

A CROSS-SECTIONAL STUDY TO ASSESS VEGADHARANA IN ETIOPATHOGENESIS
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ABSTRACT

Hrudroga is mentioned as one among the *mahagada* according to *charaka* as *hrudaya* is one among the *mahamarmas* and *ashraya* of *prana*.^[1] It is said as '*Tatra hrudaye dasha dhamanyaha pranapanou mano buddhischetana mahabhutani cha nabhyamara iva pratisthitani*'.^[2] Hence any *upaghata* to *hrudaya* leads to *pranopaghata*.^[3] Therefore, *vishesha rakshana* of *hrudaya* has to be done.^[4] Ischemic heart disease (IHD) is defined as an acute or chronic form of cardiac disability arising from an imbalance between the myocardial supply and demand for oxygenated blood. *Dharana* of the *swabhavataha pravrutta vegas* is termed *vegadharana*^[5] and all *acharyas* have mentioned it and its ill effects in detail. *Vagbhata* has mentioned 14 types of *vegadharana*, *Charaka* 13 types whereas *Sushruta* has mentioned these 13 types of *vegadharana* as *nidanans* for 13 kinds of *udavarta*. Among them, *hrudroga* is the *lakshana* for *adhovata*, *pureesha*, *udgara*, *trushna*, *kasa*, *shramashwasa*, *bashpa*, *shukra vegadharana* **Aim:** This study aims to investigate the prevalence of *vegadharana* in the etiopathogenesis of *hrudroga*. **Methodology:** This research utilized a cross-sectional design, employing a survey strategy. Data collection was conducted using a specialized case proforma and a structured questionnaire **Results:** The observational findings indicate that *mutra*, *trushna*, *shramashwasa*, and *bashpa vegadharana* were the most prevalent among participants. The co-occurrence of *mutra*, *trushna*, and *shramashwasa vegadharana* was notably prominent, followed closely by the combination of *mutra*, *trushna*, *bashpa*, and *shramashwasa* in patients diagnosed with *hrudroga*, surpassing other combinations.

KEYWORDS: *Hrudroga*, *rasavaha sroto dushti*, Ischemic heart disease, *shramashwasa vegadharana*, ECG.

INTRODUCTION

In India, cardiovascular diseases (CVDs) represent a substantial health challenge, and this concerning trend is expected to endure in the foreseeable future. Findings from the Global Burden of Disease study underscore that in 2010, CVDs were responsible for nearly a quarter (24.8%) of all mortality cases in India. Among the various risk factors associated with CVDs, high blood pressure (BP) stands out as a prominent concern.

In Ayurveda, *Hrudaya* is considered *Trimarma*, one among *dasha Pranayatanam*, placed near *Anahata Chakra*, the *sthana* of *Vyanavayu*, *Sadhaka Pitta*, *Avalambaka Kapha*, *Ojas*, *Mana*, *Buddhi*, *Chetana* and the *Moola* of *Pranavaha* and *rasavaha Srotas*. The *Samhita* discusses the causes of heart disease, highlighting *Vegadharana* as the common etiological factor. The term "*Vega*" means natural urge, and "*Dharana*" means suppression. Therefore, collectively, the term *Vega Dharana* means the forceful suppression of a natural urge.

The body sends natural signals, known as "calls," which should be heeded promptly to maintain balance and eliminate potential sources of imbalance. The human body is a remarkably intricate system with multiple mechanisms for maintaining equilibrium and removing substances that could either benefit or harm the body.

Vega dharana as a *Nidana* is a unique concept of *Ayurveda*. The process of *Vega dharana*, elucidated by the *acharyas*, instigates the derangement of *Vata Dosha*, subsequently leading to the vitiation of *Pitta* and *Kapha Doshas*. Thus, *vata* plays a crucial role in causing various diseases, including cardiac disorders.

Ayurveda strongly emphasizes the need to understand the pathophysiology of an illness before designing a treatment plan. The first line of treatment in *Ayurveda* is *Nidana Parivarjana*. For this reason, every disease caused by the suppression of natural urges can be prevented by avoiding the suppression of natural urges under any circumstances. The primary objective of this

study is to investigate the role of *vegadharana* in causing damage to the *srotas* and the *dhatu*s, consequently leading to the development of the *hrudroga*. Moreover, this research aims to analyze and assess the involvement of *vegadharana* in the *samprapti* (pathogenesis) and its significance in guiding the treatment of *hrudroga*.

Objectives of the study

1. To study the prevalence of *vegadharana* in the etiopathogenesis of *hrudroga*
2. To study *hrudroga* as per the classics.
3. To study ECG changes in *hrudroga*.

METHODOLOGY

A minimum of 60 subjects suffering from *hrudroga* were selected for the study, irrespective of their religion, social, economic, and educational statuses at random.

Study design

- This is a cross-sectional study
- A special structured case pro forma was prepared with details of questionnaires about the *vegadharana*

involved primarily in the causation of the disease and its *lakshanas*.

Inclusion criteria

- Subjects from the age groups 30-70 years are considered for the present study.
- Subjects presenting with classical *lakshanas* of *hrudroga*

Exclusion criteria

- Patients suffering from other systemic diseases like GERD, Peptic ulcer disease
- Patients with congenital heart disease
- Pregnant ladies

RESULTS

The observed data is recorded in a well-designed case proforma. Total observed data and results are divided into two sections: demographic data and data related to disease.

