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Endocrine disruptors and their *Agadatantra* perceptions**Ashwini S. Kharate,**

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ashwini.ghogale@gmail.com,**ABSTRACT**

Endocrine disruptors are exogenous substances that interfere with the normal functioning of the endocrine system and lead to adverse developmental, reproductive, neurological, metabolic, and immunological effects in humans and animals. In recent decades, industrialization, pesticide use, plastic pollution, cosmetic chemicals, and food contaminants have increased human exposure to endocrine-disrupting chemicals (EDCs). Modern toxicology recognizes them as significant environmental health hazards. Ayurveda, particularly the branch of *Agadatantra*, provides a unique perspective on chronic low-dose toxicity through concepts such as *Gara Visha*, *Dushi Visha*, *Viruddha Ahara*, and environmental contamination. This article explores endocrine disruptors from both modern scientific and Ayurvedic viewpoints and correlates their toxicodynamic actions with *Agadatantra* principles.

KEYWORDS: Endocrine disruptors, *Agadatantra*, *Gara Visha*, *Dushi Visha*,

Environmental toxins, *Ayurveda*, Hormonal imbalance, Toxicology

INTRODUCTION

The endocrine system regulates growth, metabolism, reproduction, stress response, and homeostasis through hormones secreted by glands such as the thyroid, pituitary, adrenal glands, pancreas, ovaries, and testes. Endocrine disruptors are chemicals that mimic, block, or alter hormonal signaling pathways.

Common endocrine disruptors include:

- Bisphenol A (BPA)
- Phthalates
- Dioxins
- Polychlorinated biphenyls (PCBs)
- Pesticides such as DDT and atrazine
- Heavy metals like mercury and lead
- Cosmetic and pharmaceutical contaminants

These compounds are present in plastics, food packaging, polluted water, industrial waste, pesticides, cosmetics, and household

products. Continuous exposure even at low doses may produce cumulative toxic effects.

In *Ayurveda*, toxic substances affecting bodily tissues gradually and chronically are extensively discussed in *Agadatantra*. The concept of latent poisons accumulating in the body and disturbing physiological balance closely resembles the modern understanding of endocrine disruptors. [5,7]

ENDOCRINE DISRUPTORS: MODERN SCIENTIFIC VIEW

DEFINITION

According to the World Health Organization (WHO), endocrine disruptors are substances that alter functions of the endocrine system and consequently cause adverse health effects in an intact organism or its progeny. [1,2]

MECHANISM OF ACTION [2,3]

Endocrine disruptors may:

1. Mimic natural hormones
2. Block hormone receptors
3. Alter hormone synthesis
4. Affect hormone transport and metabolism
5. Modify gene expression
6. Disturb feedback mechanisms

SOURCES OF EXPOSURE

Source	Examples [1,2,3]
Plastics	BPA, phthalates
Pesticides	DDT, organophosphates
Cosmetics	Parabens
Industrial chemicals	PCBs, dioxins
Heavy metals	Lead, mercury
Food additives	Preservatives, artificial chemicals

HEALTH EFFECTS

Reproductive Disorders [2,3]

- Infertility
- Reduced sperm count
- Polycystic ovarian syndrome (PCOS)
- Endometriosis

Metabolic Disorders [2,3]

- Obesity
- Diabetes mellitus
- Thyroid dysfunction

Neurological Effects [2,3]

- Developmental delay
- Autism spectrum disorders
- Cognitive impairment

Carcinogenic Effects

- Breast cancer
- Prostate cancer
- Thyroid cancer

Immunological Disturbances

- Autoimmune disorders
- Allergic diseases

AGADATANTRA PERSPECTIVE

Agadatantra: Overview

Agadatantra is one of the eight branches of Ayurveda dealing with poisons, toxins, environmental hazards, food incompatibilities, and their management.

Ancient Ayurvedic scholars described several forms of toxic exposure:

- *Sthavara Visha* (plant/mineral poisons)
- *Jangama Visha* (animal poisons)
- *Gara Visha* (artificial/cumulative poisons)

- *Dushi Visha* (latent toxins)

From a contemporary toxicological perspective, certain characteristics described under *Gara Visha* and *Dushi Visha* such as delayed manifestations, persistent or repeated exposure, and systemic effects may be used as a conceptual framework for discussing chronic environmental toxicant exposure. However, these Ayurvedic concepts should not be considered direct equivalents of modern endocrine-disrupting chemicals. [1-3,5,6]

CORRELATION WITH *GARA VISHA*

Definition of *Gara Visha*

Gara Visha refers to artificially prepared or combined toxic substances producing chronic toxicity. [5]

Characteristics

- Slow acting
- Chronic exposure
- Accumulation in the body
- Multi-system involvement



Subclinical manifestation initially
Modern endocrine disruptors similarly:

- Enter the body repeatedly in small doses
- Bioaccumulate in tissues
- Produce delayed manifestations
- Affect multiple organ systems

Thus, endocrine disruptors can be conceptually correlated with *Gara Visha*.

