



ENDOCRINE DISRUPTORS IN THE PERSPECTIVE OF AGAD TANTRA: AN AYURVEDIC INTERPRETATION OF DUSHI VISHA AND VISHA UPADRAVA

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ABSTRACT Endocrine-disrupting chemicals (EDCs) are natural or synthetic substances that interfere with the normal functioning of the endocrine system by mimicking, blocking, or altering hormonal signaling pathways. These agents may enter the human body through air, water, food, or skin contact and can produce a wide range of biological, metabolic, and developmental disturbances. In Ayurveda, the concepts of Visha and its chronic form, Dushi Visha, describe pathological conditions caused by slow-acting toxins that accumulate within the body and gradually impair the normal functioning of the Dhatus and other bodily systems. Endocrine-disrupting chemicals, which interfere with hormonal regulation and contribute to metabolic, reproductive, neurological, and inflammatory disorders, exhibit notable similarities to the manifestations of Dushi Visha described in classical Ayurvedic literature. This article aims to explore endocrine disruptors from the perspective of Agadtantra and establish their correlation with Visha Upadrava mentioned in Ayurvedic texts. Understanding endocrine disruptors through Ayurvedic principles may provide valuable insights into their pathogenesis, along with potential preventive and therapeutic approaches.

KEYWORDS : Endocrine Disruptors, Visha Upadrava, Dushi Visha, Agad Tantra, Environmental Toxins

1. INTRODUCTION

The endocrine system plays a vital role in maintaining physiological homeostasis through the regulation of various hormonal activities. In recent decades, rapid industrialization, urbanization, and environmental pollution have led to increased exposure to numerous chemicals capable of disrupting endocrine functions.^[1] These substances are collectively referred to as endocrine-disrupting chemicals (EDCs).

Endocrine-disrupting chemicals such as pesticides, plasticizers, heavy metals, and industrial compounds interfere with hormone synthesis, secretion, transport, metabolism, and receptor binding. Such interference may result in a wide range of health disorders, including infertility, metabolic disorders, developmental defects, neurological disturbances, and immune dysfunctions.^[2]

Ayurveda, particularly the branch of Agad Tantra, provides a detailed description of the effects of toxic substances on the human body. Concepts such as Gara Visha, Dushi Visha and Vishopadrava closely resemble the chronic toxic manifestations produced by prolonged exposure to environmental chemicals. Therefore, understanding endocrine disruptors through the perspective of Ayurvedic toxicology may help establish a conceptual correlation between traditional Ayurvedic principles and modern toxicological science.

2. Aim and Objectives

Aim: To analyze endocrine disruptors as Visha Upadrava in the context of Ayurvedic toxicology.

Objectives

1. To review the concept of endocrine disruptors in modern toxicology.
2. To study the description of Gara Visha and Dushi Visha in classical Ayurvedic texts.
3. To establish a correlation between endocrine disruption and Visha Upadrava described in Ayurveda.

3. MATERIALS AND METHODS

This conceptual review is based on classical Ayurvedic literature, including Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, and references from Agad Tantra, along with modern toxicology textbooks, World Health Organization publications on endocrine-disrupting chemicals, and peer-reviewed scientific journals.

4. Concept and Classification of Endocrine Disruptors

Endocrine disruptors are exogenous chemicals that interfere with normal endocrine function by mimicking hormones, blocking hormone receptors, or altering hormone synthesis, secretion, transport, and metabolism.^[1] Common examples include Bisphenol A (BPA), phthalates, pesticides, polychlorinated biphenyls (PCBs), and heavy metals such as lead and mercury.^[2] Endocrine disruptors may be

classified into synthetic chemicals, natural agents such as phytoestrogens, pharmaceutical compounds, and lifestyle-related factors. Besides disrupting hormonal activity, these agents may also induce epigenetic modifications, leading to endocrine imbalance and various multisystem disorders.^[3]

5. Concept of Gara Visha and Dushi Visha

Gara Visha

Gara Visha refers to an artificially prepared toxin formed by the combination of various substances, which commonly enters the body through contaminated food, water, and environmental exposure.^[11] It is categorized under Kritrima Visha (artificial poison) and is characterized by delayed toxic manifestations rather than immediate fatal effects. In the modern context, exposure to food adulterants, pesticides, plastics, and environmental pollutants may be correlated with the concept of Gara Visha.^[15]