Table No 01: Distribution of frequency of *vegadharana*.

Vega	Daily	Sometimes	Occasionally	Frequency	Never/Rare
<i>Pureesha</i>	0	9	4	2	0
<i>Mutra</i>	0	15	20	10	0
<i>Adhovata</i>	0	4	1	0	0
<i>Udgara</i>	0	1	1	1	0
<i>Trushna</i>	0	8	11	17	0
<i>Kasa</i>	0	1	6	0	0
<i>Shramashwasa</i>	0	2	19	13	0
<i>Bashpa</i>	0	3	19	7	0
<i>Shukra</i>	0	0	2	0	0

Table No 02: Distribution of duration of *vegadharana*.

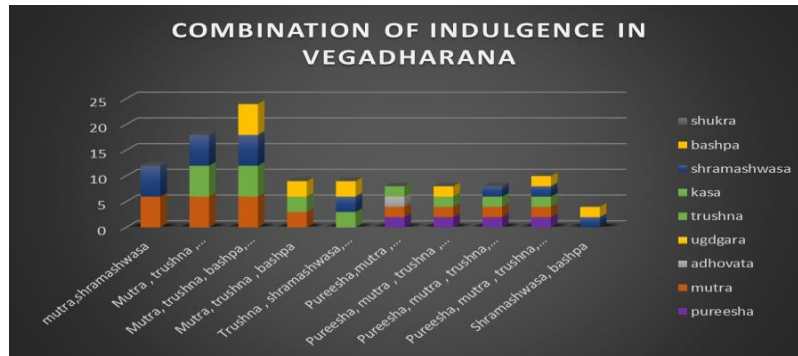
Duration	<15 mins	15-30 Mins	>30 Mins	>1 Hour
<i>Pureesha</i>	3	10	0	2
<i>Mutra</i>	8	18	0	19
<i>Adhovata</i>	3	2	0	1
<i>Udgara</i>	0	3	0	0
<i>Trushna</i>	2	6	6	22
<i>Kasa</i>	2	5	0	0
<i>Shramashwasa</i>	4	12	18	0
<i>Bashpa</i>	0(<30min)	1(3.-60min)	11(1-12hours)	17(>12 hours)
<i>Shukra</i>	0	0	0	2

Table No 03: Distribution of period of *vegadharana*.

Period	0-10Years	>10years	>20 Years	>30 Years	>40 Years
<i>Pureesha</i>	1	0	9	5	0
<i>Mutra</i>	1	16	13	12	3
<i>Adhovata</i>	1	2	1	1	0
<i>Udgara</i>	0	1	1	1	0
<i>Trushna</i>	0	16	8	9	3
<i>Kasa</i>	3	1	1	2	0
<i>Shramashwasa</i>	1	15	8	9	1
<i>Bashpa</i>	3	15	4	6	1
<i>Shukra</i>	0	2	0	0	0

Table no 04: Distribution of combination of *vegadharana*.

Combination of <i>vegadharana</i>	frequency	Percentage
Mutra,shramashwasa	6	10%
Mutra, trushna, shramashwasa	6	10%
Mutra, trushna, bashpa, shramashwasa	6	10%
Mutra, trushna, bashpa	3	5%
Trushna, shramashwasa, bashpa	3	5%
Pureesha,mutra , adhovata,trushna	2	3%
Pureesha, mutra, trushna, bashpa	2	3%
Pureesha, mutra, trushna, shramashwasa	2	3%
Pureesha, mutra, trushna, shramashwasa, bashpa	2	3%
Shramashwasa, bashpa	2	3%

Fig no 01 - Distribution of combination of *vegadharana*.Table No. 5: Distribution of patients according to *Samanya Hrudroga Lakshana*.

<i>Samanya Lakshana</i>	Frequency	Percentage
Vaivarnya	0	0%
Murcha	0	0%
Jwara	0	0%
Kasa	0	0%
Hikka	0	0%
Shwasa	39	65%
Asyavairasya	1	1.6%
Trushna	0	0%
Pramoha	7	11.6%
Chardi	0	0%
Kaphotklesha	0	0%
Ruja	46	76.6%
Aruchi	6	10%

Table No: 06: Distribution of patients according to *vataja hrudroga lakshana*.

<i>Vataja Hridroga Lakshana</i>	Frequency	Percentage
Ayaymyate	46	76.6%
Tudyate	4	6.6%
Deeryate	2	3.3%
Sphotyate	0	0%
Patyate	1	1.6%
Vepathu	1	1.6%
Vesthana	0	0%
Stambha	8	13.3%
Pramoha	7	11.63%
Shunyata	0	0%
Dara	0	0%
Jeerne Cha Atyarta Vedana	4	6.6%
Hidrava	25	41.6%
Shulyate Atyarta	27	45%

<i>Akasmata Deenata</i>	42	70%
<i>Shwasavarodha</i>	39	65%
<i>Shabdahishnuta</i>	2	3.3%
<i>Alpa Nidra</i>	18	30%
<i>Bhaya</i>	14	23.3%
<i>Shoka</i>	3	5%

Table No: 07: Distribution of patients according to *pittaja hrudroga lakshana*.

