

## Short Review



### Exploring the pathophysiology of valvular heart disease through the lens of Ayurveda: A narrative mini review.

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#### ABSTRACT:

**Background:** Cardiovascular diseases have become one among the leading global burden in the society with an estimated number of mortality and morbidity of 17.9 million lives per year. In the current era of modernization having sedentary life style, fat enriched diet, stressful jobs etc. further increase the incidence rate of cardiac disorder. Valvular Heart Disease (VHD) embodies the disorder afflicting cardiac valves. The patient is usually asymptomatic at the earlier stage but symptoms exacerbate with the severity of the disease. The contemporary science manages mild to moderate VHD with symptomatic medication and with the severity, surgical intervention for valvular repair or replacements are opted. The Surgical invasions are exceptionally high and also reported to have post-operative complications. **Objective** -The objective of this review article is to analyze the pathophysiological understanding of valvular heart disease bridging the various aspect of *Hridroga* (heart diseases) explained in the ancient Ayurvedic classics. **Materials and methods:** The references related to *hridroga* and valvular heart diseases are collected from various ayurvedic texts, indexed journals and cardiology books. Keywords Valvular heart disease AND *hridroga* and VHD OR *hridroga* prevalence are used for searching the literature in PubMed. **Results and Discussion:** VHDs in Ayurveda can be understood where the diseased valve may be stenosed or may develop laxity is usually due to improper *kapha* or *vata* condition. The risk factors and management are explained. **Conclusion-** Ayurveda can provide a novel approach in the management of Valvular Heart to enhance and improve the quality of life of VHD patients.

**KEYWORDS:** Cardiovascular disease, heart disease, *hridroga*, narrative review, valve, valvular heart disease, VHD

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## 1. INTRODUCTION

Cardiovascular diseases (CVDs) are the group of diseases that affecting heart and its blood vessels. The CVDs have become a prime concern afflicting globally with an estimated number of mortality and morbidity of 17.9 million lives per year. [1] The prevalence of cardiovascular disease is spreading rapidly with alarming rate in India and other developing countries. In CVDs, one among leading cause of cardiovascular morbidity and mortality worldwide is Valvular heart diseases (VHDs). [2] Valvular heart diseases (VHD) are the structural or functional abnormality in either of the heart valve or its adjoining apparatus. The rate of prevalence of VHDs increases with age and higher in older individuals. [3] In the era of modern advancement in cardiology, there are interventional therapies and surgeries causing economic burden. Ayurveda is a holistic science which attributes to the enhancement of quality of life. It focuses on a variety of facets of life and can be utilized for an integrated approach in cardiology.

Ayurveda have encompassed the various cardiovascular diseases in the umbrella term as *Hridroga* (heart disease) signifying the various diseases related to heart. It is a vital part of the body and considered one among the *Sadyapranahara marma* (vital points) [4] i.e. injury to the heart can lead to instantaneous death. *Hridaya* (heart) is usually differentiated in the fourth month of intra-uterine life. [5] It is predominantly made up of maternal influence during embryogenesis.

### Aims & Objective-

To analyze, understand and explore the understanding of valvular heart diseases in Ayurveda and correlate its modern concept of pathophysiology for an insightful approach as an integrated science.

## 2. METHODOLOGY –

The material and references related to *Hridroga* is reviewed and compiled from *Charak Samhita*, *Sushruta Samhita*, *Ashtanga Samhita* and other classical books. Various

references on valvular heart diseases were collected from modern cardiology books, clinical studies and contemporary research articles and comparative interpretation was done on various aspects of valvular stenosis, regurgitation and degenerative diseases. Relevant articles are extracted from PubMed using various key aspect to retrieve relevant articles. The Boolean operators AND, OR were used during the data search for the article. Key findings were used to compile the search data.

