoonful or more. They may have extreme bradycardia, hypotension, labored breathing, apnoic spells, and loss of consciousness when the amount reaches 10 tablespoonful especially when consumed during fasting period. However, consumption less than 3 tablespoonful may not be that dangerous and may be managed simply by parenteral hydration with or without the need of atropine. Inj. Atropine, parenteral hydration with normal saline were useful to treat them however, some patients with persistent hypotension and bradycardia were treated with inj. Adrenaline and dopamine infusion. 24 to 48 hour observation were adequate and were discharged from hospital.

Mad honey poisoning is relatively rare in the Himalayan country Nepal which grows its national flower rhododendron (Lali gurans) along its mountainous region. However, mad honey poisoning may be dangerous due to its severe cardiovascular symptoms like extreme bradycardia, hypotension and fainting. Despite warning of the possibility of getting drowsy just like alcohol, few adventure seeking young medical students attempted to consume wild honey in unusually large amount at the peak time of hunger on fasting state before eating meal. Some even attempted to consume 10 tablespoonful or more of wild honey and almost died of severe intoxication. Over enthusiasm and adventure seeking tendency may end up with death in apparently milder looking honey poisoning.

Poisoning is an increasingly common social problem in Nepal. Use of organophosphorus or rodenticide are common poisoning agent used for suicidal purpose. One of the cause for it may be due to easy accessibility of these agent in local market. Limiting the access to these common poisoning agent in vulnerable age group may be useful step to prevent poisoning. Development of specific manpower like spraying insecticides with all due precautions and not selling insecticides, rodenticides to vulnerable age group (15-40 years) is recommended. There is an urgent need for strict implementation of the pesticide control act, so that it could strengthen the legislature on availability of drugs and poisons in the market. Introducing separate toxicological units in the hospitals and upgrading the peripheral health centres to manage cases of poisoning in emergency could possibly help us to bring down the mortality and morbidity rates.
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