<i>Pittaja Hrudroga Lakshana</i>	Frequency	Percentage
<i>Hrit Daha</i>	2	3.3%
<i>Tiktavaktrata</i>	0	0%
<i>Tikta Amla Udgara</i>	1	1.6%
<i>Klama</i>	28	46.6%
<i>Trushna</i>	0	0%
<i>Murcha</i>	0	0%
<i>Bhrama</i>	10	16.6%
<i>Sweda</i>	32	53.3%
<i>Osha</i>	0	0%
<i>Chosha</i>	0	0%
<i>Dhoomayana</i>	0	0%
<i>Mukha Shosha</i>	0	0%
<i>Jwara</i>	0	0%
<i>Tama</i>	1	1.63%
<i>Santrasa</i>	3	5%

Table No: 08: Distribution of patients according to *kaphaja hrudroga lakshana*.

<i>Kaphaja Hrudroga Lakshana</i>	Frequency	Percentage
<i>Suptata</i>	1	1.6%
<i>Stimta</i>	7	11.6%
<i>Bharika</i>	2	3.3%
<i>Aruchi</i>	6	10%
<i>Tandra</i>	0	0%
<i>Ashmavruta</i>	0	0%
<i>Praseka</i>	0	0%
<i>Kasa</i>	0	0%
<i>Agnimardava</i>	13	21.6%
<i>Madhura Asyata</i>	0	0%
<i>Nidra</i>	0	0%

Table No: 09: Distribution of patients according to IHD clinical features.

C/F of IHD	Frequency	Percentage
chest pain	44	73.3%
chest discomfort	52	86.6%
heaviness of chest	4	6.6%
tightness of chest	19	31.6%
burning sensation in the chest	2	3.3%
squeezing	0	0%
sweating	33	55%
radiation of pain to the left arm	18	30%
shortness of breath	35	58.3%
choking in throat	3	5%
syncope	0	0%
nausea	0	0%
dizziness	7	11.6%
palpitation	23	38.3%
generalized weakness	51	85%
pedal edema	2	3.3%
others	8	13.3%

Table No 10: Distribution of patients according to *doshaja hrudroga*.

<i>Doshaja hridroga</i>	Frequency	Percentage
<i>vataja</i>	17	28.3%
<i>pittaja</i>	2	3.3%
<i>kaphaja</i>	0	0%
<i>vatapittaja</i>	36	60%
<i>vatakaphaja</i>	3	5%
<i>pittakaphaja</i>	0	0%
<i>tridoshaja</i>	2	3.3%

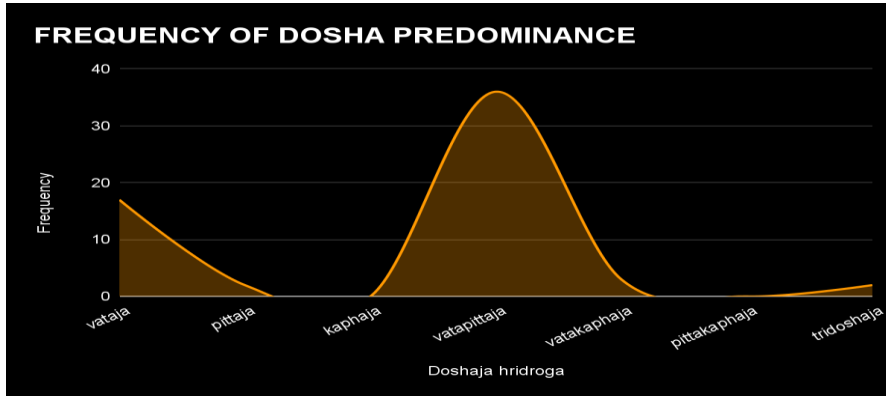


Fig no 02- Distribution according to *dosha* predominance ECG changes.

Table no 11: Distribution according to changes in ECG parameters.

ECG Parameters	Frequency of Normal	Frequency of Abnormal	Percentage of changes in parameter
Rate	46	14	23.3%
Rhythm	48	12	20%
Axis	60	0	0%
P Wave	60	0	0%
PR Interval	60	0	0%
R Wave	52	8	13.3%
Q Wave	60	0	0%
ST Segment	5	55	91.6%
ST Elevation	-	48	80%
ST Depression	-	7	11.6%
T Wave	23	37	61.6%

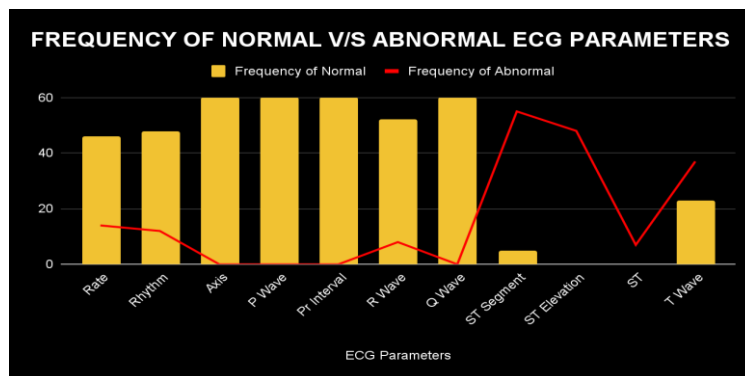


Fig no. 03- Distribution of normal v/s abnormal ECG Parameters.

Table no 12: Distribution according to the site of infarction.

