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ROLE OF *HRIDAYAVARANA* IN MITIGATING THE CARDIOTOXIC SEQUELAE OF *GARA VISHA*

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ABSTRACT

Introduction: Cardiovascular diseases remain the primary contributor to global death and disability. They include hypertension, coronary artery disease, heart failure, arrhythmia, etc. Chest pain, palpitations are some common symptoms seen frequently in these conditions. Chemical exposure such as industrial toxins, environmental pollutants and synthetic drugs causing cardiovascular diseases. *Ayurveda* offers a classical approach to understanding and treating such conditions through lens of *Gara Visha*. A narrative review of chemically induced cardiovascular diseases from Ayurvedic and modern perspective. Objectives are to identify the chemicals causing cardiovascular diseases and to evaluate the role of *Hridayavarana* in them. The idea of *Hridayavarana* used for prevention as well as management of cardiovascular diseases. Oxidative stress and endothelial dysfunction are common mechanism causing chemical induced cardiovascular diseases. Chemicals producing oxidative stress, etc. can be correlated with *Gara Visha* through *Agada Tantra* point of view. *Hridayavarana* having cardioprotective action by increases *Ojas*, medicated *Ghruta* like *Ajeya Ghruta*, *Amrita Ghruta* can be used in such condition. The *Hridaya* is considered as *Marma* and is highly vulnerable to *Srotorodha*, *Avarana* and *Dosha Dushti* by exposure to *Gara Visha*. *Agadatantra* provides

strategies to neutralize, eliminate and pacify such toxins. *Agada yoga* provide unique ayurvedic approach to detoxify, protect and rejuvenate the cardiovascular system affected by chemicals. Combining *Shodhana*, *Agada Prayoga*, *Hridayavarana* these align with preventive and managing cardiovascular diseases induced by chemical exposure.

Keywords: *Agada Tantra, Gara Visha, Cardiovascular Diseases, Chemical exposure*

INTRODUCTION

Cardiovascular diseases are major health concern in India, accounting for a significant portion of death and disability accounting 27% of all deaths as per WHO. Cardiovascular diseases with urban areas having higher prevalence rate i.e. 12% and in rural areas it is 6% [1]. Various environmental and industrial chemicals can generate ROS (Reactive Oxygen Species) directly during their metabolism. It also depletes antioxidants inside the body and activate inflammatory pathways which ultimately increases oxidative stress. ROS impairs nitric oxide (NO) production, reducing vasodilation and producing hypertension and atherosclerosis. Oxidized low density lipoprotein are taken up by macrophages to form foam cells, which leads to plaque formation and narrowing of arteries. By promoting inflammation and smooth muscle proliferation it causes atherosclerosis.

Ayurveda is a science of life which gives knowledge about diagnosis, prevention and management of diseases. Though it is ancient science, we directly do not get all types of diseases and its descriptions but it with holds essence of all

the principles which can relate with any disease diagnosis, management and prevention. In classical texts like *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya* and *Ashtanga Sangraha* there is concept of various types of *Visha*. Mainly they are *Sthavara Visha* (Plant poison), *Jangama Visha* (Animal poison), *Dooshi Visha* (Cumulative poison) and *Gara Visha* (Artificial poison). *Gara Visha* is a chronic latent poison which can gradually accumulate inside the body and giving its effect due to synergism [2].

➤ “*Garasamyogaja cha anyada garasagna gadapradam*”
(Cha.Chi.23/14)

Gara Visha is composite of various types of poisons and it produce diseases.

Previously some work on *Hridayavarana* has been done for its cardioprotective activities. Some considered this *Upakrama* is used to prevent heart, lungs and brain in poisoning condition [3]. Cardiovascular diseases are the leading cause of mortality these days, especially various chemical exposure in day-to-day life causing such a disease. So, linking this with *Gara Visha* and application of

Hridayavarana can be effective in prevention as well as management in initial stages of cardiovascular diseases.

This article aims to integrate contemporary perspectives on chemical-induced cardiovascular diseases with the classical Ayurvedic concepts of *Gara Visha* and *Hridayavarana*, while also outlining preventive strategies and potential approaches for early-stage management. This will be helpful in exploring different dimension of treatment of chemical induced cardiovascular diseases.

