Review Article
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Forensic Applications of Indian Traditional Toxic Plants and their Constituents

Abstract

Poisonous plants contain various biologically active phytochemicals that may be harmful to living organism if come in contact. Due to the presence of wide number of phytochemicals constituents (including digitoxin, colchicines and atropine etc.) these poisonous plants have also been found to be useful in treating various diseases. There are number of toxicologically significant phytochemicals (including proteins, oxalates, glycosides, terpenes, phenolics, alkaloids, anthocyanins, proteins, glycosides and resins etc.). These plant derivatives are used as silent naturally occurring biological bioweapons which may destroy life mysteriously without any violence. Poisonous plants which cause serious problems or even death are considered as biological weapons. These are the first choice of professional poisoners in toxicological crime because of their easy availability and having no cost. These plant derived naturally occurring biological weapons were also used by criminals in burglary, rape and murder cases. In India, there are so many cases where criminals use these products by mixing in food material or/and contact to victim's body in the buses/trains. The toxic constituents of many of such plants need to be properly recorded to develop a prefect database to be utilized in forensic analysis and identification of specific causal agents. This review is an endeavour to present an updated account of forensically important Indian traditional toxic plants and their chemical ingredients commonly used by the criminals to commit different crimes.

Keywords: biological weapons, toxic plants, forensic analysis, forensic toxicology, plant poisoning, phytochemical constituents

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Introduction

In ancient times, the primitive human beings might have come across poisonous plants and learned to distinguish between toxic and non toxic plant species by hit and trial error. Poison is defined as a substance which has the capacity of acting deleteriously on human health. The poisonous plants have been used for the assassination, suicide, murder and execution since ancient time if a small quantity of its stem, leaves, seeds, fruits and roots are ingested.[1,2] Poisons could be categorised in two distinct divisions according to their origin:

i. Natural poisons (produced by species of bacteria, fungi, protists, plants and animals) and

ii. Synthetic chemicals manufactured by humans (pesticides, sedative drugs, chemicals, alcohols and household poisons).[3]

An ideal poison should be cheap, easily available, colorless, odorless, tasteless, highly toxic, capable of painless death, signs and symptoms should resemble a natural death, capable of being administered easily either in food/ drink/ medicine and must be rapidly cleared from the victim's body that it could be made undetectable. Poisoning was developed as an important tool/method for crime (murder and suicide). Criminals have used toxic or irritating plants to cause harm to their victims.[4] and if victim left untreated it may lead to death.[1,5,6] The poisonous nature of whole plant or any part of it is due to production of toxic substances.[2] Some plants are normally harmless, but they may become toxic when they are taken in excess.[7]or for a long period of time.[1] Poisoned weapons were used as war tactics of ancient India.[8]Chanakya also known as Kautilya (350-283 BC), was adviser and prime minister to the first Maurya Emperor Chandragupta (340-293 BC), suggested the secret use of poisons / poisoned weapons for political gain.[2] As we know that Hemlock was an Athenian state-poison by which Socrates died.SusrutaSamhitahas elaborated several modes of poisoning and explained how the poisons were mixed with food, drink, honey, sprinkled over cloths, beds, shoes, garlands, jewellary and saddles of horses etc. in ancient India. Now a day, naturally occurring poisons are being frequently used for robbery of travelers, murder and suicide. In forensic work, it can be used as a truth serum. The toxic constituents of many of such plants need to be properly recorded to develop a prefect database to be utilized in the forensic analysis and identification of specific causal agents. A thorough survey of literature indicates that not much work has been carried out in this area of research. This review is an endeavour to present an updated account of forensically important Indian traditional toxic plants and their chemical ingredients commonly used by the criminals to commit different crimes.

Discussion

Phytochemical poisoning in India

In India, it was estimated that more than 50,000 people die every year from toxic exposure which was highest in the world.[1,9] The administration of a poison is a criminal offence in India.[5] In law, the difference between a medicine and a poison is based on the intention with which it is given. If the intention is to save life, it is a medicine but if it is given with the intention to cause harm, it is a poison.[2] According to Paracelsus (1493-1541), the father of toxicology said "Everything

is poison, there is poison in everything, only the dose makes a thing not a poison".[10] Now a days, in India mostly poisons are used for robbery and suicidal purposes. The poisoning and robbing of travelers happen to be of frequent occurrence in India. There are more than 4000 species of medicinal plants growing as shrubs, herbs and trees in India; many of which are poisonous when administered in large doses. Suicide in India is very common as poison can be easily obtained and many poisonous plants grow wild e.g. datura, oleanders, aconite, nux vomica, etc. A lot of work has been reported on toxicology of plants, but little work has been done on the study of chemical constituents of plants in terms of forensic context. In the present study, a review has been performed on most of the poisonous plants of India to report the basic details of the plants poisonous parts, toxic chemical constituents, botanical and family names. The salient features of some of the Indian traditional toxic plants have been summarized in Table 1.

