



Review Article

TOXIDROME THROUGH THE LENS OF AGAD TANTRA: AN AYURVEDIC INTERPRETATION OF TOXIC SYNDROMES - A CONCEPTUAL REVIEW

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ABSTRACT

Toxidrome, a combination of the word "toxic" and "syndrome," refers to a constellation of signs and symptoms that are characteristic of a particular class of toxins. It plays a crucial role in the rapid diagnosis and management of poisoning, especially in emergency settings where immediate identification of the toxic agent may not be possible. Modern toxicology classifies toxidromes into various categories such as cholinergic, anticholinergic, sympathomimetic, opioid, and sedative-hypnotic toxidromes. Although the term toxidrome is not explicitly mentioned in Ayurveda, the classical science of *Agad Tantra* provides a detailed description of *Visha* (poison), its *Lakshana* (clinical manifestations), *Vega* (stages), *Dosha* involvement, and systemic effects. These descriptions show conceptual similarities with the modern concept of toxidromes. Ayurveda emphasizes understanding poisoning based on *Dosha* imbalance, *Sthana* (site of action), and chronic accumulation in the form of *Dushi Visha*. This conceptual review aims to explore and correlate the modern concept of toxidrome with Ayurvedic principles of *Visha Lakshana*, *Dosha Dushti*, and systemic manifestations. The Ayurvedic approach provides a holistic framework for identifying and managing toxic states based on symptom clusters and individualized treatment. Integrating Ayurvedic concepts with modern toxicological understanding may enhance diagnostic accuracy and therapeutic outcomes in poisoning cases. The correlations presented in this review are conceptual and based on similarities in clinical manifestations rather than direct pathophysiological equivalence.

INTRODUCTION

Poisoning is a significant medical emergency and a major public health concern worldwide [8,9,10]. Rapid identification and management of poisoning are essential to prevent morbidity and mortality. In modern toxicology, the concept of toxidrome is widely used to identify poisoning based on characteristic clinical features rather than waiting for laboratory confirmation. A toxidrome is defined as a group of signs and symptoms that consistently occur together following exposure to a particular class of toxic substances [10,11,12]. Recognition of toxidromes enables clinicians to initiate early and appropriate treatment,

including administration of antidotes and supportive care [9,10].

Common toxidromes described in modern medicine include cholinergic toxidrome (seen in organophosphate poisoning), anticholinergic toxidrome (seen in atropine poisoning), sympathomimetic toxidrome (seen in stimulant toxicity), opioid toxidrome (seen in opioid overdose), and sedative-hypnotic toxidrome (seen in sedative overdose) [10,11,12].

Ayurveda, particularly *Agad Tantra*, provides a comprehensive understanding of poisons (*Visha*), their properties, effects on the body, stages of progression, and management [1,3,7]. Classical Ayurvedic texts such as *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya* describe detailed clinical features of poisoning affecting various organs and systems. These manifestations can be correlated with modern toxidrome patterns. Ayurveda emphasizes the role of *Dosha* imbalance (*Vata*, *Pitta*, *Kapha*), *Dhatu*

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involvement, and systemic spread of poison in producing specific symptom complexes. Thus, the concept of toxidrome can be understood through the Ayurvedic framework of *Visha Lakshana* and *Dosha*-based clinical manifestations.

AIM AND OBJECTIVES

Aim

To explore the concept of toxidrome through the Ayurvedic perspective of Agad Tantra and correlate it with classical descriptions of *Visha Lakshana*.

Objectives

- To study the modern concept and classification of toxidromes.
- To explore Ayurvedic descriptions of *Visha Lakshana* and systemic toxicity.
- To correlate toxidrome manifestations with *Dosha* imbalance and Ayurvedic principles.

Major Types of Toxidromes

- To understand Ayurvedic management strategies for toxic conditions.

MATERIALS AND METHODS

This is a conceptual review based on classical Ayurvedic texts and modern toxicology literature. Ayurvedic references include *Charaka Samhita (Kalpa Sthana)*, *Sushruta Samhita (Kalpa Sthana)*, and *Ashtanga Hridaya (Uttara Tantra)*. Modern references include standard toxicology textbooks and peer-reviewed articles related to toxidromes and poisoning.