Type	Frequency	Percentage
Anterior Wall	20	33.3%
Posterior Wall	4	6.6%
Lateral Wall	8	13.3%
Inferior Wall	5	8.3%

Septal	0	0%
Antero Lateral	10	16.6%
Antero Septal	6	10%
Infero Lateral	7	11.6%

Table no 13: Distribution of patients according to type of MI.

Type	Frequency	Percentage
UA/NSTEMI	37	33.3%
ACUTE MI/STEMI	23	38.3%

DISCUSSION

Hrudaya is a vital organ, considered a Pranayatana.^[6] It is one among the Trimarmas^[7] contemplated as Sadyo Pranahara Marma.^[8] Hrudaya is the Moola of both Rasavaha and Pranavaha Srotas^[9,10], reflecting the body's circulatory and respiratory mechanisms. Hrudaya is also considered as Chetana Sthana which includes all the functions of Manas and Indriyas and is not restricted exclusively to the conducting system of the heart.

Discussion on demographic data

- Data obtained about the Age of the patients shows that the highest incidence of *Hrudroga* is seen in the patients belonging to the age group of 56 - 70 years (81.7%) followed by the group of 46 - 55 years (13.3%) then 30 -45(5%) That means the majority of the patients are in *vruddha avastha*, where *Vata Dosha* predominates, and *vegadharana* which has been done also leads to *vata prakopa* leading *rasavaha sroto dushti* and thus affects the *hrudaya* which is its *moola*.
- Gender-wise distribution of patients shows that the highest incidence is seen in males (65%) followed by females (35%). Emotional challenges, hormonal changes, obesity, smoking, and alcohol history are all substantial risk factors for cardiovascular disease in males along with *vegadharana*.
- Data obtained about occupation, shows a higher incidence in housewives (21.7%) followed by businessmen (13.3%). This may be due to their irregular and faulty dietary habits, disturbed sleep, mental stress, and strain with their service which led them to do *vegadharana* which led to more incidence of the disease.
- Data obtained about the Socio-Economic Status of the patients shows the highest incidence in the Middle-Class Family (95%). People with a lack of health awareness, irregular eating habits, active addiction, and heavy workload along with *vegadharana* are more susceptible to the condition.

Discussion on personal history

- Screening of the patients as per Agni showed 75% of patients were having Mandagni. It is due to Akala Bhojana and Vishamashana. This results in Vata dushti^[11] and thereby resulting in Agni Mandya.
- In this present study 65% were having disturbed sleep, and 35% sound sleep. Disturbed sleep may be

due to the Vata prakopa due to vegadharana and other nidanas indulged.

- In this study, 61.7% had baddha mala, and 38.3% had prakruta mala pravrutti. Baddha mala may be due to the vata prakopa and agni mandya. Changes in intestinal microbiota by constipation can induce atherosclerosis and blood pressure rise in arteries and may lead to heart diseases.^[12]
- Data obtained about the Diet of the patients shows the highest incidence of Hrudroga is seen in patients habituated to a mixed diet (68.3%) and vegetarian (31.7%) Nonvegetarian food is spicy, oily, and heavy for digestion which leads to Agnimandya.
- 90% were involved in Vishamashana, 68% in Anashana and also 26.6% were involved in Adhyashana. Vishamashana is responsible for agni dusti, anashana leads to vata prakopa and adhyashana leads to tridosha prakopa all leading to rasavaha sroto dusti and hrudroga.
- The maximum rasa combination seen was of katu, lavana which was 36% followed by madhura, lavana and katu which was 15%. katu and lavana rasa is said to cause vata prakopa leading to the disease.
- The maximum guna combination seen was of ruksha ushna guru which was 25% followed by snigdha ushna guru which was 23%. Also, 36% of people were indulged in teekshna ahara. Ruksha, ushna and tekshna guna are said to cause vata prakopa leading to other dosha prakopa and agni mandya.^[13,14]
- 20.5% were doing ratrijagarana. Ratrijagarana causes vata and pitta vriddhi as the kala is vata pitta pradhan.^[15,16] This influences the agni leading to its dushti and thus leading to rasa and also rakta dushti
- In this study, 31.3% were doing divaswapna. Either sleeping for more than the general given time, or day sleep causes kapha dosha prakopa and increases snigdha guna^[17] and also tridosha prakopa^[18] which leads to mandagni. This leads to improper rasa formation affecting the hrudaya.
- In this study, 33.7% were doing ativyayama. This leads to vata prakopa and thus leading to rasa dushti and hrudroga.
- In this study, 16.6% were smoking. It has ushna, teekshna, ruksha, and vyavayi guna which causes vata pitta vriddhi and leads to rasa dushti and also affects the rasavaha srotas and raktavaha srotas which ultimately affects the hrudaya.
- Madya is having ushna, teekshna, ruksha, vyavayi guna, and is amla rasa pradhana. Hence excess

consumption for a long duration leads to vata pitta dushti leading to rasa dushti. It also affects the buddhi of the person, the seat of which is said to be the hrudaya thus leading to its disease. In this study, 23.3% had a habit of alcohol.

- In this study, 6.6% had a habit of tobacco chewing which because of its ruksha ushna teekshna guna causes vata dushti.

