

A Comprehensive Review of Dushi Visha w.s.r. to Occupational Toxicity among Saw Mill Workers

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ABSTRACT

Classical text of Ayurveda explained Dushi Visha (cumulative poison) as an important concept of Agadtantra. Dushi Visha is a residual (cumulative) poison, mild in potency and not fatal, which remains in dormant state within the body for longer period due to covering of kapha and aggravated due to favorable desha (environment), kaala (time), food, over exertion, mental dilemma, anger etc. It vitiates the dhatus and presented with different symptoms. In the modern era, the atmosphere is increasingly contaminated with harmful toxins due to pollution, chemicals, industrial emissions, and vehicle exhaust all of which are absorbed by humans. Additionally, the global rise in wood usage and industrial wood processing has led to a surge in health issues caused by exposure to wood dust and associated substances. The resulting disorders range from mild irritations and allergic reactions to severe, carcinogenic effects. This review explores the health impacts of occupational wood dust exposure in relation to the classical Ayurvedic concept of Dushi Visha.

KEYWORDS: Dushi Visha, Occupational toxicity, Saw Mill workers, Dhatu, Kapha.

I. INTRODUCTION

Ayurveda, the ancient traditional healthcare system of India, is a well-developed and effective branch of medicine. Agadtantra is one of the eight branches (Ashtanga Ayurveda) and deals with the study of various types of poisons (visha). Among these, Dushi Visha is a significant concept elaborated upon by ancient scholars. Dushi Visha refers to denatured or attenuated poisons that, due to their mild potency, are not immediately fatal but can persist in the body for years, especially when enveloped by the humor kapha.^[1] It represents a form of cumulative toxicity caused by repeated low-level exposure, leading to serious health effects such as indigestion, anorexia, red patches on the body,

facial and limb edema, urticaria, fainting, ascites, vomiting, diarrhea, skin discoloration, epileptic attacks, intermittent fever, and increased thirst.^[2]

There is negative impact on health, occupational hazards are indeed a global concern. The Occupational Safety and Health Administration (OSHA) defines occupational hazards as workplace conditions that pose risks to employee health and safety. To ensure optimal health and safety and to prevent occupational hazards, occupational health programs are implemented across various industries, including factories and mines.^[3] Industrialization offers substantial benefits to society and the economy, with the sawmill industry being a key contributor.^[4] In saw milling, wood dust is generated as a byproduct during processes such as sanding, sawing, and drilling whether performed manually or using machines.^[5] It is estimated that over 2 million people are exposed to wood dust daily all over the world.^[6] Globally, approximately 2.9 billion workers are exposed to hazardous conditions in their workplaces.^[7] In the sawmill industry, occupational diseases are the most pressing global public health issues, accounting for up to 30% of all registered work-related illnesses and showing a prevalence of up to 50%.^[8] Numerous occupational hazards affecting sawmill workers due to wood dust exposure closely resemble the symptoms described in Dushi Visha toxicity.

II. METHODOLOGY

Concept of Dushi Visha According to Ayurveda:

● Dushi Visha Nirukti

The word "DUSHI" is derived from the root word "DUSH" and with a suffix "NICH"

The word "Dushi" meaning polluting or defiling. It means which pollutes many times or having the property of vitiation.^[9]

● **Definition of Dushi Visha according to Bruhtrayee**

Charaka Samhita ^[10]

Dushi Visha is latent poison which vitiates rakta dhatu and causes various skin diseases. Dushi Visha vitiates the doshas one by one and at last causing death. Acharya Chakarpani, commentator of Charak Samhita quoted that the Dushi Visha is the poison which gets aggravated after a long time and considered as heena visha. Even Dushi Visha Keetas are also considered as Heena Visha (low potency poison).

Sushruta Samhita ^[11]

A poison of either sthavara, jangama or kritrima origin which when not eliminated from the body completely, gets accumulated in human body, also due to its low potency it does not kill the person quickly and remains in the body for many years due to aavarna of Kapha is known as Dush Visha.