Modern Concept of Toxidrome

Toxidrome refers to a recognizable pattern of symptoms and signs resulting from exposure to a specific class of toxins. Identification of toxidromes helps clinicians diagnose poisoning rapidly and initiate appropriate treatment [10,11,12].

Table 1: Major Types of Toxidromes and Their Clinical Features

Toxidrome	Clinical Features	Common Causes
Cholinergic	Salivation, lacrimation, excessive sweating, miosis, bronchospasm, bronchorrhea, bradycardia, hypotension, abdominal cramps, diarrhea.	Organophosphates (Chlorpyrifos, Malathion, Parathion) Carbamates (Carbaryl) Nerve agents (Sarin, VX) Physostigmine Pilocarpine Mushrooms (Inocybe, Clitocybe – muscarinic type)
Anticholinergic	Dry skin, dry mouth, hyperthermia, tachycardia, mydriasis (dilated pupils), urinary retention, decreased bowel sounds, confusion, delirium.	Atropine Scopolamine Antihistamines (Diphenhydramine) Tricyclic antidepressants (Amitriptyline) Antipsychotics Datura (Dhatura) Antispasmodics (Dicycloverine)
Sympathomimetic	Hypertension, tachycardia, hyperthermia, agitation, restlessness, tremors, diaphoresis, dilated pupils, seizures.	Cocaine Amphetamines Methamphetamine MDMA (Ecstasy) Ephedrine Pseudoephedrine Theophylline Caffeine (high dose)
Opioid	CNS depression, respiratory depression, miosis (pinpoint pupils), hypotension, bradycardia, decreased level of consciousness, coma.	Morphine Heroin Codeine Fentanyl Tramadol Oxycodone Methadone

Sedative-hypnotic	CNS depression, drowsiness, slurred speech, ataxia, hypotension, respiratory depression (severe cases), coma.	Benzodiazepines (Diazepam, Alprazolam, Lorazepam) Barbiturates (Phenobarbital) Z-drugs (Zolpidem) Alcohol (Ethanol) Chloral hydrate Propofol (clinical setting)
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Source: Adapted from Goldfrank's Toxicologic Emergencies and Poisoning & Drug Overdose. [11,12]

These toxidromes represent specific physiological responses due to receptor-level interactions and neurotransmitter alterations.

Ayurvedic Concept of Visha Lakshana

Ayurveda describes *Visha* as a substance that produces harmful effects in the body due to its inherent properties such as *Tikshna* (sharp), *Ashu* (rapid acting), and *Vyavayi* (quickly spreading)[1,3,7]. *Visha* affects *Doshas*, *Dhatus*, and vital organs, producing characteristic clinical features.

Samanya Lakshana of Sthavara and Jangama Visha

Acharya Charaka has described general symptoms (*Samanya Lakshana*) of *Sthavara* (inanimate/plant and mineral origin) and *Jangama* (animate/animal origin) *Visha*. These symptom clusters can be conceptually correlated with modern toxidromic patterns.

Samanya Lakshana of Sthavara Visha

Jwara (fever), *Hikka* (hiccups), *Dantaharsha* (dental sensitivity), *Galagraha* (choking sensation in throat), *Phenodgama* (frothing from mouth), *Chardi* (vomiting), *Aruchi* (anorexia), *Shwasa* (dyspnea), *Murcha* (fainting)[1,6]. These features suggest acute systemic toxicity involving gastrointestinal, respiratory and neurological systems. Frothing, dyspnea and altered consciousness may resemble cholinergic or neurotoxic toxidromes.

Samanya Lakshana of Jangama Visha

Nidra (excessive sleep), *Tandra* (lassitude), *Klama* (fatigue), *Daha* (burning sensation), *Paka* (suppuration/ inflammation), *Lomaharsha* (horripilation), *Shopha* (edema), *Atisara* (diarrhea)[1,7]. These manifestations indicate inflammatory, neuro-depressive and systemic toxic responses. CNS depression (*Nidra*, *Tandra*) may resemble sedative toxidrome, while *Daha* and *Shopha* reflect inflammatory or allergic toxic reactions.