METHODOLOGY

A) Chemicals causing cardiovascular diseases

In today's era a person may expose to enormous amount of chemicals. Abnormal lifestyle like unhealthy dietary habits,

sedentary lifestyle can lead to cardiovascular diseases. Household air pollution either in the house or outside house certain chemical exposure will be effect on cardiovascular systems [4].

Sources of chemicals: -

- Dietary sources: - Contaminated water, food additives, pesticides, preservatives etc.
- Occupational sources: -Pipes, paint, industrial waste, industrial solvents, combustion byproducts, fertilizers, batteries, etc. [5]
- Household sources: - Cookware, plastic container, cosmetics etc.
- Medicines: - Cocaine and its derivatives, amphetamines, NSAIDs, steroids, anticancer drugs etc. [6]

(Table 1).

Table 1: List of chemicals which produce cardiovascular diseases

Chemicals	Cardiovascular diseases
Lead	Hypertension, Arterial stiffness
Mercury	Oxidative stress, Endothelial dysfunction
Cadmium	Atherosclerosis, Hypertension
Arsenic	Ischemic heart disease
Benzene	Hematotoxicity leads to ischemia
Toluene	Tachycardia, Hypotension
Carbon monoxide	Hypoxia, Myocardial ischemia
Nitrogen dioxide	Atherosclerosis, Cardiac remodelling
Organophosphates	Bradycardia, Myocardial ischemia
Dioxins	Inflammatory response, Lipid disturbances
Bisphenol A	Hypertension, Coronary artery disease
Phthalates	Blood pressure alteration, Vascular damage
Cocaine	Myocardial infarction, Arrhythmias
NSAIDs	Elevates blood pressure

Direct cardiac toxicity encompasses functional and structural changes of the cardiovascular system due to possible

exposure to medicines. This phenomenon extends beyond cardiac drugs to include non-cardiovascular drugs

including anticancer medications such as tyrosine kinase inhibitors, immune checkpoint inhibitors, anthracyclines, etc. as well as various drugs for depression, anxiety like venlafaxine and even some antibiotics (such as macrolides). All these causes drug induced cardiotoxicity [7]. The primary sources of environmental toxins include pollutants containing particulate matter and organic substances, such as sulphate, nitrates, ammonium, elemental carbon, crystal elements, arsenic (As), mercury (Hg), cadmium (Cd), and Bisphenol A (BPA). Heavy metals such as lead, mercury, etc and pesticides from environmental toxins are contribute to cardiovascular diseases, even at low levels of exposure over longer period of time. Mercury exposure, even at low concentrations, can adversely affect multiple organs, including the heart, kidneys, nervous system, and immune system [8].

Chemical induced atherosclerosis refers to development of atherosclerotic changes in blood vessels due to exposure to various chemicals. In initial phase chemicals like tobacco smoke, air pollutants lead to increase a permeability, leucocyte adhesion in vessels. ROS oxidized LDL which is highly atherogenic. Plaque progression occurs due to inflammation, apoptosis and matrix degradation [9].

B) Synergistic effect and toxicity generation

Exposure to two or more chemicals at the same time can cause toxicity by its synergistic effect.

- Additive effects: combined effect of both chemicals become more toxic than its single effect.

Example: two vasoconstrictors cause more hypertension than alone drug.

- Potentiated Effect: Amplification of receptor activation, enzyme inhibition or increases oxidative stress.

Example: Alcohol + Caffeine
Cocaethylene leads to arrhythmia and sudden cardiac death.

- Transformational Interactions: Two chemicals react to produce a new molecule that did not exist before.