**Table 1: Keyword Search Strategy**

Database/ source	Search Term Used	Filter applied	Results	Notes
PubMed	Valvular heart disease AND hridroga	English No time restriction	01	Review data was collected
PubMed	VHD OR <i>hridroga</i> prevalence	English	1730	Articles related to <i>hridroga</i>

### Literature review-

Valvular Heart Disease is a defect in heart valve which usually occurs due to valve myxomatous or fibrotic changes leading to various histopathology patterns leading to various dysfunction. [6] Valves are the structure present in the heart to ensure unidirectional flow of the blood and prevents its backward regurgitation in the circulation. VHD can be manifested in any of the cardiac valve in form of Valvular Stenosis, Valvular regurgitation or further may lead to prolapse of the valve.

### Anatomy of the Heart Valve.

*Hridaya* is a delicate organ, made up of the essence of *kapha* (one among the 3 governing entities) and *shonita* (blood). [7] It is considered *pranayatana* (seats of life) [8] i.e. seat of life which includes the structures like Myocardium, Pericardium, Valves & chambers of, Arch of Aorta, coronary Arteries, coronary sinuses, Pulmonary arteries. Mature heart valve is

made up of extracellular matrix (ECM) and valve interstitial cells (VIC) along with endothelial cell layer [9] which shows the predominance of *prithvi mahabhuta* (earth entity) along with harmony of *rasa, rakta, mamsa dhatu* (bodily tissues). The structure thus confers the opening and closing of the valve in the synergy with the pressure gradient across the valve. There are generally two types of heart valve- Atrioventricular valve (in between the atria and ventricle) and semilunar valve (resembles semilunar shape valves). [10] There are four valves in heart to regulate the flow of blood namely mitral valve (between the left atrium and left ventricle), tricuspid valve (between the right atrium and right ventricle), aortic valve (between the left ventricle and aorta) and the pulmonary valve (between the right ventricle and pulmonary artery). Basic structure of valve consists of a fibrous ring, cusps, chordae tendineae and papillary muscles.

#### Physiology of Heart Valve

The heart is a muscular organ which consists of *Prana vayu, vyana vayu* (types of vata), *sadhak pitta* (type of pitta), *avalambak kapha* (type of kapha) and *oja* (vital essence) and mind. These valves open and close in response to pressure differences between cardiac chambers. Proper valve function ensures efficient blood circulation and prevents backward flow. The blood flows from atria to ventricle through opening of AV valve as the ventricle relaxes with the relaxation of papillary muscle etc. When the ventricles contract, the raised pressure drives the cusps upward leading the edges of cusp to meet thus closing the opening and papillary muscles thus tightening the chordae tendineae thus preventing the cusps from everting. At the same time, semilunar valves open up as the pressure in ventricles exceeds the pressure in the arteries and ejecting the blood from left ventricles to aorta and from right to the pulmonary trunk. Semilunar valves close with the relaxation of the ventricles with the opening of AV valve. The First cardiac sound "S1" is produced on the closure of AV valves second cardiac sound "S2" occurs on the closing of

semilunar valve in the cardiac cycle producing cardiac normal heart sounds.

The *vyana vayu* (type of vayu) helps in the rhythmic contraction and relaxation of the muscles, along with the movements of the valvular apparatus for its opening and closing. [11]

#### Causes of VHD

Valvular heart disease is caused by [12]

1. Age related / Degenerative calcification is the common cause of VHD - Calcific aortic stenosis, mitral annular calcification or Myxomatous degeneration leading to mitral valve prolapse.
2. Congenital causes – bicuspid aortic valve, congenital mitral stenosis etc.
3. Rheumatic heart disease – is also one among the cause of VHD.
4. Ischemic changes in a valve or changes causing connective tissue disorder.
5. Dietic - Fatty food, fermented diet, junk food etc.
6. Lifestyle habits – smoking, alcohol, irregular eating habits
7. Trauma
8. Stress, anger, irritability.
9. Secondary to diabetes, hypertension, smoking, and elevated levels of low-density lipoprotein cholesterol and lipoprotein(a) can lead to stenosis pathology.