Dushi Visha-

Dushi visha is described as a low-potency residual toxin that remains in the body for prolonged periods and gradually gives rise to chronic diseases.^[12] It persists within the Dhatus such as Rasa, Rakta, Mamsa, Meda, Asthi, Majja and Shukra, leading to progressive and variable clinical manifestations. The classical statement, "Vichitran Karoti Dhatuprabhavan Vikaran," signifies that different disorders develop depending upon the affected Dhatu. This concept closely resembles the cumulative toxicity and bioaccumulation produced by endocrine-disrupting chemicals and environmental pollutants in modern science.^[7]

6. Visha Upadrava

Visha Upadrava refers to the complications arising from the prolonged or systemic effects of toxins within the body. These manifestations are generally chronic and progressive in nature, affecting multiple organs and physiological systems. In Ayurveda, Visha Upadrava is closely associated with Doshā-Dhatu Dushti, wherein toxic substances disturb the equilibrium of Doshas and gradually impair various Dhatus, resulting in diverse clinical manifestations depending upon the site, extent, and severity of involvement.^[13]

According to the Charaka Samhita, common manifestations of Visha Upadrava include Mada (intoxication or altered mental state), Murcha (syncope or fainting), Vishada (depression or mental distress), and Hrudadrava (palpitations or tachycardia).^[11] According to Vagbhata, sixteen important manifestations of Visha Upadrava have been described, namely Jwara, Kasa, Shwasa, Vamana, Atisara, Malavrodha, Hikka, Anaha, Ati Trishna, Murcha, Shirashoola, Shophā, Basti Shoola, Raktasrava, Puti Damsa, and Vata Prakopa.^[13] These manifestations indicate the multisystemic effects of toxic substances on the body and reflect the progressive involvement of various Doshas and Dhatus.

EDCs and Visha Upadrava

EDCs manifestations can be correlated with Visha Upadrava which are shown in Table No.1

Table 1- Correlation of Visha Upadrava with Endocrine Disruptors and Modern Effects

Ayurvedic Manifestation	Associated Endocrine Disruptors/Toxicants	Modern Correlation / Effect
Jwara (chronic inflammatory state)	PFAS, PCBs, Dioxins, PAHs	Chronic low-grade inflammation, metabolic dysregulation, endocrine dysfunction
Kasa–Shwasa (respiratory manifestations)	Phthalates, Air Pollutants, Organophosphates	Airway inflammation, asthma, impaired pulmonary function
Agni Dushti (GI Manifestations)	BPA, Phthalates, PFAS	Altered gut microbiota, metabolic imbalance, digestive dysfunction
Ati Trishna (excessive thirst)	BPA, Arsenic, PFAS	Disturbed glucose metabolism, insulin resistance, diabetes-related endocrine changes
Murcha and Shirashoola (neurotoxic manifestations)	Lead, Mercury, Organophosphates, PCBs	CNS dysfunction, neurotoxicity
Shophpa (oedema / fluid imbalance)	Cadmium, PFAS	Renal dysfunction, hormonal imbalance, oedematous conditions
Raktasrava (bleeding tendencies)	Dioxins, Heavy Metals, BPA	Vascular damage, coagulation abnormalities, haematological disturbances
Vata Prakopa (systemic neuroendocrine dysregulation)	PCBs, Lead, PBDEs, Organophosphates	Neurological and endocrine signalling disturbances, multisystem dysregulation

EDCs cannot be explained solely on the basis of acute toxicity. Their artificial nature resembles Gara Visha, while their prolonged persistence in the body reflects the characteristics of Dushi Visha. This ultimately leads to Agni Vaishmya, Ama formation and Srotorodha. Vagbhata also mentioned that when Dushi Visha remains concealed within the body for a prolonged period, it affects the Rasadi Dhatus and gives rise to various disorders originating from the Dhatus.^[13]

Correlation of Endocrine Disruptors with Dushi Visha Manifestations and Modern Effects

