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MISUSES OF MEDICINAL AND AROMATIC PLANTS AS POISONS: A STUDY OF PLANT POISONING CASES IN NEPAL

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ABSTRACT

National forensic science laboratory receives many criminal cases (suicidal, homicidal and accidental) annually for the forensic analysis. Some of these criminal cases have been related to plant poisoning. In last ten years (1997-2006), 70 cases have been reported as plant poisoning in forensic laboratories of Nepal. Present paper describes the cause and nature of mostly misused plants like *Aconitum* (Bikahma), *Thevetia peruviana* (Pahelo karbir), *Datura* sp. (Dhatura) etc.

Key words: Medicinal and aromatic plants, plant poisons, forensic analysis.

INTRODUCTION

Over time, as modern scientific methodologies emerged, herbal remedies began to lose their popularity. As the 20th century progressed and modern medicine was making some of its most significant impacts on society, the dark side of technology was forging a crack in the foundation of modern science. Due to this, people are attracted towards “back to nature” fundamentalism. The wealth of medicinal and aromatic plants may be considered as one of the major natural resources to uplift the economic development of Nepal. Due to the physiographic diversity of Nepal, many kinds of plants and herbs grow here and large numbers of them have been used for medicinal purposes (Chaudhary 1998). Medicinal plants are of interest not only because they are used as medicine but also because they may be misused as poison in

homicidal, suicidal and accidental incidents. Before we describe about aromatic and medicinal plants, with specific reference to their misuses as poisons, it would be appropriate to briefly touch upon the question as what is “poison”. In the biological context, poisons are substances that can cause damage, illness, or death to organisms, usually by chemical reactions or other activity at the molecular scale (Modi 1998). According to Paracelsus, widely regarded as the father of modern toxicology, all things are poison and nothing is without poison: only the dose makes a thing a poison (Casarett and Doulls 2007). A key principle in toxicology is the dose response relationship.

Over the past few years deaths attributed to the use/misuse of medicinal plants have increased. The vast majority of herbal products are deficient in

appropriate toxicological analysis. The misconception is that these “all natural” remedies are safe. Nowadays, owing to the growing conception of toxicology i.e. plant poisoning; misuses of medicinal and aromatic plants have been increasingly popular and concerned subject to toxicologists, chemists and public health authorities. From the remote past to present time human beings have misused the plant products for the purpose of homicide suicide, abortion and drug addiction (Bhandari and Shrestha 1985, Vij 2002). Many accidental deaths and illness of human beings, cattle and other animals have been frequently reported due to misuse of plants in different parts of Nepal (Bhandari and Shrestha 1985).

Causes of misuse of medicinal plants

Misconception, ignorance, criminal intention and accidents are supposed to be the main factors of misuses of medicinal plants as poison (Vij 2002).

Misconception: Many people use plant products as medicines without sufficient knowledge. They do not have adequate information, as some medicinal plants may be highly poisonous. Misconception among people is cause for the misusing of medicinal and aromatic plants as poisons.

Ignorance: Many people are unknown about toxicity of plant. Amount of toxicity varies in different parts of the same plant. Hence, all parts of the plant may not have necessarily been medicinal value. For example, young stems of Sajiwan (*Jatropha curcus*) are used by local people as hygienic toothbrush but seeds of same plant are highly poisonous (Bhandari and Shrestha 1985, Modi 1988). Similarly, leaves of yellow oleander (*Thevetia peruviana*) are used as fodder for goats

but fruits are highly poisonous (Modi 1988). Young shoots of Angeri (*Lyonia ovalifolia*) are highly poisonous for cattle but toxicity of shoot gradually decreases with maturation (Bhandari and Shrestha 1985, Shrestha and Dhillion 2003). Actually dose, type and nature of victims, active parts of the plant stage of growth and development, and other environmental parameters are the factors that influence the toxicity of plants (Bhandari and Shrestha 1985).

Accidental poisoning: In rural areas of Nepal hundreds of plant species are used as fodder for livestock. Fodder poisoning of livestock happens frequently in such rural areas. For example accidental poisoning of cattle by ingesting the young shoots of Angeri (*Lyonia ovalifolia*), Kalosiris (*Albizia chinensis*), Bakaino (*Melia azedarach*), etc. are common in rural areas (Bhandari and Shrestha 1985). Similarly, severe accidental poisoning to humans has been reported due to confusion about toxic plant and medicinal plants.

Poisoning due to criminal intention: Many cases of homicide, suicide and abortion have been reported for abusing the plants like Aconitum (*Aconitum ferox*), Dhaturu (*Datura stramonium*), Yellow oleander (*Thevetia peruviana*), Darsan pepale (*Colocasia* sp.) etc (Modi 1988, Joshi and Joshi 2000). Some persons are involved intentionally in fish poisoning by using the toxic plants like Pire jhar (*Polygonum hydropiper*) and Ratopire (*Polygonum viscosum*) (Annual Progress Reports 1997-2006a, Kulakkattolickal 1989). Similarly, Chitu (*Plumbago zeylanica*), and Tama bans (*Dendrocalamus hamiltonii*) have been misused intentionally as aborticides in rural area (Vij 2002, Joshi and Joshi 2000). The brief view of type and nature of plant poisoning is given in Table 1.