Table 1 List of plants having toxic constituents

S. No.	Name of plant	Common Name	Family	Toxic Parts	References
1	*Digitalis purpurealinn*	Yellow broom, fox glove	Terophulariaceae	Seed, leaves and Twigs	11,12
2	*Plumbagorosea*	Raktachitraka	Plumbaginaceae	Root	13
3	*Cerberathevetia*	Yellow oleander and pila kaner	Apocynaceae	All parts especially leaves and fruits	14
4	*Calotropisprocera*	Calotropissps. and madar, akdo	Apocyanaceae	latex	15
5	*Nerium oleander*	White oleander and kaner	Apocynaceae	All parts	14
6	*Semecarpusanacardium*	Marking nut and bhilawa	Anacardiaceae	Juice	16
7	*Dieffenbachia sp.*	Dieffenbachia, dumbcane	Araceae	All parts	17-19
8	*Prunusamygdalus*	Almond, baadam	Rosaceae	Almond	20
9	*Nicotianatabaccum*	Tobacco and tambaku	Solanaceae	All parts except ripe seeds	21-23
10	*Atropa belladonna*	Deadly nightshade	Solanaceae	All parts	24,25
11	*Dhaturafastuosa*	Thorn apple and dhatura	Solanaceae	All parts especially seeds and fruit	26
12	*Erythroxylum coca*	Coke, snow	Linaceae	Leaves	27
13	*Papaver somniferum*	Opium poppy and afim	Papaveraceae	Petals, stem, seeds and ripe dried capsules	28
14	*Argemonemexicana*	Argemone and Sial-kanta	Papaveraceae	All parts especially seeds	29-31
15	*Strychnosnux vomica*	Poison nut and kuchila	Loganiaceae	All parts especially seeds of ripe fruits	32,33
16	*Gloriosa superb*	Superb lily, flame lily and kalihari	Liliaceae	Tubers and roots	34
17	*Abrusprecatorius*	Jequirity, Indian liquorice, gunchi or rati	Leguminosae	Seeds (mainly), root and stem leaves	35
18	*Croton tiglium*	Croton tiglium, Jamal-gota	Euphobiaceae	Seeds and oil	36
19	*Ricinuscommunis*	Castor bean, erandi	Euphorbiaceae	Entire plant especially seeds	37,38

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Table Continues...

S. No.	Name of plant	Common Name	Family	Toxic Parts	References
20	*Cannabis sativa or Cannabis indica*	Indian hemp, hashish	Cannabinaceae	Dried leaves and fruit (Bhang), flowers top of female plant (Ganja), resin of leaves and stems (Charas)	39,40
21	*Aconitum napellus*	Indian aconite, monkshood and mithazahar	Ranunculaceae	All parts especially dried tuberous root	41,42
22	*Aesculushippocastanum*	Horse - chestnut, conker	Hippocastanaceae	All parts especially seeds	43,44
23	*Alocasiamacrorrhiza*	Giant taro, elephant ear	Araceae	All parts	45,46
24	*Antiaristoxicaria*	Upas tree, Antiaris	Moraceae	Leaves and bark	47
25	*Cerbaraodollum*	Dabur , pilikirbir	Apocynaceae	Fruit and seed	48
26	*Citrulluscolocynthis*	Indian wild gourd, bitter cucumber	Cucurbitaceae	Fruit, root and dried pulp	49,50
27	*Cleistanthuscollinus*	NA	Euphorbiaceae	Leaves and bark	51,52
28	*Conium maculatum*	Poison hemlock	Apiaceae	All parts	53,54
29	*Crotolariaspectabilis*	Jhunjhunia	Leguminosae		55
30	*Euphorbia helioscopia*	Sun spurge	Euphorbiaceae	Milky latex	56,57
31	*Lantana camara*	Lantana, bunch berry	Verbenaceae	Entire plant, especially the berries	58,59
32	*Myristicafragrans*	Nutmeg, mace tree	Myristicaceae	Seeds	60,61
33	*Partheniumhysterophorus*	Carrot grass	Compositae	Leaves and seeds	3
34	*Pegnumhermala*	Wild rue	Zygophyllaceae	All parts	62,63
35	*Semecarpusanacardium*	Marking nut and bhilawa	Anacardiaceae	Juice	64