This classical differentiation of *Sthavara* and *Jangama Visha* demonstrates early clinical grouping of symptom complexes, which aligns conceptually with the modern classification of toxidromes.

Classical References Supporting *Visha Lakshana*

As per *Charaka Samhita* [(Ch. Chi. 23/15–16)]

General symptoms of Sthavara and Jangama Visha include

Jwara (fever), *Hikka* (hiccups), *Dantaharsha* (dental sensitivity), *Galagraha* (choking sensation), *Phenodgama* (frothing from mouth), *Chardi* (vomiting), *Aruchi* (anorexia), *Shwasa* (dyspnea), *Murcha* (fainting)

These clustered manifestations resemble acute toxidrome patterns described in modern toxicology.

As per Sushruta Samhita [Su. Ka. 2/7–1]

Different categories of *Visha* such as *Moola Visha*, *Patra Visha*, *Phala Visha* and others produce specific symptom complexes like: *Udveshta* (twisting pain), *Pralapa* (delirium), *Moha* (stupor), *Jrimbha* (yawning), *Shwasa* (dyspnea), *Daha* (burning sensation), *Atisara* (diarrhea), *Phenodgama* (frothing), *Hridaya Peeda* (cardiac pain)

These descriptions indicate systematic clinical grouping of symptoms, which is conceptually similar to toxidrome identification.[15]

Chronic Poisoning and Dushi Visha

Ayurvedic Perspective

Chronic poisoning is described in Ayurveda under the concept of *Dushi Visha*. According to *Acharya Vagbhata* [A.H. Uttara Tantra 35/34–35], *Dushi Visha* remains dormant in the body and manifests gradually when aggravated by *Dosha* or seasonal factors.

Features include: *Aruchi* (loss of appetite), *Murcha* (fainting), *Chardi* (vomiting), *Gatra Shoola* (body ache), *Twak Vikara* (skin discoloration), *Kshaya* (emaciation), general debility[7].

Dushi Visha is characterized by slow progression and variable presentation, which shows conceptual similarity with chronic toxicity described in modern medicine.

Modern Toxicology Perspective

In chronic poisoning, symptoms develop gradually and may remain concealed for a long time. Common features include weakness, weight loss, gastrointestinal disturbances, restlessness, anxiety, and neurological manifestations. [10,12]

The gradual onset and nonspecific presentation often lead to delayed diagnosis, similar to the Ayurvedic description of *Dushi Visha*. These features resemble chronic toxic syndromes seen in environmental and occupational toxicology.

Ayurvedic Principles of Management

Agad Tantra provides detailed management strategies for poisoning^[1,7].

General Treatment Principles

Vamana (emesis), *Virechana* (purgation), administration of *Agada* (antidotes), *Lepa* (external applications), *Nasya* (nasal therapy), *Dosha*-specific Management, *Dosha* treatment principle, *Vata-Sneha* therapy, *Pitta*-cooling therapy, *Kapha-Lekhana* and stimulation

These treatments help neutralize poison and restore *Dosha* balance.

Dosha-based Interpretation of Toxic Manifestation^[1,7,10]

Vata-dominant poisoning may present with restlessness, tremors and neuromuscular disturbances; *Pitta*-dominant poisoning with burning sensation, sweating and inflammatory features; while *Kapha*-dominant poisoning may manifest as heaviness, lethargy and altered consciousness. These symptom clusters show conceptual similarities with certain toxidromic patterns described in modern toxicology.

Sthana (Organ-based) Manifestations and Toxidrome Correlation

Ayurveda describes that poison affects different organs producing specific symptoms.