Example: Nitrites + secondary amines $\Rightarrow$ Reactive Oxygen Species (ROS)

C) Cellular and Molecular mechanism

- Oxidative stress and lipid peroxidation
- Mitochondrial dysfunction and bioenergetic failure
- Sarcoplasmic reticulum Ca^{2+} ATPase hampers
- Endothelial dysfunction
- Thrombosis and procoagulant changes

D) Concept of *Gara Visha* and chemicals

The concept of *Gara Visha* is explained in the *Agada Tantra*. *Gara Visha* is artificial poison produce by combination of *Nirvisha Dravya* and *Savisha Dravya* as per *Aacharya Chakrapani* [10]. We can correlate it with drug induced toxicity, and certain other chemicals. It is an artificial, chronic latent poison. So, they can be routinely exposed chemicals and occupational exposures which are chronic in nature. They act slowly in a body due to 'Apaki' Guna (indigestion). *Gara Visha* may be acute or chronic in nature [11].

In ancient time use of *Gara Visha* is mostly done by females to gain attention of

their husband for various intentions. For killing king also such kind of artificial poisons were mixed with food articles. So, *Gara Visha* given intentionally to various persons. In today's era also, multiple industries, businessman, etc. are selling intentionally low quality, adulterated and low-quality foods and things which ultimately causing hazardous diseases, one of them is chemical induced cardiovascular diseases [12].