Discussion on hrudroga lakshana

- In this study, maximum people were seen with vatapitaja hrudroga i.e 60% and 28.3% with vataja hrudroga.
- Among the samanya lakshanas 76.6% of the people presented with shula and 65% had shwasa which was either associated with shoola or present singly. Other lakshanas were not prevalently seen.
- Among vataja hrudroga lakshanas, along with shoola and shwasa, 41.6% had hridrava, 70% had deenata and other lakshanas were less prevalent.
- Among pittaja hrudroga lakshanas, 53.3% of people experienced sweda and other lakshanas were not much seen.
- Among kaphaja hrudroga lakshanas, the major lakshana seen was agnimandya (21.6%). The rest of the lakshanas were not seen much. Various symptoms or clinical features include.
- Various kinds of pain are mentioned in different subtypes of IHD as heavy, squeezing, and crushing, although, occasionally, it is described as stabbing or burning and prolonged which can be considered as various kinds of pain mentioned such as atyarta shula, nirmathana, bhidyate, tudyate which are of vata origin, daha, osha, chosha of pitta origin and bharika of Kapha origin.
- Epigastric pain or discomfort, heartburn along with nausea and vomiting are mentioned which can be considered as hrit daha, tikta amlodgara which is of pitta origin and praseka, chardi because of kapha.
- Terrified, restless, and apprehensive due to great fear of death laxanas can be said as bhaya, shoka caused because of vata prakopa.
- Lethargy can be said to tandra or alasya caused because of kapha.
- Peripheral cyanosis or Paleness may be seen which is mentioned as vaivarnya in the lakshana.
- There are accompanying symptoms like weakness which can be said as. akasmat deenata, klama, or anxiety as santrasa which may be due to vata and pitta.
- Sweating and fever indicate involvement of pitta dosha.
- Dyspnoea can be said as shwasavarodha because of the involvement of vata as prana and udana vata both are related to hrudaya.

In a nutshell, IHD cannot be classified as a particular kind of hrudroga since different combinations of symptoms may be present, indicating the existence of

different doshas, making it crucial to determine which dosha predominates. IHD constitutes angina and myocardial infarction and according to the lakshanas of hrudroga observed, most of the lakshanas of the vataja hrudroga can be seen under the angina pectoris symptoms predominating the pain. Whereas the other lakshanas of vataja and even pittaja and kaphaja lakshanas are observed under the symptoms of MI.

Discussion on pureesha vegadharana

- Apana vata plays a crucial role in the normal downward movement of pureesha.^[19] When vegadharana occurs, it obstructs the normal downward movement of vata, leading to udavarta and baddha mala. This can manifest as symptoms such as udara shoola, shiroruja, and mukhena vit pravritti. Additionally, the pratiloma gati affects agni, leading to rasa dushti and affecting the hrudaya and pranavahana.
- Faeces are composed of dead bacteria, fat, inorganic matter, proteins, undigested roughage, digestive juices, bile pigments, sloughed cells, and odoriferous products including Indole, Skatole, Mercaptans, and hydrogen sulphide. These components are found after maximum absorption from the large intestine and bacterial action in the colon.^[20]
- When faeces enter the rectum, the defecation reflex is initiated through two positive loops. The first loop, which is relatively short, involves the myenteric plexus and triggers a series of peristaltic contractions in the rectum. The second loop is longer and operates through the parasympathetic system. Furthermore, specialized rectal stretch receptors initiate a reflex that leads to two voluntary contractions. The first contraction is a visceral reflex, which results in the relaxation of the internal sphincter, while the second is a somatic reflex that affects the external sphincter. This intricate process ensures the smooth and coordinated passage of faeces during defecation.^[21]
- People who often inhibit these reflexes suffer from severe constipation. If one fails to allow defecation when reflexes are excited, reflexes themselves become progressively less strong over some time and the colon becomes atonic.^[22]
- When reflex suppression persists, it results in elevated pressure on the abdominal muscles and the diaphragm. The diaphragm plays a crucial role in the normal peristaltic movement of the colon, leading to increased pressure on the chest and heart, potentially resulting in discomfort and cardiac complications.
- The regular process of defecation through the defecation reflex can be understood as the normal operation of apana vata. When there is an obstruction to the normal downward movement because of vegadharana, leads to symptoms such as shakrut graha. The aggravated vata, due to increased ruksha guna, results in dry faeces and reduced snigdhatata of the channels, making elimination even

more challenging. Prolonged suppression weakens reflexes and reduces the natural rhythmic movement, known as peristalsis, due to the decreased chala guna of the Vata. The aggravated vata, due to the obstruction, takes a reverse course (pratiloma gati), leading to symptoms such as abdominal distension and increased pressure on the heart, potentially causing heart disease.