Astanga sangraha ^[12]

● **Lakshanas of Dushi Visha**

Table 1: Lakshanas (Manifestations) of Dushi Visha according to different Acharya ^[15,16,17,18,19,20,21]

C.C. (23/31)	S.K (2/30-32)	A.S.U. (35/34)	A.H.U. (40/37)	Y.R. (40/1-2)	B.Ni. (67/38-40)	M.Ni. (69/30-31)
Rakta Dushti	Anna mada	Bhinna purisha	Bhinna purisha	Annamad	Bhinna purisha	Anna Mada
Vrana	Avipaka	Bhinaa Varna	Bhinna Varna	Avipaka	Bhinna Varna	Avipaka
Kitibha	Arochaka	Rakta dusti	Rakta Dushti	Arochaka	Vigandhi	Arochak
Kotha	Mandala	Trita	Trita	Mandala	Vairasya	Mandala
Uru	Kotha	Arochak	Arochak	Kotha	Pipasi	Kotha
—	Moha	Moorch	Moorcha	Moha	Moorcha	Mamsa Kshaya
—	Dhatu Kshaya	Vami	Vami	Mamsa Kshaya	Bharama	Pada Shopha
—	Pada sopha	Gadgad Vaak	Gadgad Vaak	Pada Shopha	Gadgad vaak	Kara Shopha

Acharya Vagbhata agreed with the quotation of Acharya Susruta that any poison which when affected by antidotes, dried by forest fire, breeze and sunlight or that which by its very low potency and not endowed well with the all properties of poisons, when remained inside the body for many years (varshagananubandhi) due to its kaphaavarana property derives the name Dushi visha.

● **Nidana of Dushi Visha** ^[13,14]

In classical point of view, the causative factors for developing Dushi Visha are-

- 1) Sthavar Visha
- 2) Jangam Visha
- 3) Kritim Visha
- 4) Virudhaahar ^[13]
- 5) Ajirna
- 6) Vegavarodha ^[14]
- 7) Manasika Bhava - somewhere there is pathological imbalances due to repeated stress that results into systematic manifestations.

—	Kara shopha	Moha	Moha	Pani Shopha	Vami	Moorcha
—	Moorcha	Dushyo Dara	Dushyo Dara	Akshi Shopha	Vichesth	Chhardi
—	Chhardi	—	—	Moorcha	Arati	Atisara
—	Atisar	—	—	Chhardi	—	Shwasa
—	Vaivarnya	—	—	Atisara	—	Trishna
—	Trishna	—	—	Swasa	—	Jwara
—	Visham Jwara	—	—	Trishna	—	Jathara
—	Unmada	—	—	Jwara	—	—
—	Aanaha	—	—	Jathara	—	—
—	Shukra Kshaya	—	—	Unmada	—	—
—	Gadgadya	—	—	Aanaha	—	—
—	Kushta	—	—	Shukra Kshaya	—	—
—	Dakodar	—	—	Gadgadya	—	—

- **Treatment of Dushi Visha**
Shodhan and Sanshamana chikitsa play an important role in Dushi Visha chikitsa (jirna visha chikitsa)

Table 2 : General protocol for Treatment of Dushi Visha according to different Samhita

Sr. No.	Procedure and Drugs	Charaka	Susruta	Astang Sangrah	Astang Hridaya
1	Swedan (Sudation)	—	√	√	√
2	Vaman (Induced Emesis)	√	√	√	√
3	Virechan (Induced Purgation)	√	√	√	√
4	Anulomana (Mild Purgative)	—	—	√	—
5	Raktamokshana/ Siravedha (Blood Letting)	√	—	—	—
6	Dushivishari Agad Prayoga	—	√	√	√

● Contemporary Aspect of Dushi Visha (Cumulative Poison):

The concept of Dushi Visha, as explained in classical texts, is highly relevant in today's world. From a contemporary perspective, with the changing lifestyle of modern civilized man, the risk of exposure to poisons similar to Dushi Visha is steadily increasing. Dushi Visha refers to a type of cumulative toxin that can remain in the body for years without producing immediate symptoms but gradually causes harm. In our daily lives, the impact of rapid industrialization and commercialization is becoming increasingly evident. This has led to a greater risk of exposure to various toxins. Substances such as heavy metals, chemical fertilizers, industrial by-products, pesticides, automobile exhaust, and more are constantly entering the human body through multiple internal and external routes. These harmful agents contribute to a condition known as Cumulative toxicity.^[22] This toxicity closely aligns with the concept of Dushi Visha described by Acharya Sushruta.^[23] To eliminate such toxins from the body, annual Panchakarma therapy (a traditional Ayurvedic detoxification process) is recommended. This therapy purifies the body, neutralizes accumulated toxins, maintains physiological balance, and helps prevent the onset of various diseases. In today's society, many sectors contribute significantly to Dushi Visha-like toxicity. These include:

1. Food Adulteration – Use of preservatives, coloring agents, additives, adulterated milk, artificial sweeteners, and flavoring agents.
2. Cosmetics – Harmful chemicals present in beauty and skincare products.
3. Psychoactive Drugs – The widespread use and misuse of substances affecting the mind.
4. Occupational Poisoning – Exposure to hazardous substances in certain work environments.
5. Industrial Pollution – Contamination of air, water, and soil due to industrial waste and emissions.

● Occupational Toxicity

Occupational hazards are a major cause of disability and mortality among working population all over the world. Occupational exposure to hazardous substances is a significant concern in many work environments, particularly as industrialization, emerging technologies, and evolving organizational practices continue to reshape the modern workplace. Occupational hazards are sources of potential harm or adverse

health effects arising from workplace conditions, processes, or environments that can negatively impact a worker's physical or mental well-being. Inadequate safety protocols, combined with changing work environments, have led to the emergence of new and often unpredictable hazards. In response to these challenges, the concept of Total Worker Health (TWH) was developed. TWH is an integrated approach that combines workplace safety with broader strategies to promote overall worker health and well-being.^[24] It encompasses coordinated policies, programs, and practices designed to prevent work-related injuries and illnesses while enhancing employee wellness. Globally, more than 1 billion workers are exposed annually to hazardous agents including pollutants, dust, vapors, and fumes, which can result in serious health outcomes such as chronic diseases, injuries, and long-term disabilities, cancer. As a result, proactive and comprehensive workplace health strategies are increasingly essential to safeguard the workforce.^[25]

● Occupational Wood Dust Exposure among Sawmill Workers

Because of the world-wide increase demand of wood, diseases due to exposure to wood dust and substances connected with the saw milling are also increases. Saw milling is one of the common wood processing industries which involve cutting, processing and shaping of wood into logs and planks.^[26] By products of wood processing, such as wood dust, mould, formaldehyde, and noise are well known with respect to their health hazards. Wood contains microorganisms (including fungi), toxins and chemical substances work as causative factors for occupational hazards and they may significantly affect the human health.^[27]

Following causative factors are responsible for occupational toxicity in sawmill workers

➤ Wood Dust and Wood Dust Components

Wood dusts are a complex mixture of various substances formed as byproduct during wood processing.^[28] Wood dust composition varies according to species of trees it consists of cellulose, lignin, polyoses, and variable number of substances of lower relative molecular mass. These include polar organic extractives like tannins, flavonoids, quinones and lignans, non-polar organic extractive like fattyacids, resin acids, waxes, alcohols, terpenes, sterols, steryl esters and glycerol, and water-soluble extractive like carbohydrates, alkaloids, proteins and inorganic materials.^[29]

➤ **Wood Contaminants**

Wood contaminants such as fungal spores, other microbials, their product spores and mycelial fragments of aspergillus, penicillium, rhizopus, paecilomyces, mucor species and other fungus.^[30,31]

➤ **Wood Preservatives**

Azole Fungicide - Propiconazole and Tebuconazole are the most common azole compounds are use to protect wood from wood-destroying basidiomycete fungus, specially those working with resinous timbers, these fungus can induce deterioration or bluing of wood, making wood useless.^[32] Also, wood preservatives, coatings, sealants and glues e.g. formaldehyde, pentachlorophenol, glycols, copper naphthanate, etc. this mixture makes it difficult to determine a specific irritant or allergen.^[33]

● **Occupational Toxicity due to Wood Dust Exposure among Sawmill Workers**

Occupational toxicity among sawmill workers results from exposure to toxic chemicals at work, often due to outdated processes, poor supervision, inadequate protective measures, improper use of PPE, and poor safety awareness has resulted in numerous industrial health hazards. Also, the release of corrosive, hazardous pollutants, or radioactive toxins into the surrounding continuously affected the health of workers. Following occupational manifestations are found among sawmill workers.