Table 1. Medicinal and aromatic plants.

SN	Scientific Name	Local Name	Active principle	No. of Cases	Type of cases			
					Homicidal	Suicidal	Accidental	Others
1	<i>Thebetia peruviana</i>	Pahelo karbir	Thevetine/ Thevetoxine	7	3	2	1	1
2	<i>Aconitum ferox</i>	Aconite/Setobikh	Aconitine/ Pseudoaconitine	6	1	4	1	-
3	<i>Colocasia</i> sp	Darsan peepal	Calcium oxalate	4	3	3	1	-
4	<i>Datura stramonium</i>	Dhaturo	Atropine/ Scopolamine	6	2	1	1	-
5	<i>Nux vomica</i>	Kuchila	Strychnus	2	1	1	-	-
6	<i>Jatropha curcas</i>	Sajiwan	Curcin	1	-	-	-	-
7	<i>Plumbago zeylanica</i>	Chitu	-	2	-	-	-	2
8	<i>Lyonia ovalifolia</i>	Angeri	Andromedotoxin	2	-	-	2	-
9	<i>Melia azedarach</i>	Bakaino	Azaridine/ Bakayanin/ Benzoic Acid	1	-	-	1	-
10	<i>Poligonum viscosum</i>	Rato pire	-	1	-	-	-	1
11	<i>Poligonum hydropiper</i>	Pire jhar	-	2	-	-	-	2
12	<i>Albizzia chinensis</i>	Kalo siris	Saponin	1	-	-	-	1
13	<i>Dendrocalamus hamiltonii</i>	Tama bansh	Saponin	1	-	-	-	1
14	Unidentified poisonous glycosids	-	-	16	2	2	4	8
15	Unidentified poisonous alkaloids	-	-	18	1	2	3	12

Source: (1) Annual Progress Reports 1997-2006a,b; (2) Bhandari and Shrestha 1985.

Plant poisoning cases in Nepal

In Nepal two forensic laboratories are involved in the scientific analysis of biological samples (blood, urine, viscera, vomits etc) and other physical evidences including plant products. One is National Forensic Science Laboratory (NFSL), which is running, as an autonomous organization under the ministry of environment, science and

technology and another laboratory is Central Police Science Laboratory (CPSL), which is running under the Ministry of Home Affairs. Toxicology sections of both laboratories receive different type of samples related to criminal cases for the toxicological analysis from all over the country. National Forensic Science Laboratory receives the sample related to clinical cases as well. In this paper only the data of the plant

poisoning cases of last 10 years (1997 to 2006) from both laboratories are included. In the last ten years, 70 cases have been reported as plant poisoning cases; mostly suicidal, homicidal, accidental deaths were reported (Annual Progress Reports 1997-2006a,b). In few cases plant products were misused as aborticides.

In the laboratories suspected samples were received through different sources like police authority, National parks, Hospitals, custom offices, veterinary departments and from public directly (Annual Progress Reports 1997-2006a,b). Nature of samples requested for the analysis were biological (viscera, vomit blood and urine) and physical samples like suspected plant products, fodders, etc.

Out of the 70 plant poisoning cases, 28 cases were related to homicidal and suicidal. In 6 cases Plants were misused as aborticides. Similarly, 15 cases have been reported as accidental poisoning mainly in cattle. In 8 cases, persons were intentionally involved in fish poisoning by using plant products. In remaining 13 plants poisoning cases nature of incident could not be ascertained.

After Laboratory analysis, it was found that plants like Pire jhar (*Polygonum hydropiper*), Rato pire (*Polygonum viscosum*) and Khirro (*Sapium insigne*) were misused intentionally for fish poisoning. Aconite (*Aconitum ferox*), Dhaturu (*Datura stramonium*), Yellow oleander (*Thebetia peruviana*), Darsan pepale (*Colocasia* sp.), Sajiwan (*Jatropha curcas*) and Kuchila (*Nux vomica*) were misused for the purpose of homicide and suicide. Angeri (*Lyonia ovalifolia*), Kalosiris (*Albizia chinensis*), Bakaino (*Melia azedarach*) and Dhaturu (*Datura stramonium*) were accidentally used as fodder for cattle. In one case, Dhatura was accidentally used as vegetable by members of one family due to confusion. Tama bans (*Dendrocalamus hamiltonii*) and Chitu

(*Plumbago zeylanica*) were misused as aborticides. Out of 70 plants poisoning cases, individual plants and their active principals were identified only in 36 cases. In remaining 34 cases, only poisonous glycosides and alkaloids have been ascertained but individual alkaloids and glycosides could not be identified.

CONCLUSION

Maximum public awareness about the medicinal plant is important to prevent the misuse of plants.

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