Table 2: Organ-based Manifestations of Visha and Their Conceptual Similarity with Modern Toxidromes

Organ/System	Ayurvedic Manifestations	Modern Correlation
CNS	<i>Murcha, Bhrama, Moha, Sanyasa</i>	CNS depression, coma
Heart	<i>Hridrava, Hridspandana, Hridaya Peeda</i>	Tachycardia, arrhythmia
Skin	<i>Daha, Raga, Vaivarnya</i>	Sweating, flushing
Eyes	<i>Dristi Vibhrama, Raga</i>	Miosis, mydriasis
Respiratory system	<i>Shwasa, Kasa, Pranvaha Srotodusti Lakshana</i>	Respiratory depression

Source: Compiled and conceptually interpreted from classical Ayurvedic texts and modern toxicology literature [1,3,7,10]

This supports that Ayurvedic descriptions show conceptual similarity with modern toxidrome patterns.

Adhithana-based Clinical Grouping of Toxic Manifestations: An Ayurvedic Perspective on Toxidromes (Based on Mula, Patra, Phala etc.)

In classical texts, especially *Sushruta Samhita (Kalpa Sthana)*, *Visha* is described according to its *Adhithana*, i.e., the part of the plant from which poison originates- such as *Mula* (root), *Patra* (leaf), *Phala* (fruit), *Pushpa* (flower), *Twak* (bark) etc. Each *Adhithana* produces a specific cluster of symptoms. This classification can be conceptually compared with modern toxidrome patterns.

Table 3: Adhithana-based Clinical Grouping of Toxic Manifestations and Their Toxidromic Interpretation

Visha Adhithana	Classical Features	Toxidromic Interpretation	Example
1. <i>Mula Visha</i> (Root poison)	<i>Udveshta</i> (twisting pain), <i>Pralapa</i> (delirium), <i>Moha</i> (stupor).	Predominantly neurotoxic pattern with CNS involvement, abdominal colic, altered sensorium.	<i>Vatsanabha (Aconitum ferox)</i> - Root toxicity produces neurological manifestations such as confusion, cardiac irregularity and altered consciousness, resembling neuro-cardiotoxic toxidrome.
2. <i>Patra Visha</i> (Leaf poison)	<i>Jrimbha</i> (yawning), <i>Anga-Udveshta</i> (body twisting pain), <i>Shwasa</i> (dyspnea)	Neuromuscular and respiratory toxidrome, possibly correlating with cholinergic or neuro-excitatory states.	<i>Dhattura (Datura stramonium)</i> leaves – produce delirium, restlessness and altered sensorium, resembling anticholinergic toxidrome.
3. <i>Phala Visha</i> (Fruit poison)	<i>Daha</i> (burning sensation), <i>Aruchi</i> (anorexia), <i>Atisara</i> (diarrhea)	Gastrointestinal irritant toxidrome with Pitta predominance.	<i>Bhallataka (Semecarpus anacardium)</i> fruit – causes burning sensation, blistering and gastrointestinal irritation, resembling irritant toxidrome.
4. <i>Pushpa Visha</i> (Flower Poison)	<i>Chardi</i> (vomiting), <i>Adhmana</i> (borborygmi), <i>Moha</i> (stupor)	Mixed gastrointestinal and CNS depressive toxidrome.	Certain toxic flowering plants described in <i>Kalpa Sthana</i> produce nausea, vomiting and altered consciousness, reflecting mixed toxidromic presentation