E) Pathophysiology of *Gara Visha* and cardiovascular diseases

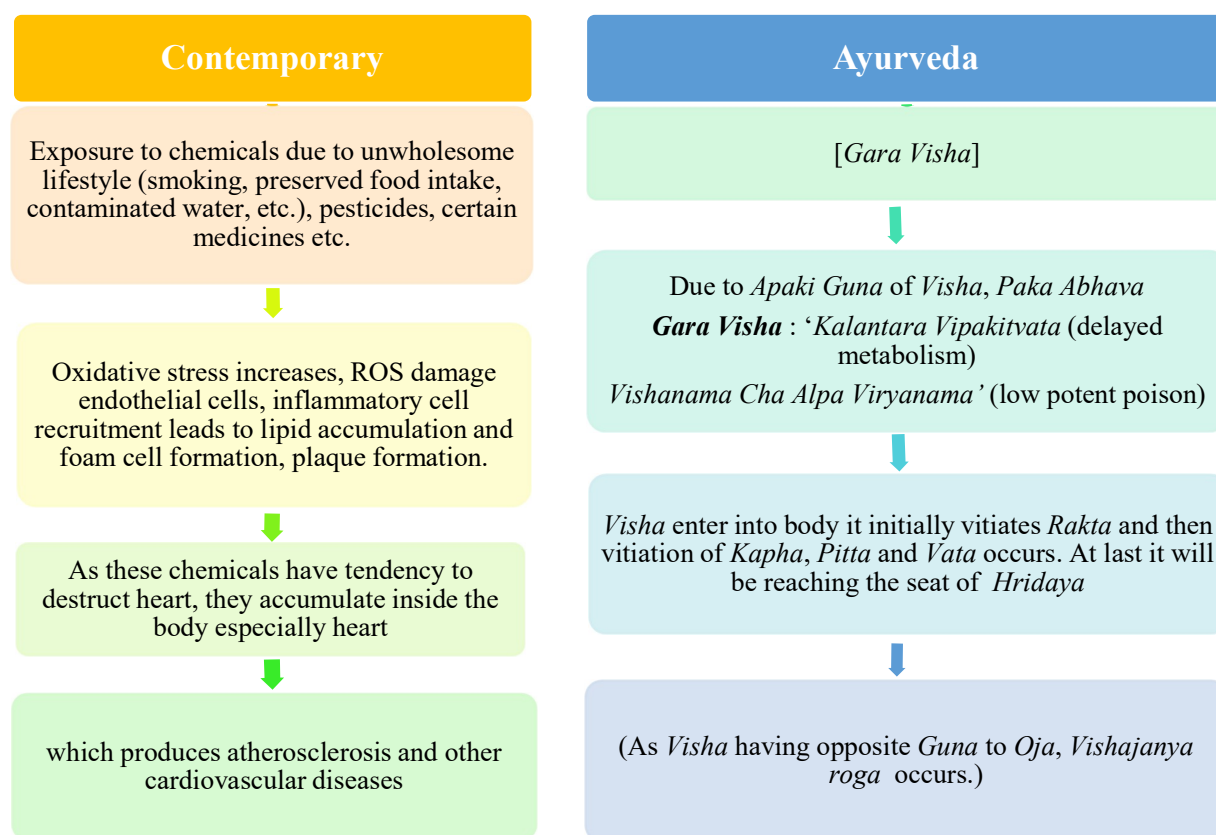


Figure 1: Pathophysiology of chemical induced *Hridroga*

Visha having ten properties like *Teekshana*, *Ushna*, *Ruksha*, *Vishada*, *Vyavayi*, *Asukari*, *Laghu*, *Vikasi*, *Sookshma*, *Avyakta Rasa* and *Apaki*. All *Visha* gunas having opposite qualities of *Oja*, when it vitiates *Vata-Pitta* then it becomes *Sadhyo Pranahara* in nature. When cardiac toxic chemicals, enter inside the body, it impairs the functioning of sodium, potassium, calcium channels and leads to cardiovascular diseases, which is mentioned in (Figure 1).

F) Role of *Hridayavarana* in prevention and management of cardiovascular diseases

Hridayavarana is a unique and effective treatment modality mentioned in *Charaka Samhita* under the heading of *Chaturvimsati Upakrama* [13]. *Hridayavarana* mainly focusing on protection of heart. *Hridaya* is considered as a site of *Oja*, *Vyana Vayu*, *Sadhaka Pitta*, *Avalambaka Kapha*, *Rasa*, *Pranavaha Strotas*, *Mana* and *Aatma*. *Oja* resides in *Hridaya*, which sustain the life. *Hridayavarana* treatment mainly includes *Ghrita* with *Agada Yogas*, as a remedial measure to protect *Hridaya*. *Hridaya* is mainly formed from *Prasadabhaga* of *Rakta* and *Kapha* in fourth month of pregnancy [14].

In *Sushruta Samhita* *Aacharya* mentioned the concept of regular doing *Hridayavarana* for protection of *Hridaya*.

Main function of this modality is to prevent spreading of toxicity in whole body. Nowadays we are expose to numerous chemicals unknowingly so, preparing body prior to occurrence of certain serious diseases is most important things. In ancient period they were used ghee, curd, honey, milk and cold water. They also used Meat soup as a *Rasayana* to make built strong to prevent the diseases.

Line of treatment for chemical induced cardiovascular diseases as per *Ayurveda*:

- *Langhana* and *Deepana Pachana*
- *Shodhana*: - *Vamana*, *Virechana*
- *Vishaghna Dravya*: - *Arjuna*, *Haridra*, *Guduchi*, *Nimba*, *Trikatu*, *Vasa*
- *Hridya Rasayana*: - *Ajeya Ghrita*, *Amruta Ghrita*, *Kalyanaka Ghrita*
- *Ojovardhaka Dravya*: - *Ashwagandha*, *Shatavari*, *Bramhi*
- *Vishaghna Mahakashaya* [15]
- *Agada yoga*: - *Mahagandhaka Agada*, *Vishari Agada*, *Tamalakyadi Agada*, *Dooshivisari Agada*, *Sidhuvaradi Agada*, *Murvadi Agada*

Chemical induced cardiovascular diseases are mainly caused by certain chemicals which we can correlate with *Gara Visha*. In *Gara Visha* treatment *Acharya Vagbhata* mentioned to perform *Vamana*. After proper detoxification of the body, wholesome diet should be given to patient and then detoxification of heart should be

done. *Hridaya Shuddhi* done with one *Shana* gold powder. These are classical methods for treatment of chemical induced cardiovascular diseases [16].

RESULTS

Chemical induced cardiovascular diseases is mainly caused by Oxidative stress. Chemical toxins, oxidative stress, etc can be correlated with *Gara Visha*. *Hridayavarana* having cardioprotective action by increases *Ojas*, medicated *Ghrta* like *Ajeya Ghrta*, *Amrita Ghrta* can reduce *Strotorodha* and having *Rasayana* effect. By using these principle cardiovascular diseases can be prevent as well manageable.