● **Allergic Skin Disorders**

Irritative and allergic dermatitis are mainly caused by tropical woods. They contain various substances like alkaloids, chinones, catecholes, glycosides, saponines, terpenes. Most of them can act both as irritants and as allergens. The most risky wood dusts are those produced by grinding, sawing and shaving. Such skin disorders tend to appear mainly on the face, hands, forearms, neck and genital area.^[34]

● **Allergic Respiratory Disorders**

The lung function impairment is the most common occupational respiratory problem. In addition to sino-nasal cancer [IARC, 1995], exposure to dust of both hard (broad-leaved trees or Angiosperms) and softwood (conifers or Gymnosperms) has been shown to be associated with upper and lower respiratory symptoms, reduced lung function, increased bronchial responsiveness, occupational asthma, and eye and nose irritations.^[35]

● **Nasal and Sino-Nasal Cancer**

Wood dust is classified as a Group 1 agent carcinogenic to humans.^[36] Exposure to wood dust is a risk factor for nasal and sino-nasal Cancers.^[37]

● **Musculoskeletal Disorders and Machinery Related Injuries**

The equipment and materials handle during saw milling leading to occupational hazards include being caught-in or struck by machinery, falling from a height, ergonomic hazards resulting from lifting of heavy loads, reaching for objects, repetitive work, twisting or reaching, and poor work posture.^[38]

● **Cardiovascular disorders**

Long term exposure to noise has been associated with negative cardiovascular health outcomes such as arterial hypertension, acute myocardial infarction, arteriosclerosis, ischemic heart disease and stroke.^[39]

● **Organic Dust Toxic Syndrome**

It is condition in which an inflammatory reaction of the airways and alveoli found due to inhaling large amounts of spores and mycelial fragments of aspergillus, penicillium, rhizopus, paecilomyces, mucor species and other fungi resulted in a strong antibody response and respiratory disorders, most commonly allergic alveolitis (wood trimmer's disease) in wood dust exposed workers.^[40]

● **General Symptoms**

General symptoms like fever, headache, nausea, vomiting, diarrhoea, vertigo etc. Along with the noise pollution and unfavourable weather conditions that is injurious to human health.^[41]

● **Management and Treatment Strategies for Occupational Toxicity due to Wood Dust Exposure among Sawmill Workers**

❖ **Pharmacological Treatment**

Management and treatment of occupational toxicity due to wood dust exposure among sawmill workers involve both acute and chronic care strategies, with a multidisciplinary approach to address respiratory, dermatological, cardiac and psychological health, along with machinery related injuries. In cases of acute exposure, immediate removal from the toxic source is crucial. Symptomatic treatment should be initiated promptly, including the use of bronchodilators, nebulizers, artificial respiration, and corticosteroids, particularly in cases involving respiratory distress, cardiac complications, or dermatological toxicity. For

chronic conditions, long-term respiratory therapy may be necessary to manage persistent pulmonary symptoms. Dermatological conditions may require the ongoing use of topical steroids and antihistamines to control inflammation and allergic reactions. Additionally, psychological support is essential, especially for workers experiencing occupational stress or symptoms of neuro toxicity. Addressing these aspects through counseling or therapy helps to improve overall well-being and supports recovery from occupational hazards.

❖ **Preventive Measures and Occupational Health Strategy** ^[42]

➤ **Awareness and Perception of Health Risks:**

It is important to assess the level of knowledge of workers regarding the health risks commonly experienced by themselves and their peers. Understanding their perceptions can help identify gaps in awareness and guide the development of effective health and safety interventions.

➤ **Use of Safety Measures and Personal Protective Equipment (PPE)**

To reduce exposure to occupational hazards, workers should use appropriate safety gear, including face masks or respirators are used to protect against inhalation of wood dust, protective goggles and shield of eyes protect particles and debris, hand gloves helps to prevent cuts, splinters, and chemical exposure, safety boots to protect feet from injuries caused by falling objects, aprons or protective clothing are reduces dust contact and chemicals ear muffers or earplugs aid to protect

hearing from constant loud noise, and mechanical lifters or lifting aids reduces the risk of back injuries.