**Types:** The types of VHD are as follows- [13]

1. **Valvular Stenosis-** Valvular Stenosis is the stiffening of the heart valve due to fibrotic changes, calcification of the valve restricting the movement of the valve further reducing the area of the valve orifice. The valve has to undergo more pressure to pass the blood from the narrowed orifice. The changes can hemodynamically lead to pressure overload in the chamber, thickening of the heart muscles leading chamber hypertrophy and can also reduce the cardiac output.

**2. Valvular Regurgitation-** Valvular regurgitation is the backward flow of blood due to the scarring or retraction of the valve weakened leaflets leading improper closure of the valve. This leads to further dilation of the chamber to accumulate the regurgitant blood. This hemodynamically also affects the volume overload in the affected chambers further increasing the cardiac workload. It may also further lead to prolapse of the valve and vice versa. The heart initially compensates by dilating and increasing stroke volume, but prolonged overload eventually leads to heart failure.

The patient is usually asymptomatic at the earlier stage but as the disease progress with severity its leads to various signs and symptoms. The presence of murmur caused by the turbulence flow of blood along with the echocardiography can be diagnostic parameter to confirm VHD. The turbulence is created by the disoriented *vyana vayu* leading to the pathology. As the disease progress there may complaint of chest pain, dyspnea and palpitation.

### Pathophysiology

Ayurveda does not describe Valvular Heart disease as a single entity but can be under *hridroga*. The sign and symptoms of VHD in stenosis and regurgitation can be correlated to *Vata-kaphaja* or *vataja* kind of *hridroga*. The various causes affect the *doshas present* in the heart specially afflicting the the *avalambhaka kapha* and *sadhaka pitta* to bring about rheumatic changes in the valve leading to various dysfunction in the valve along with its morphological changes. The changes also affect the *gati* (movement) of the *vyana vayu* leading to its *vimargagaman* (abnormal movement) thus affecting the normal physiology of opening and closing of the valve.

*Samprapti-Ghatakas* (pathophysiology) –

*Samprapti-Ghatakas* as explained in ayurveda are- [14]

1. *Doshas- Vata* dominance -*Prana, Vyana, Apana Vayu, Pitta- Sadhaka, Pachaka pitta & Kapha- Avalambaka kapha*

2. *Dushyas - Rasa-Rakta- Mamsa* (bodily tissue)
3. *Aama - Rasagata*

4. *Srotas* (channel) - *Rasavaha, Raktavaha , Mamsavaha & Manovaha*

5. *Srotodushti - Sanga* (accumulation)& *Vimargama type of srotorodha* (obstructed channel)

6. *Vyakta Sthana* (Manifestation stage of a disease)- *Hridaya, Dhamani*

7. *Adhithana - Mamodaihika* (Psychosomatic) (*Sira, Dhamani, Srotas*)

8. *Sanchara sthana - Sarva Sharir* (whole body)

9. *Rogamarga - Madhyama*

### 3. DISCUSSION

The pathophysiology where the diseased valve may be stenosed or may develop laxity is usually due to improper *kapha* or *vata* condition. The sclerotic changes lead to *ati kathinyata* (hardening) of the valve. The *mahabhuta predominancy* in *hrudaya* (heart) is formed of *teja, prithvi* and *Aap mahabhuta*. [15] The modified life style, cholesterol enriched diet, sedentary life style etc. can lead to diminishes the *agni* further produce improper *rasa dhatu* leading to improper formation of further *dhatu*s. As heart is seat of *rasavaha srotas*. The increased *kledata* due to *saama kapha* and *dushta meda* (vitiated fat tissue) when enters the *srotas* (channels) may do the *upalepna* (coating) in the *srotas* causing *sroto sanga* (obstructions of the channels) further leading to *dhamani pratichaya* (thickening of the arteries) like condition further obstructing the movement of *vyana vayu* leading its *vimargamana* (abnormal movement). To compensate the loss the heart works vigorously. To overcome the above the *samprapti* (pathogenesis) drugs with hot, light, *akash mahabhuta* predominant drugs need to be used.