Phytochemicals as bioweapons

The overuse or abuse of the phytochemicalconstituents of medicinal plants may be harmful.[6]The latex containing plants found in families of apocynaceae, araceae, asclepiadaceae, sapotaceae, euphorbiaceae and papaveraceae can be poisonous, may cause serious illness and death may occur if left untreated. Orthophosphoric acid containing plants after coming in contact with skin or mucous membrane cause painful irritation and eruption. Some plants or their part (*Annona squamosa*L. and unripe pineapple) when consumed induce abortion in pregnant women. The chemical analysis of different toxic plants has revealed that they contain different toxic ingredients with varying degrees of activities (Table 1).

Classification of poisonous plants on the basis of chemical constituents

Plants containing alkaloids and glucosides are used as medicines. There are more than 20 groups of chemical constituents (alkaloids, glycosides, saponins, resinoids and mineral compounds) accumulated from the soil, which make a plant or its part to be poisonous. According to their chemical constituents, plant poisons are broadly classified in four groups:

a. Alkaloids

b. Glycosides

c. Toxic proteins and

d. Resins

Which are further sub-divided on the basis of their chemical structure and pharmacological actions (Figure 1). The plants having toxic properties which may be used as biological weapons are listed in Table 1.

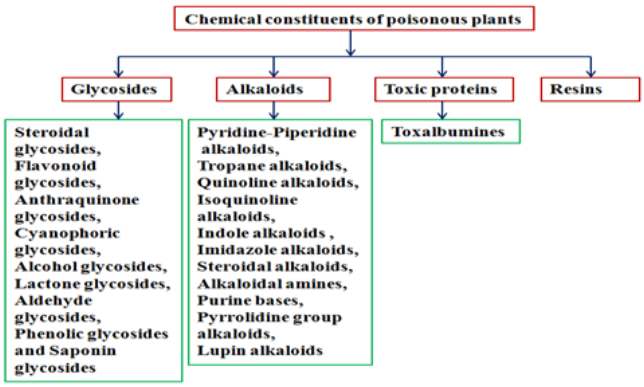

Figure 1 Classification of poisonous plants on the basis of chemical constituents.

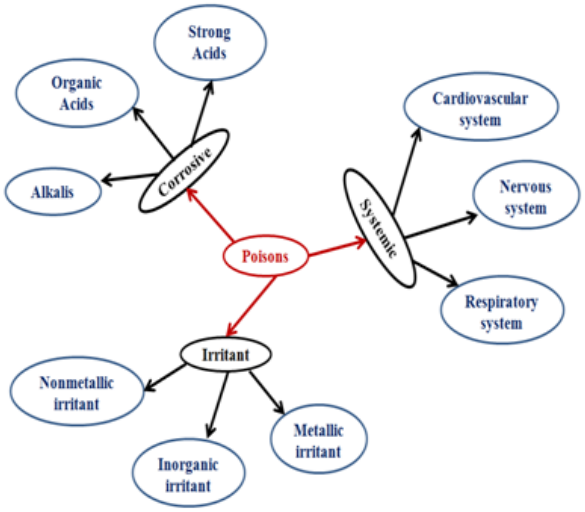

Figure 2 Types of poisons according to nature of poisoning.

Types of poisonous phytochemicals

Plant poisons are the chemical constituents of organic nature, which are naturally synthesised in the plants through their individual cellular activities with the help of enzymes. On the basis of their effect on the body, the plant based poisons are broadly classified in three major groups such as

i. Systemic

ii. Corrosive and

iii. Irritant

Which are sub-divided according to their chemical composition and site of action[1,2,10] that are summarized in Figure 2.

Conclusion

Many species of toxic plants has been reported from different plant families. Mostly the poisonous parts of toxic plants have been reported to be seeds, latex, root, root bark, fruits, stem, stem bark, tubers, bulbs and sometimes whole plant. The data regarding family of poisonous plants, its poisonous part and its active chemical constituents, may be useful in the classification of poisonous plants. There are some plants which have neither medicinal value nor edible. Allergic or less poisonous plants are used in burglary purpose in buses / trains. On crime spot, forensic experts can get evidence related to suicidal, accidental or homicidal poisoning by chemical analysis of plant based poisons. Moreover, symptoms of poisoning may help an investigator to lead the investigation in right direction. This review may be useful to the researchers, scientists and the forensic investigators in detecting and determining the specific plant based principle/material during autopsy material or on the crime spot.