Discussion on *mutra vegadharana*

- Normal functioning of apana vata helps in the normal downward movement of mutra. When there is an obstruction in this downward movement, it can lead to an upward movement of vata called udavarta. This can cause symptoms similar to pureesha vegadharana.^[23]
- The filtrate in urine contains various substances such as salts, organic molecules, calcium, fatty acids, inorganic salts, proteins, hormones, and metabolites.
- The micturition reflex is by the sensory stretch receptors in the bladder wall especially in the posterior urethra which causes many superimposed micturition contractions. The signals are taken back to the bladder through the parasympathetic nerve fibres. Once the reflex begins it is a self-regenerative one where the cycle continues until the bladder reaches a strong degree of contraction. After a few minutes, this reflex becomes weak and the reflex starts again after a few minutes to an hour. Once the bladder begins to fill, the frequency of these contractions increases and becomes more powerful. This reflex is basic but the final control is through the higher centres of the brain.^[24]
- When the body's natural reflexes are suppressed for an extended period, urine may stagnate due to weakened reflex strength. This can lead to the accumulation of waste products, which may irritate the bladder causing inflammation of the bladder wall, and also may contribute to systemic inflammation. Prolonged urine stagnation can also exert reverse pressure on the kidneys, leading to increased pressure on the abdomen, chest, and heart, potentially contributing to heart diseases. Furthermore, bladder and kidney irritation can reduce intestinal activities, further increasing abdominal pressure.^[25]
- The reflex's regular operation is connected to the normal operation of apana vata. However, if the reflexes are held back for an extended period, it can lead to vata prakopa, resulting in pain at the location and reversed movement due to the blockage, which puts pressure on the abdomen and may impact the heart, causing hrudamayas.

Discussion on *adhovata vegadharana*

- The normal functioning of apana vata helps in the normal downward movement of the adhovata. When there is obstruction in the normal downward movement of vata due to vegadharana, udavarta

takes place. This affects the agni, causes rasa dushti, affects prana vata, and results in hrudaya badha.

- Gases in the body are formed as a result of swallowed air, bacterial action inside the gut, and gases diffusing from the blood into the gastrointestinal tract. Most gases are a mixture of nitrogen and oxygen derived from swallowed air. The large intestine has a greater proportion of gas by bacterial action and occurs in variable amounts along with nitrogen and oxygen. Among large quantities of gas formed in the large intestine only a small amount is expelled through the anus and the remaining is absorbed back into blood through the intestinal mucosa and expelled into the lungs.^[26]
- When gases are suppressed in the body, it can cause discomfort in the large intestine due to the retention or trapping of gases. This trapping of gases can lead to heightened pressure in the abdomen, which may in turn exert pressure on the diaphragm and subsequently on the heart.
- In the case of both pureesha and adhovata vegadharana, changes are seen in the gut Microbacteria.^[27] This may lead to various inflammatory reactions, thus leading to atherosclerotic changes. The metabolites of these reactions may also affect the organs or tissues of the heart.

Discussion on *udgara vegadharana*

- Udgara is the function of prana vayu.^[28] The normal upward movement of vata is hampered when udgara vegadharana is done, its normal pathway is obstructed and this leads to prakopa of vata and prana dusthi. As hrudaya is the sthana of prana vayu mainly it is affected leading to hrudroga. Also udgara vegadharana leads to dushti of udana vata. As its sthana is uras its vikruti also affects hrudaya leading to its amayas.
- Belching is the physiological venting of gastric air. With each swallow, a certain volume of air is ingested through oesophageal peristalsis and lower oesophageal sphincter relaxation and thus transported to the stomach. To protect the stomach against extreme dilatation physiological venting system exists. There is activation of the stretch receptors of the gastric wall which initiates the vasovagal reflex and an anti-reflux barrier is relaxed and air moves upward this induces relaxation of the upper oesophageal sphincter and thus air escapes sometimes with sound. During this reflex dilatation of the oesophageal body may cause chest pain and heartburn.^[29]
- For belching there is a necessity for dilatation of the oesophageal body also supported by the crural diaphragm. Suppression may exert pressure over the oesophagus and on the diaphragm and thus may affect the heart.^[30]

Discussion on *trushna vegadharana*

- Trushna vegadharana might lead to Ap-kshaya, which causes a decrease in Dravata and an increase in Guruta and Picchilata of Rakta. This might be associated with cardiac disease. Due to the decrease in ap dhatu, there will be rasavaha sroto dushti and shosha, which affects the heart (hrudaya) and leads to its diseases (amayasa).^[31]
- A depletion in intracellular or extracellular fluid volume causes thirst. It is an essential mechanism for maintaining fluid balance in our body. Also, blood volume loss stimulates thirst through neutral input from cardiopulmonary and arterial receptors. Dryness of the mouth and mucous membrane of the oesophagus can elicit the sensation of thirst and hence if a thirsty person drinks water may find relief even when osmolarity is not changed. As kidneys always have to excrete some amount of fluid there is always a tendency for dehydration and a desire to drink water.
- When this need is not met, there will be fluid and electrolyte imbalance, hypovolemia, and hypotension, which can affect the pumping capability of the heart.^[32]

Discussion on *kasa vegadharana*

- Kasa is caused by the involvement of prana and udana vayu.^[33] Both are related to the heart, and pranavahana is also carried out by the heart. When these vata are affected by vegadharana, normal heart functioning gets affected, leading to heart diseases.
- The bronchi and trachea are very sensitive to light touch, and even a small amount of foreign matter or other irritants can trigger the cough reflex. An intact cough reflex is important to protect the lungs from harmful substances and to clear excess secretions.
- For a cough reflex initially, the air is rapidly inspired followed by the closure of the epiglottis and vocal cords to entrap air inside the lungs. Following these abdominal muscles contract forcefully pushing against the diaphragm, and other expiratory muscles also contract which increases the pressure inside the lungs. Then the vocal cord and epiglottis suddenly open wide and air explodes out of the lungs under high pressure. This rapidly moving air carries any foreign material present in the bronchi or trachea.^[34]
- When the cough reflex is suppressed or controlled for a long period, the pressure exerted on the abdomen, diaphragm, and surrounding muscles may increase in strength. This increased pressure may eventually impact the heart, potentially leading to heart disease. Additionally, foreign materials trapped due to the suppression could worsen the condition, leading to various respiratory infections and associated cardiovascular illnesses.