In case of regurgitation, the valve loses its competency and unable to close properly due to weakened valve leading to *vimargamana* (abnormal movement) of the *vyana vayu*. To compensate the loss and to nurture the valve the motility of

*vata* need to stabilize along with providing nourishment to the valve. The valvular abnormalities usually alter normal cardiac hemodynamic. If VHD left untreated it can lead to several complications like heart failure due to chronic pressure or volume overload, arrhythmias, formation of blood clots due to turbulent flow leading to thromboembolism, pulmonary hypertension or infective endocarditis like condition. Hence early diagnosis and appropriate management are essential to prevent long-term complications and improve patient outcomes.

The diagnosis and evaluation of VHD depends on echocardiography, doppler studies, cardiac catheterization and imaging modalities for its anatomical and also its quantitative assessment. In modern science VHD is considered as mechanical and hemodynamic disorder. The treatment depends on the severity of the disease. Mild VHD is conservatively managed using diuretics, beta blocker, ACE inhibitors, anti-coagulants etc. and with severity of the disease it requires interventional procedures like balloon valvotomy, valve repair or valve replacement with mechanical or bioprosthetic.

The general line of treatment mention in our classics is *nidana parivarjana* i.e. changes in a causative factors like faulty diet and lifestyle, *samsodhana* (detoxification) therapies. [16] The specific treatments are also mentioned as per the *doshas* in our classics. In *vatajahridroga*, *snehana* (oleation) followed by *Vamana* (therapeutic emesis), *basti* (enema) can be done in treating *Vataja Hrid Roga*. *Pippalyadi Churna*, *Pushkarmooladya Churna*, *bilwadi taila*, *punarnavadi taila* etc are used in *vataja hridroga*. In *pittaja hridroga*, *Vamana* (therapeutic emesis) should be administered with mixture of *Shreeparni* or *Gambhari* (*Gmelina arborea*), *Madhuka* (Indian licorice), *Madhu* (honey), *Sita* (sugar), *Guda* (jaggery) and *Jala* (water). *Dkrakshyadi Churna*, *Arjunadi Churna*, *Arjunadi Ksheerapak*, *Laghu Panchmoola Ksheerapak*, *Bala Madhuk Ksheerapak* etc. are used in this condition. The treatment

principle used in *kaphaja hridroga* are *Swedana* (sudation followed by *Snehana*), *Vamana* administered after *Swedana*, *Langhana* – especially fasting should be administered. Formulation used are *Trivrutadi Churna*, *Eladi Choorna*. In *Sannipataja Hridroga* caused by aggravation of all the 3 *doshas*, *Langhana* i.e mainly fasting or light food should be administered, foods which alleviate *Tridoshas* should be administered. Medicines which are antagonistic to the *Tridoshas* should be given i.e., *Tridosha* alleviating *Churnas*, *Ghritas* like *Pusdhkaramoola churna*, *Nagabala churna*, *Arjuna churna* etc. In *krimija hridroga*, *Langhana* should be initially done followed by *Apatarpana chikitsa* i.e the patient should be kept on starvation or food which doesn't provide nourishment to the tissue. *Krimi hara karma* meaning all the treatments and medicines which destroy *Krimi* (worms) as explained in *Krimi Roga Chikitsa* should be done like *Vidangadi Churna* etc. The treatment for various valvular disease is planned as per the involvement of *doshas* leading to valvular dysfunction like valve rigidity, stenosis, thickening, fibrosis of valve leading to obstruction or any inflammatory condition.