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Conflicts of interest

None.

References

1. Greval SD. Lyon's Medical Jurisprudence for India. (10th edn), Law Publishers (India) Pvt. Ltd, India. 1953.
2. Narayan RKS. Medical Jurisprudence and Toxicology (Law Practice & Procedure). ALT Publications, India. 2005.
3. Qureshi JM, Bano S, Mohammad T, et al. Medicinal potential of poisonous plants of tehsil Kahuta from district Rawalpindi, Pakistan. *Pak J Biol Sci*. 2001;(4):331–332.
4. Khajja BS, Sharma M, Singh R, et al. Forensic study of Indian toxicological plants as botanical weapon (BW): A review. *J Environ Anal Toxicol*. 2011;(1):112.
5. Murari A, Sharma GK. A comparative study of poisoning cases autopsied in LHMC New Delhi and JIP-MER Pondicherry. *J Forensic Med Toxicol*. 2002;(19):19–21.
6. Ballantyne B, Mars TC, Turner P. Fundamentals of toxicology. Gen AppTox, McMillan Press, USA. 1995.
7. Viswanathan N, Joshi BS. Toxic constituents on some Indian Plants. *Curr Sci*. 1983;(52):1–8.
8. Subrahmanyam BV. Modi's Medical Jurisprudence and Toxicology. (22nd edn), Butterworths, India. 1999.
9. Boesche R. Kautilya's Arthasastra on War and Diplomacy in Ancient India. *J Milit Hist*. 2003;(67):9–37.
10. Parikh CK. Textbook of Medical Jurisprudence and Toxicology. (6th edn), CBS publisher, India. 1999.
11. Lin CC, Yang CC, Phua DH, et al. An outbreak of fox glove leaf poisoning. *J Chin Med Assoc*. 73(2):97–100.
12. Vyas A, Bachani N, Thakur H, et al. Digitalis toxicity: ECG vignette. *Indian Heart J*. 2016;68(2):S223–S225.
13. Solomon FE, Sharada AC, Devi PU. Toxic effects of crude root extract of Plumbago rosea (Rakta chitraka) on mice and rats. *J Ethnopharmacol*. 1993;38(1):79–84.
14. Bandara V, Weinstein SA, White J, et al. A review of the natural history, toxinology, diagnosis and clinical management of Nerium oleander (common oleander) and Thevetia peruviana (yellow oleander) poisoning. *Toxicon*. 2010;56(3):273–281.

15. de Lima JM, de Freitas FJ, Amorim RN, et al. Clinical and pathological effects of Calotropis procera exposure in sheep and rats. *Toxicon*. 2011;57(1):183–185.

16. Matthai TP, Date A. Renal cortical necrosis following exposure to sap of the marking-nut tree (Semecarpus anacardium). *Am J Trop Med Hyg*. 1979;28(4):773–774.

17. Adhikari KM. Poisoning due to accidental ingestion of Dieffenbachia plant (Dumb cane). *Indian Pediatr*. 2012;49(3):247–248.

18. Mocking RJ, Schene KM, Maingay-Visser DA. Dieffenbachia poisoning in an infant. Ned Tijdschr Geneeskd. 2015;160:A9750.

19. Altin G, Sanli A, Erdogan BA, et al. Severe destruction of the upper respiratory structures after brief exposure to a dieffenbachia plant. *J Craniofac Surg*. 2013;24(3):e245–e247.

20. Pack WK, Raudonat HW, Schmidt K. Lethal poisoning with hydrocyanic acid after ingestion of bitter almonds (Prunus amygdalus). *Z Rechtsmed*. 1972;70(1):53–54.

21. Hodjat M, Rezvanfar MA, Abdollahi M. A systematic review on the role of environmental toxicants in stem cells aging. *Food Chem Toxicol*. 2015;86:298–308.

22. Riou B, Kongolo G, Djeddi D. Nicotine poisoning from patch application a pediatric case report. *Arch Pediatr*. 2015;22(8):895–896.

23. Slotkin TA, Skavicus S, Card J, et al. Developmental Neurotoxicity of Tobacco Smoke Directed Toward Cholinergic and Serotonergic Systems: More Than Just Nicotine. *Toxicol Sci*. 2015;147(1):178–189.