Discussion on *shramashwasa vegadharana*

- Shramashwasa is the shwasa caused by ati vyayama adhva adi.^[35] Thus, there is the role of prana and udana vata in the causation of it. As hrudaya is the

moola of pranavaha srotas and also udana sthana is uras, Dharana of Shrama shwasa leads to vikriti in both types of vata and thus affecting the hrudaya.

- Panting is a natural phenomenon that helps cool the body and relax it from stress. Panting is a controlled increase in respiratory frequency accompanied by a decrease in tidal volume, the purpose of which is to increase ventilation of the upper respiratory tract, preserve alveolar ventilation, and thereby elevate evaporative heat loss.^[36]
- Rapid breathing in and out causes a large quantity of new air from external to come in contact with the upper respiratory tract and thus helps in cooling the respiratory passage mucosa as a result of water evaporation especially the saliva of the tongue. This is majorly confined to the dead space of the trachea. Evaporative heat loss is initiated by the nose through the turbinate's but when it is inadequate, the pattern of respiration changes to open-mouth breathing. Thus, hyperthermic hyperventilation is a fundamental property of the respiratory system.^[37]
- During any strenuous activity, there is increased oxygen consumption and increased formation of carbon dioxide. The motor impulse for contracting muscles also has collateral stimuli to the respiratory centre to increase arterial pressure and ventilation. If the demands are not met person suffers from dyspnoea which is mental anguish associated with an inability to ventilate enough to satisfy the demand for air i.e., air hunger.^[38]
- The relationship between the two is such that an elevated temperature and increased carbon dioxide levels lead to rapid and forceful breathing. If this desire to breathe rapidly is restrained, carbon dioxide accumulates in the bloodstream, where oxygen is utilized and must be removed as a waste product. Reduced oxygen availability can cause changes in cardiac output, leading to higher blood pressure, which can impact the heart.

Discussion on *bashpa vegadharana*

- Ashru is facilitated by udaana vayu with help of vyaana vayu. Ashru possesses kapha-like properties and lubricates the eyes. As it can be said derived from rasa dhatu and habitual vegadharana of ashru leads to dusti in the rasa and rasavaha srotas thus affecting the hrudaya. Also, hrudaya is the sthana of vyana vata and does indriyabhigraha, when ashru vegadharana is done chakshurindriya abhigata is present which does dushti of vyana vata and thus hrudaya.^[39]
- Crying is either an arousing behaviour to accompany distress or a soothing behaviour to promote the reduction of arousal after distress. Lacrimal glands are innervated by parasympathetic nerves predominantly than sympathetic which when stimulated helps in more tear production but parasympathetic effects on the heart cause a decrease in heart rate. It is seen that there is an increase in heart rate just before crying which comes

to normal after the onset of crying and this has more effect in the case of people who are crying out of stress.

- Respiratory Sinus Arrhythmia (RSA) associated with a high-frequency component of heart rate variability (HF-HRV) is a reflex variation in heart rate linked to the respiratory cycle and is a tool for assessing the ability to regulate stress, it has been found that on onset of production of tears there is an increase in RSA and slowed breathing.^[40]
- Thus, when the reflex is initiated, there are changes in heart rate and respiratory cycle which when suppressed may cause harmful effects on the functions of the heart and respiratory system together and may lead to heart disease. This also can lead to psychological stress and chronic anxiety, causing changes in heart rate and blood pressure, which can adversely affect heart function and lead to heart disease.

Discussion on shukra vegadharana

- Shukra is sarvashareera vyapi^[41] not only in males but also in females. It's not limited to semen or sperm, but also encompasses sexual desire. This study specifically focuses on males about Shukra Vega. Indulging in vegadharana can lead to vata prakopa, which, in the long term, can result in pratiloma dhatu kshaya, affecting the rasa dhatu and subsequently impacting the heart.
- Of the various urges developing in an individual, the urge for love, affection, and sexual intimacy is strongest. Despite being an important aspect of health and quality of life individuals do not usually receive training on appropriate expression and management of sexual urges. Individuals with suppressed urge use a variety of coping methods which help them for the short term but in the long run they backfire and lead to discomfort, stress, psychological suffering, depression, neurosis, hysteria, and loneliness also puts other basic needs at risk.^[42]
- Male sexual act results from inherent reflex mechanisms integrated with the spinal cord and these mechanisms can be initiated by psychic stimulation from the brain or by actual stimulation of sex organs but usually, it's a combination of both. There is a role of parasympathetic and sympathetic nerves in the entire process which causes relaxation of the cavernous sinusoids for erection and contraction of the urethral wall for the emission and ejaculation.^[43]
- The normal stimulation and mechanism of sexual urge can be attributed to the normal functioning of apana vata. The normal contraction and relaxation movements and movement of semen is because of the normal downward movement of apana vayu but when the process is suppressed there will be prakopa of vata leading to its vikruta gati and affecting the hrudaya and its vikaras.