CORRELATION WITH *DUSHI VISHA*

Definition

Dushi Visha is partially metabolized poison that remains dormant in the body and manifests under favorable conditions. [5,6]

Features of *Dushi Visha*

- Low potency but persistent toxicity
- Chronic morbidity
- Aggravation by improper diet and lifestyle
- Tissue contamination

SIMILARITIES WITH ENDOCRINE DISRUPTORS

<i>Dushi Visha</i>	Endocrine Disruptors
Latent accumulation	Bioaccumulation
Chronic low-grade toxicity	Long-term exposure
Affects <i>Dhatus</i>	Affects endocrine organs
Triggered later	Delayed disease manifestation
Multi-system effects	Systemic hormonal disturbances

Role of *Viruddha Ahara*

Ayurveda emphasizes incompatible food combinations (*Viruddha Ahara*) as causes of toxic accumulation.

Examples:

- Chemically preserved foods
- Artificial coloring agents
- Excessively processed foods
- Reheated oils
- Food stored in plastic containers

These may contribute to toxic burden and endocrine imbalance.

DOSHA AND DHATU INVOLVEMENT

Dosha Involvement

Vata

- Neurological disturbances
- Hormonal signaling imbalance

Pitta

- Metabolic dysfunction
- Inflammatory changes
- Carcinogenesis

Kapha

- Obesity
- Insulin resistance
- Cystic disorders

Dhatu Involvement

Dhatu	Possible Effect
<i>Rasa</i>	Hormonal transport disturbance
<i>Rakta</i>	Toxic circulation
<i>Meda</i>	Obesity and lipid accumulation
<i>Shukra</i>	Infertility and reproductive disorders

Samprapti (Pathogenesis)

1. Exposure to environmental toxins
2. *Agnimandya* (impaired metabolism)
3. Formation of *Ama* and toxic metabolites
4. Accumulation in *Dhatus*
5. *Dosha* vitiation
6. *Srotodushti* (channel dysfunction)
7. Endocrine and metabolic disorders

PREVENTION ACCORDING TO AYURVEDA

Ahara (Dietary Measures)

- Consumption of fresh food
- Avoidance of processed and preserved foods
- Avoiding reheated oils
- Use of organic produce

Vihara (Lifestyle)

- Dinacharya and Ritucharya
- Regular exercise
- Adequate sleep
- Stress reduction

Environmental Measures

- Avoid plastic food containers
- Use natural cosmetics
- Reduce pesticide exposure

AYURVEDIC MANAGEMENT PRINCIPLES

Nidana Parivarjana

Avoidance of causative toxic exposure.

Deepana and Pachana

Improvement of digestion and metabolism to prevent *Ama* formation.

Examples:

- *Trikatu*
- *Panchakola*

Shodhana Chikitsa

Panchakarma

- *Vamana*
- *Virechana*
- *Basti*

These therapies may help in detoxification and restoration of *Dosha* balance.

Rasayana Chikitsa

- Guduchi
- Amalaki
- Haridra
- Ashwagandha

These drugs possess antioxidant and adaptogenic properties.

DISCUSSION

Modern lifestyles expose humans continuously to environmental endocrine disruptors. These chemicals exert subtle but chronic toxic effects that may remain unnoticed for years. Ayurveda had already conceptualized similar chronic toxic states under *Gara Visha* and *Dushi Visha*.

Agadatantra provides a holistic toxicological framework emphasizing:

- Prevention
- Detoxification
- Metabolic correction
- Dietary regulation
- Environmental hygiene

The *Ayurvedic* understanding of cumulative toxins aligns remarkably with present-day concepts of bioaccumulation and chronic endocrine toxicity.

An integrative approach combining modern toxicological awareness with *Ayurvedic* preventive principles may help reduce the burden of endocrine-related disorders.

CONCLUSION

Endocrine disruptors are emerging environmental toxins with profound effects on human health. Their chronic, cumulative, and systemic actions closely resemble the Ayurvedic concepts of *Gara Visha* and *Dushi*

Visha described in *Agadatantra*. Ayurveda emphasizes prevention, detoxification, and restoration of metabolic balance through *Ahara*, *Vihara*, *Shodhana*, and *Rasayana* therapies. Integrating modern scientific understanding with Ayurvedic toxicology may provide effective strategies for addressing endocrine disruption in contemporary society.

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