24. Demirhan A, Tekelioğlu ÜY, Yıldız İ, et al. Anticholinergic Toxic Syndrome Caused by Atropa Belladonna Fruit (Deadly Nightshade): A Case Report. *Turk J Anaesthesiol Reanim*. 2013;41(6):226–228.

25. Glatstein M, Danino D, Wolyniez I, et al. Seizures caused by ingestion of Atropa belladonna in a homeopathic medicine in a previously well infant: case report and review of the literature. *Am J Ther*. 2014;21(6):e196–e198.

26. Quek KC, Cheah JS. Poisoning due to ingestion of the seeds of kechubong (Datura fastuosa) for its ganja-like effect in Singapore. *J Trop Med Hyg*. 1974;77(5):111–112.

27. Zimmerman JL. Cocaine intoxication. *Crit Care Clin*. 2012;28(4):517–526.

28. Carod Artal FJ. Neurological syndromes associated with the ingestion of plants and fungi with a toxic component (II). Hallucinogenic fungi and plants, mycotoxins and medicinal herbs. *Rev Neurol*. 2003;36(10):951–960.

29. Babu CK, Ansari KM, Mehrotra S, et al. Activation of inflammatory response and apoptosis of polymorphonuclear leukocytes in patients with argemone oil poisoning. *Chem Biol Interact*. 2010;183(1):154–164.

30. Babu CK, Khanna SK, Das M. Antioxidant status of erythrocytes and their response to oxidative challenge in humans with argemone oil poisoning. *Toxicol Appl Pharmacol*. 2008;230(3):304–311.

31. Babu CK, Ansari KM, Mehrotra S, et al. Alterations in redox potential of glutathione/glutathione disulfide and cysteine/cysteine disulfide couples in plasma of dropsy patients with argemone oil poisoning. *Food Chem Toxicol*. 2008;46(7):2409–2414.

32. Prat S, Hoizey G, Lefrancq T, et al. An unusual case of strychnine poisoning. *J Forensic Sci*. 2015;60(3):816–817.

33. Fernando K, Jayasekara K, Warushahennadi J, et al. Intentional ingestion of Strychnos nux-vomica seeds causing severe muscle spasms and cardiac arrest: a postmortem report. *Wilderness Environ Med*. 2015;26(1):101–102.

34. Kande VCJ, Ekanayeka R, Wijewardane DK. Case report: a rare case of attempted homicide with Gloriosa superba seeds. *BMC Pharmacol Toxicol*. 2016;17(1):26.

35. Patil MM, Patil SV, Akki AS, et al. An Arrow Poison (Abrus Precatorius) Causing Fatal Poisoning in a Child. *J Clin Diagn Res*. 2016;10(3):SD03–SD04.

36. Luo H, Lv XD, Wang GE, et al. Anti-inflammatory effects of anthocyanins-rich extract from bilberry (Vaccinium myrtillus L.) on croton oil-induced ear edema and Propionibacterium acnes plus LPS-induced liver damage in mice. *Int J Food Sci Nutr*. 2014;65(5):594–601.

37. Martínez MA, Martínez SL, Margarit SA, et al. Poisonous plants: An ongoing problem. *An Pediatr (Barc)*. 2015;82(5):347–353.

38. Wang CF, Nie XJ, Chen GM, et al. Early plasma exchange for treating ricin toxicity in children after castor bean ingestion. *J Clin Apher*. 2015;30(3):141–146.

39. Hamilton I. The need for health warnings about cannabis and psychosis. *Lancet Psychiatry*. 2016;3(3):188–189.

40. Rabner J, Gottlieb S, Lazdowsky L, et al. Psychosis following traumatic brain injury and cannabis use in late adolescence. *Am J Addict*. 2016;25(2):91–93.

41. Ge YB, Jiang Y, Zhou H, et al. Antitoxic effect of Veratrilla baillonii on the acute toxicity in mice induced by Aconitum brachypodum, one of the genus Aconitum. *J Ethnopharmacol*. 2016;179:27–37.

42. Chan TY. Aconitum Alkaloid Poisoning Because of Contamination of Herbs by Aconite Roots. *Phytother Res*. 2016;30(1):3–8.

43. Zając M, Wiśniewski M, Sein AJ. Intoxication by powdered seeds of horse chestnut (Aesculus hippocastanum) used nasally as snuff - a case report. *Przegl Lek*. 2014;71(9):502–503.