- Persistent incidence of stimuli and absence of relevant measures to satisfy the resultant urge causes disturbance in the psychosomatic axis. Suppressing sexual desire can cause psychological stress and may lead to changes in blood pressure, potentially resulting in heart disease. The relationship between stress and myocardial ischemia can be explained not only by an increase in the activity of the sympathetic part of the autonomic nervous system, an increase in myocardial oxygen demand but also by an increase in platelet aggregation, atherogenic fractions of lipoproteins in blood plasma, endothelial dysfunction and also chronic inflammation being said as a potent risk factor in developing atherosclerosis.^[44]
- In the case of both ashru and shukra vegadharana mental stress has been a major contributing factor. Mental stress can induce endothelial layer dysfunction through increased activity of the sympathetic nervous system which may activate systemic inflammation that causes activation of the neural hematopoietic arterial axis which causes the release of inflammatory mediators that migrate to the arterial wall and does infiltration of the plaque. Immediate response to stress includes vascular inflammation and progression of atheromatous plaque. Thus, mental stress causes an imbalance in autonomous regulation which results in inflammation and has an effect on atheromatous plaque and causation of heart disease.^[45]

In the context of the suppression of Vegas, it was observed that an imbalance in the sympathetic and parasympathetic nervous systems played a significant role. During reflex actions, the sympathetic system becomes activated, leading to an increase in heart activity. However, when these reflex actions are suppressed, an imbalance in this activation occurs, also affecting the activities and thus putting pressure on the heart and resulting in a withdrawal of parasympathetic function, which can lead to cardiac issues.

The impact of vegadharana on a person's health is substantial, and a combination of them may be more harmful than an individual one. The combination of these factors may have a greater influence on the imbalance of the doshas and consequently greatly contribute to causing hrudroga.

Among the 60 patients included in the study, about 90% of them indulged in different types of vegadharana for various reasons. In addition to vegadharana, many other factors also contributed to the disease's formation. However, when considering everything, vegadharana had a significant impact on triggering and accelerating the development of hrudroga.

Discussion on ECG changes

- Rate fluctuations and also rhythm changes can be attributed to chala and vishama guna of vata.

Additionally, Manda and Sara Guna of Kapha and pitta also may contribute to the same.^[46,47]

- The normal electrical axis correlating with the normal activity of the heart can be attributed to the normal functioning of Vyana vata.^[48]
- If PR interval is **prolonged** it signifies conduction delay which may be due to disturbance in Chala guna or due to Manda, Sheeta guna of Kapha avarana over Vyana Vayu.^[49] **Short PR** may be observed due to Chala, Tikshna, Sara guna of Vata-Pitta.^[50]
- Contraction and relaxation are functions of Vyana Vayu. Chala, Snigdha, Shlakshna guna help in contraction and relaxation. Kapha-Pitta causes Avarodha of Rasa by Drava-Ushna guna and disturbance in Vyana karma, represented by continuous **elevated or depressed ST segment**.^[51]

LIMITATIONS

- Even though the study fulfilled the objectives mentioned, the sample size was not enough for statistically significant data analysis.
- As the study was done in a specific *desha* the results cannot be justified or standardized the same for all the other *desha*.
- The response to the questionnaire was not completely satisfactory because of issues such as faulty memory and hesitation, which may have restricted the final results.

CONCLUSION

- The present study revealed the age group suffering from hrudroga were majorly of the vrudhdhava i.e between 56-70 years.
- Among the lakshanas, shoola was predominantly seen followed by shwasa indicating predominance of vata in the present study. Other lakshanas related to pitta kapha were also found but were less prevalent.
- In the current study, a higher incidence of hrudroga was found in housewives and businessmen which correlates to them being prevalently indulging in vegadharana.
- Vegadharana was identified as the major vyanjaka hetu for the causation of the disease in the present study as sannikrsta nidana included aharaja nidanas which are vishamashana, anashana, ati katu lavana ahara, ati ruksha ushna guru ahara, viharaja nidana i.e., ativyayama, ratrijagarana and diwaswapna and also manasika hetus like chinta and shoka.
- In the current study, the majority of the people were found to have avara agni bala which was the main reason for the impairment of the rasavaha srotas.
- In the current study, majority of the people were found to be indulged in vegadharana leading to hrudroga. Among 9 vegadharana mutra (75%), trushna (60%), bashpa (48%), and shramashwasa (57%) were predominantly and more prevalently seen.

- Among the subjects taken for study, Mutra, trushna and shramashwasa vegadharana (10%) and Mutra, trushna, bashpa, and shramashwasa (10%) were majorly seen together in combination.
- Among the subjects, vegadharana was seen up to a period of 20 years frequently for duration of up to 1 hour. And more prevalent times were found to be during travelling or work.
- Along with hrudroga other lakshanas of the respective vegadharana were also identified but the prevalence was much lower and was confined to the day of suppression.
- The research revealed that a prolonged association with vegadharana is observed in all instances, which has been recognized as a possible risk factor for the onset of hrudroga.
- In terms of ECG findings, the majority of cases exhibited ST and T wave abnormalities, indicating ventricular abnormalities, with ST elevation being the most commonly observed abnormality. Pathological Q waves, abnormal heart rate, and irregular rhythm were not frequently observed in the cases.

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