For the *ayurvedic* management in the case of stenosis drugs have diuretics, analgesics and anti-inflammatory properties like *Punarnava* (*Boerhavia diffusa*), *Devardaru* (*Cedrus deodara*), *Gokshura* (*Tribulus terrestris*), *Dashmoola* etc. can be used. Similarly, the drugs like *Punarnava*, *Dashmoola* etc. having anti-inflammatory properties will also help to manage fluid overload and oedema. Drugs Like *Bala* (*Sida cordifolia*), *Arjuna* (*Terminalia arjuna*), *Shatavari* (*Asparagus racemosus*), *Yashtimadhu* (*Glycyrrhiza glabra*) etc. can be used to provide nourishment to the weakened valve and prevent regurgitation or prolapse. The drugs like *Rasna* (*Pluchea lanceolata*), *Dashmoola*, etc. will pacify the *vata*. [17] These drugs are also having *hridya* (cardiotonic) properties, strengthening the cardiac muscle and in proper circulation.

Palpitations can be managed with *Mukta pishti*, *Akika pishti*, *Jaharmohra pishti*, *Nagarjunabhra Rasa*, *Jawahar mohra*, *Arjuna kshirapaka*, *Arjunarista*, *Siddha Makardhwaj*, *Brihat vatachintamani Rasa*, *Mahalaxmivilas Rasa* etc. which helps in nourishing the heart. Angina or chest pain can be treated on the line of *Hritshula* (chest pain) with *Mrigshringa Bhasma*, *Brihat vata chintamani Rasa*, *Yogendra Rasa*, *Nagarjurnabhra Rasa*, *Hridyarnav Rasa*, *Arjunarista*, *Dashmoola*. [18] *Swaskuthar-Rasa*, *Swaskasachintamani Rasa*, *Malla-Sindur*, *Sameer-Pannag-Ras*, *Abhraka Bhasma*, *Shringa Bhasma*, *Sitopaladi Churna*, *Talisadi churna*, *Vasavleha*, *Kantakari avleha*, *Agastya Haritaki avleha*, *Kankasava* etc medication can be given in case of exertional dyspnea, cough. Panchakarma therapies like *basti* (enema therapy) and *mrudu shodhana* (mild detoxification) therapies are also beneficial in cleansing the obstructed channels and strengthening the valves improving perfusion. *Rasayana* therapy plays an important role in strengthening the heart and improving longevity. Herbs such as *Amalaki*, *Ashwagandha*, and *Guduchi* help improve immunity, nourish tissues, and enhance overall vitality. Use of *rasayana* therapy will help to improve cardiac strength and slow the disease progression enhancing tissue nutrition. Patients are advised to follow and maintain proper diet, *dincharya* (daily regimen) and also *ritucharya* (seasonal regimen) to maintain homeostasis of the body. Consumptions of high fat intake diet, oily junk food items, overeating etc should be avoided in day-to-day life. Patient should be asked to avoid strenuous work, and also sedentary life style. Yoga, pranayama and mild brisk walking like exercises which helps to improve cardiac efficiency should be recommended after proper assessment. A balanced diet along with proper lifestyle practices helps maintain cardiac health and reduces the risk of complications. Although classical Ayurvedic texts describe various formulations and therapies beneficial for heart diseases under the category of *hridroga*, there is limited scientific

evidence specifically addressing their effectiveness in valvular heart disease. Lack of lesion specific clinical trials, randomized clinical trial on VHD, no specific protocol in management of VHD develops a major gap. The lack of supportive evidence develops a drawback in the field of cardiology in ayurveda. Hence, there is a need for future studies, an approach to analyze the mechanism of VHD through Ayurveda to enhance and improve the quality of life of VHD patients. There is also a need to explore scientifically the various concept of cardiology in Ayurveda.

Limitations: Previous research work data not compiled.

#### 4. CONCLUSION

Ayurveda can provide a novel approach in the management of Valvular Heart Disease with knowledge of the basic principle provided in the management of *Hridroga*. It can be utilized to improve cardiac strength, symptomatic burden and to ensure better quality of life. Evidence-based research is need for an integrated approach in contemporary VHD in field of cardiology

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The authors declare this manuscript was written without the use of generative artificial intelligence tools. All the content, including text

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