➤ **Challenges in PPE Usage and Safety Compliance:**

Despite the availability of safety devices, many workers do not consistently use them. Reasons for non-compliance include lack of awareness or proper training, limited access to or affordability of PPE, absence of employer support or provision of safety gear, inadequate enforcement of workplace safety regulations.

III. DISCUSSION

Dushi Visha, as described by the Acharya in classical texts, is a slow-acting, cumulative poison that gradually disrupts the body's functions by repeatedly accumulating and vitiating the dhatus. Factors like Dushit Desha (polluted environments), Dushit Kaala (seasonal changes), Dushit Anna (contaminated food), and Divaswapna (unhealthy habits) contribute to its manifestation, affecting Doshas, Dhatus, and Malas. Symptoms such as indigestion, diarrhoea, vomiting, body aches, skin eruptions, and chronic skin disorders reflect the classical signs of Dushi Visha. These align closely with health issues observed in modern occupational settings particularly among workers in polluted or toxic environments, such as sawmills, where respiratory, gastrointestinal, dermatological, and musculoskeletal conditions are common. It is observed that there is correlation between toxic effects of occupational wood dust exposure among sawmill workers and Dushi Visha Manifestations These are as follows

Table 3 : Comparative table of Occupational Toxicity due to Wood Dust Exposure and Dushi Visha Lakshane

Sr. No.	Systemic Involvement	Occupational Toxicity due to Wood Dust Exposure	Dushi Visha Lakshane
1.	Respiratory	Impaired lung functions, acute and chronic lung diseases, like dry cough, cough with phelgam, dyspnea, occupational asthma, wheezing, chronic bronchitis, breathlessness, alveolitis (wood trimmers diseases)	Swasa, kasa,
2.	Gastro-Intestinal	Loss of appetite, nausea, vomiting, intermittent diarrhoea, emaciation	Anamada, avipaka, arochaka, jathara, anaha, dkodara, atisara, bhinna purisha, vaman
3.	Cardiovascular	Systolic Hypertention, chest pain, eschemic heart diseases	Hrddrava, bhrama, paadkaraasya shopha
4.	Skin problem	Acute and chronic dermatitis,	Kustha, mandal, dadru,

		eczema	kotha, uru, kitibha, vaivarna
5.	Allergic reactions	Redness of eyes and nose, sneezing, irritation of oral cavity and throat	Kandu,lalastrava,kasa,phen, mukhapakha
6.	Musculoskeletal Disorders	Discomfort, bachach, lower back injuries	Angamarda
7.	Others problem	Fever, headache, infertility, weakness,emaciation, sleeplessness	Vishamjwara, sukryashaya, dhatukshya, anidra

This comparison highlights the relevance of Ayurvedic insights in understanding chronic and cumulative toxicity, effectively bridging ancient wisdom with modern occupational health perspectives. Given this context, the Ayurvedic treatment modality like Shodhan and Sansaman may offer valuable interventions for managing occupational toxicity, particularly among sawmill workers who are frequently exposed to harmful dust and chemical agents. However, no previous studies appear to have explored this specific application of Ayurveda in the context of sawmill occupational exposure. Therefore, the present study address this gap and suggests efficacy of Ayurvedic interventions in such occupational settings.

IV. CONCLUSION

Based on the above discussion, it is concluded that the ancient Ayurvedic concept of Dushi Visha offers a profound understanding of chronic, low-grade, and insidious toxicity, which is particularly relevant to the occupational exposure to wood dust among sawmill workers.. Drawing parallels between Dushi Visha and modern occupational health hazards opens up valuable opportunities for integrative approaches to prevention and management blending traditional Ayurvedic wisdom with contemporary evidence-based medicine to improve the health outcomes of industrial workers.Till date, no clinical trials have been identified that investigate the prevalence of manifestations of Dushi Visha resulting from occupational toxicity in sawmill workers. This highlights a significant gap in research and underscores the need for clinical studies in this area.

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