44. Jiang N, Xin W, Wang T, et al. Protective effect of aescin from the seeds of Aesculus hippocastanum on liver injury induced by endotoxin in mice. Phytomedicine. 2011;18(14):1276–1284.

45. Chan TY, Chan LY, Tam LS, et al. Neurotoxicity following the ingestion of a Chinese medicinal plant, Alocasia macrorrhiza. *Hum Exp Toxicol*. 1995;14(9):727–728.

46. Lin TJ, Hung DZ, Hu WH, et al. Calcium oxalate is the main toxic component in clinical presentations of alocasis macrorrhiza (L) Schott and Endl poisonings. *Vet Hum Toxicol*. 1998;40(2):93–95.

47. Chuan TK, Han CW. A toxicological study of Antiaris toxicaria (Nu chien tzu). *Chin Med J*. 1949;67(5):261–264.

48. Narendranathan M, Krishna DKV, Vijayaraghavan G. Eelectrocardiographic changes in cerbera odollum poisoning. *J Assoc Physicians India*. 1975;23(11):757–762.

49. Al-Yahya MA, AL-Farhan AH, Adam SE. Preliminary toxicity study on the individual and combined effects of Citrullus colocynthis and Nerium oleander in rats. *Fitoterapia*. 2000;71(4):385–391.

50. Pfab R. Poisoning by Citrullus colocynthis. Unknown to us, a frequent poisonous plant in foreign travel. *MMW Fortschr Med*. 1999;141(31-32):41–42.

51. Kesri R, Joseph J, Henry RA, et al. Cleistanthus collinus poisoning; Diagnostic dilemma and n-acetyl cysteine as a possible treatment option. *J Assoc Physicians India*. 2016;64(1):142.

52. Mohan A, Naik GS, Harikrishna J, et al. Cleistanthus collinus poisoning: experience at a medical intensive care unit in a tertiary care hospital in south India. *Indian J Med Res*. 2016;143(6):793–797.

53. Konca C, Kahramaner Z, Bosnak M, et al. Hemlock (Conium Maculatum) Poisoning In A Child. *Turk J Emerg Med*. 2016;14(1):34–36.

54. Wiart C. A note on Conium maculatum L, the plant that defeated Alexander the Great. *Clin Toxicol (Phila)*. 2014;52(6): 645.

55. Alfonso HA, Sanchez LM, Figeurdo MA, et al. Intoxication due to Crotalaria retusa and C spectabilis in chickens and geese. *Vet Hum Toxicol*. 1993;35(6):539.

56. Schmidt RJ, Evans FJ. Skin irritants of the sun spurge (Euphorbia helioscopia L.). *Contact Dermatitis*. 1980;6(3):204–210.

57. Zayed SM, Farghaly M, Soliman SM, et al. Dietary cancer risk from conditional cancerogens (tumor promoters) in produce of livestock fed on species of spurge (Euphorbiaceae). V. Skin irriitant and tumor-promoting diterpene ester toxins of the tigliane and ingenane type in the herbs Euphorbia nubica and Euphorbia helioscopia contaminating fodder of livestock. *J Cancer Res Clin Oncol*. 2001;127(1):40–47.

58. Sharma OP, Sharma S, Pattabhi V, et al. A review of the hepatotoxic plant Lantana camara. *Crit Rev Toxicol*. 2007;37(4):313–352.

59. Bevilacqua AH, Suffredini IB, Romoff P, et al. Toxicity of apolar and polar Lantana camara L. crude extracts in mice. *Res Vet Sci*. 2011;90(1):106–115.

60. Flam B, Bendz E, Jonsson Fagerlund M, et al. Seizures associated with intentional severe nutmeg intoxication. *Clin Toxicol (Phila)*. 2015;53(9):917.

61. Sein Anand J, Barwina M, Waldman W. Acute intoxication with nutmeg used as a recreational purpose--a case report. *Przegl Lek*. 2013;70(8):693–694.

62. Narasimhan TR, Ananth M, Swamy MN, et al. Toxicity of Parthenium hysterophorus L. to cattle and buffaloes. *Experientia*. 1977;33(10):1358–1359.

63. Sadr Mohammadi R, Bidaki R, Mirdrikvand F, et al. Peganum Harmala (Aspand) Intoxication; a Case Report. *Emerg (Tehran*). 2016;4(2):106–107.

64. Berdai MA, Labib S, Harandou M. Peganum harmala L. Intoxication in a Pregnant Woman. *Case Rep Emerg Med*. 2014;783236.