5. <i>Twak / Sara Visha</i> (Bark or Extract Poison)	<i>Shiroroga</i> (headache), <i>Mukha Durgandha</i> (halitosis), <i>Kaphasrava</i> (mucus secretion)	Systemic irritant pattern with Kapha involvement and mucosal manifestations.	<i>Arka</i> (<i>Calotropis procera</i>) latex/bark exposure – produces irritation, excessive secretions and inflammatory response, resembling secretory-irritant toxidrome.
6. <i>Ksheera Visha</i> (Latex-based Poison)	<i>Phenodgama</i> (frothing), <i>Atisara</i> (diarrhea), <i>Jihva Gaurava</i> (heaviness of tongue)	Secretory toxidrome resembling cholinergic or irritant poisoning.	<i>Snuhi</i> (<i>Euphorbia nerifolia</i>) latex – causes local irritation, excessive salivation and gastrointestinal disturbance, comparable to secretory toxidromic features.
7. <i>Kanda Visha</i> (Tuber/Bulb Poison)	<i>Udara Shoola</i> (abdominal pain), <i>Chardi</i> (vomiting), <i>Daha</i> (burning), <i>Moha</i> (confusion)	Acute gastrointestinal and neuro-irritant toxidrome.	<i>Langali</i> (<i>Gloriosa superba</i>) tuber produces severe vomiting, abdominal pain, and systemic toxicity, resembling irritant-cytotoxic toxidrome.
8. <i>Dhatu Visha</i> (Metal/Mineral Poison)	<i>Vaivarnya</i> (discoloration), <i>Panduta</i> , <i>Daha</i> , <i>Murcha</i> , <i>Gatra Daurbalya</i>	: Systemic metabolic and hematotoxic pattern with chronic progression.	<i>Parada</i> (Mercury) and <i>Haratala</i> (Arsenic compound) - produce chronic toxicity with neurological weakness, discoloration, and multisystem involvement, comparable to chronic syndromes in modern toxicology) [5,7,12,14]

Source: Compiled and conceptually interpreted from classical Ayurvedic texts and modern toxicology literature. [5,7,12,14] comparisons are intended solely as conceptual interpretations.

This *Adhisthana*-based classification demonstrates that classical Ayurvedic scholars recognized distinct symptom clusters depending upon the anatomical source of poison. Conceptually, this shows conceptual similarity with toxidrome grouping based on pharmacological action. Thus, *Mula-Patra-Phala* based classification can be interpreted as an early clinical toxidrome model described in *Agad Tantra*.

DISCUSSION

The modern concept of toxidrome is based on recognizing clusters of clinical features associated with specific toxic agents. This approach allows rapid diagnosis and early management of poisoning. Similarly, Ayurveda describes specific patterns of symptoms caused by *Visha* based on *Dosha* imbalance, organ involvement, and systemic spread.

Certain clinical manifestations described under *Vata*, *Pitta* and *Kapha* predominant states demonstrate conceptual similarities with specific toxidromic patterns. For example, *Vata*-dominant manifestations such as restlessness and tremors may resemble sympathomimetic presentations, while *Kapha*-dominant manifestations characterized by lethargy and altered consciousness may resemble sedative or opioid toxicity. Similarly, *Pitta*-dominant features such as sweating and burning sensation may show similarities with secretory toxic states. These

Furthermore, the Ayurvedic concept of *Dushi Visha* explains chronic toxic states similar to modern chronic toxicity syndromes. Ayurveda also provides individualized treatment based on *Dosha* involvement, which may offer advantages in personalized medicine.

Thus, modern toxidrome patterns may be conceptually interpreted through the Ayurvedic framework of *Dosha*-specific manifestations of *Visha*.

Strengths

Agad Tantra describes distinct symptom clusters based on *Dosha* predominance, organ involvement and the nature of poison. These symptom complexes demonstrate conceptual similarities with modern toxidrome classification, suggesting that Ayurvedic toxicology incorporated a clinical pattern-recognition approach centuries ago.

Limitations

The present correlations are conceptual and based on symptom similarities. Modern toxidromes are defined through receptor-mediated pharmacological mechanisms, whereas Ayurvedic descriptions are based on *Dosha*, *Dhatu* and *Srotas* involvement. Therefore, these correlations should not be considered exact equivalents without further clinical validation.

Future Scope

Future clinical, toxicological and pharmacological studies may help validate these

correlations and contribute to integrative approaches in poisoning diagnosis and management.

CONCLUSION

The concept of toxidrome demonstrates notable similarities with the Ayurvedic understanding of *Visha Lakshana*, *Dosha Dushti* and systemic manifestations of poisoning. *Agad Tantra* provides a holistic framework for recognizing toxic states based on symptom complexes, organ involvement and individualized assessment. These conceptual correlations may contribute to integrative approaches in toxicology and emergency medicine. However, prospective clinical and experimental studies are required to validate these correlations and explore their practical utility in contemporary toxicology.

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