Various endocrine-disrupting chemicals (EDCs) are associated with chronic systemic and reproductive disorders that may be understood in Ayurveda as manifestations of Visha Upadrava. Their synthetic and artificial nature is comparable to Gara Visha, while their gradual accumulation and long-term persistence within the body resemble the concept of Dushi Visha.^[12] Chemicals such as bisphenol A (BPA), phthalates, pesticides, polychlorinated biphenyls (PCBs), dioxins, and heavy metals have been associated with infertility, metabolic disorders, neurotoxicity, thyroid dysfunction, and various cancers. These manifestations may be correlated with Ayurvedic conditions such as Artava Dushti, Vandhyatva, Kilaibya, Agni Vaishmya, Granthi, Arbuda, and Vata Prakopa described in classical Ayurvedic literature.^[10]

Correlation of EDCs manifestations with Ayurvedic disorders w.s.r. to Dushi visha is shown in Table No.2

Table 2 - Correlation of EDCs Manifestations with Ayurvedic Disorders w.s.r. to Dushi Visha.

Endocrine Disruptor	Modern Correlation	Ayurvedic Correlation
BPA	PCOS, infertility	Artava Dushti, Vandhyatva
Phthalates	Reduced sperm count	Kilaibya, Sukra Dushti
Pesticides/DDT	Thyroid disorders, infertility	Agnivaishmya, Vandhyatva
PCBs	Hypothyroidism	Agni Dushti, Vata-Kapha Prakopa

Dioxins	Endometriosis, cancers	Granthi, Arbuda
Lead, Mercury	Neurotoxicity, infertility	Murcha, Vata Prakopa

8. Preventive and Therapeutic Approaches

Preventive and therapeutic approaches for exposure to endocrine-disrupting chemicals involve both modern preventive strategies and Ayurvedic management principles.^[16] Preventive measures include minimizing exposure to plastics, pesticides, and other environmental toxins, encouraging the consumption of organic foods, and promoting public awareness regarding the harmful effects of endocrine disruptors. From an Ayurvedic perspective, management primarily aims at the elimination of accumulated toxins and the restoration of physiological balance through Shodhana therapy (purificatory procedures), Rasayana therapy for rejuvenation and enhancement of tissue strength, and the administration of Agada formulations, which are traditionally indicated for detoxification and protection against various forms of poisoning.^[16]

9. DISCUSSION

The persistent and bioaccumulative nature of endocrine-disrupting chemicals closely resembles the Ayurvedic concepts of Gara Visha and Dushi Visha. The prolonged retention and gradual accumulation of these toxic substances within the body may lead to Agni Vaishmya (impairment of digestive and metabolic functions), Ama formation (generation of toxic metabolic by-products), and Srotorodha (obstruction of bodily channels). Furthermore, Acharya Vagbhata, in Uttara sthana describes that Dooshi Visha, when retained in a latent state within the body for an extended period, affects the Rasa and subsequent Dhatus, ultimately leading to the manifestation of various systemic disorders originating at the tissue level.

These pathological changes can be correlated with modern concepts of endocrine disruption, receptor-mediated interference, metabolic dysregulation, and multisystem toxicity induced by environmental pollutants. Similarly, manifestations of Visha Upadrava such as Jwara (fever), Kasa (cough), and Murcha (syncope or altered consciousness) may be interpreted in the context of chronic inflammation, respiratory dysfunction, neurotoxicity, and neuroendocrine disturbances associated with long-term exposure to endocrine-disrupting chemicals. Therefore, Ayurvedic toxicology offers a valuable conceptual framework for understanding the pathogenesis and systemic consequences of chronic toxic exposure.

10. CONCLUSION

Endocrine-disrupting chemicals constitute a significant environmental health concern because of their chronic, cumulative, and multisystem effects on human health. From an Ayurvedic perspective, these toxic substances may be interpreted as Gara Visha, which, upon prolonged accumulation and persistence within the body, transforms into Dushi Visha and subsequently manifests as Visha Upadrava.

Ayurvedic concepts such as Gara Visha, Dushi Visha, and Visha Upadrava provide a meaningful conceptual framework for understanding the pathogenesis and systemic manifestations of endocrine disruptors. Correlating endocrine-disrupting chemicals with principles of Ayurvedic toxicology may contribute to a better understanding of chronic toxic exposure and aid in the development of preventive as well as therapeutic approaches. However, further interdisciplinary and evidence-based research is necessary to scientifically validate these correlations and explore their clinical applicability.

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