DISCUSSION

In *Ayurveda* classics it's mentioned that *Agnimandya* being the one of the major factors for creating various diseases. *Visha* also having *Apaki Guna* and *Kaphavarana* in such condition primarily performing fasting and promoting digestion by giving various digestion promoting drugs is very effective. *Shodhana* (detoxification) has a crucial role to remove vitiated *Dosha* and *Visha* outside the body. Effect of *Shamana* treatment (palliative measures) only significant when aggravated *Dosha* and *Alpa Virya Visha* remove from the body. Procedures like *Vamana* and *Virechana* can be used for this purpose.

References of *Vishghna Dravya* found in *Brihatrayi*. *Vishaghna Mahakashaya* was mentioned in *Charaka*

Samhita. *Charaka Acharya* gave ten antitoxic drugs; *Sushruta* gave 95 antitoxic drugs and *Astanga Hridaya* gave 104 antitoxic drugs. These drugs act as per its *Dravya Prabhava*, *Guna Prabhava* and *Dravya-Guna Prabhava* and give its antitoxic effect.

Hridayavarana is one of the *Upakrama* mentioned by *Acharyas* in their classical texts. *Acharya Sushruta* mentioned about *Ajeya Ghrta*, *Amrita Ghrta*, *Kalyanaka Ghrta* for *Hridayavarana* [17]. *Ajeya Ghrta* having mainly *Ushna Veerya Dravya* having *Kapha-Vatahara* and *Tridosahara* property. Also, the ingredients having *Vishghna* property, cardioprotective due to its antioxidant and catalyst activity. It also reduces lipid peroxidation of myocardial cell membrane. *Ghrta* contains Beta-carotene which has anti-oxidant properties [18]. *Amruta Ghrta* is having *Laghu*, *Ruksha*, *Teekshna* and *Vyavayi Guna* and maximum *Ushna Veerya Dravya* in it which improves *Agni*, and helps to reduce *Kapha* melting in *Dooshivisha*. This is *Tridosha Shamaka* and *Sarvavishahara* [19]. *Ghrta* administration immediately after poisoning (acute conditions) Slows down the spread of toxin whereby more time is available for treatment.

Kalyanaka Ghrta described in *Ashtang Hridaya*, under *Visha* indication. Its specific utility is to produce *Hridayavarana*

in *Visha*. Now most physicians use these formulations in *Manoviyadhi Chikitsa* [20]. In comparison to the other formulation, *Ushna* and *Teekshna Dravyas* are less in *Kalyanaka Ghruta*. This yoga executes their *Pachana Karma* more due to the *Vayu* and *Aakash* in the *Tikta Rasa Dravya* and less due to the *Tejbhuta* in the *Katu Rasa Dravyas* [21].

Agada Prayoga (antitoxic formulations) are used in various poisoning and diseased conditions. These are unique preparations mentioned in *Ayurvedic* texts which is having *Tridosahara* (maintain equilibrium in body), *Rakta Shodhana* (blood purifier), *Ojovardhana* (rejuvenate) and *Hridya* (cardioprotective) [22]. Recent researches done on various *Agada* formulations which shows its organ protective activities [23]. *Ojovardhaka* *Dravya* helps to counteract the effect of toxins as it is having exact opposite qualities to poison. It also provides strength, increases immunity and helps to cope up with toxin and it prevents further commencement of diseases [24].

CONCLUSION

In *Ayurveda* texts *Aacharyas* well aware about protection of vital organs in various conditions. *Hridayavarana* is distinctive treatment modality mentioned in texts as it protects *Marma* in a body. *Hridayavarana* has great impact on chemical induced cardiovascular diseases. As it

prevents many cardiac related diseases, also it helps to manage the initial stage of atherosclerosis which is caused by chemicals exposure. But proper research is very needful for using treatment in emergency condition.

The principles of *Hridayavarana Chikitsa* offer a promising avenue for research and therapeutic development as contemporary medicine struggles with the rising prevalence of cardiotoxicity caused by pesticides, industrial chemicals, environmental pollutants, and therapeutic agents. Aim of study is fulfilled by comparing both aspect *Ayurveda* as well as modern in regards of chemical induced cardiovascular diseases. This review provide base for further research work on cardiovascular diseases prevention specially through *Hridayavarana* concept.

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