



## Review Article

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### A REVIEW ON THE CONCEPT OF HRIDYA IN AYURVEDA: LOOKING BEYOND CARDIO TONICS

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#### ABSTRACT

The term Hridya is used in different contexts with reference to different articles with diverse characteristics. Unlike the various Ayurvedic terms which can be more or less understood by the term itself, the term Hridya need a more elucidation. It is vital to screen these basic terms and find their meanings in different aspects for better discernment of Hridya in Ayurveda Hence this article attempts to illuminate the concept Hridya and the diversities in the Hridya dravyas mentioned in different contexts. On critical analysis of the literature and recent studies it can be understood that Ayurveda has included heart and brain in the umbrella term 'Hridaya'. The Hridya dravyas can thus be understood as Cardiac or Central Nervous System (CNS) stimulants which evoke stimulation through various chemo-sensory pathways. Overall, commentaries describe Hridya as something pleasing or that which is good for the body. All the pleasurable sensations of the body attained by virtue of taste, smell, touch and by mere sight can be comprised under the concept Hridya and the act and articles which impart the pleasurable sensation can be understood as Hridya dravyas. As such the classical textbooks have references of food articles, flowers, fragrances, etc. described as Hridya dravyas as they have the ability impart the pleasurable sensation in common. While portraying the concept Hridya, the motor, sensory and psychological components should be taken contemplated. Any stimuli that impart a sense of pleasure to the respective sense organ and hence impart a sense of pleasure in Hridaya can be considered as Hridya.

**Keywords:** Hridya, Hridaya, Central Nervous System stimulants, Cardiotonic, Ayurveda

#### INTRODUCTION

In Ayurveda, the sequence of presentation of the subject differs according to the different school of thoughts. The logically adopted methodology for the presentation of the subject in Ayurveda is called Tantrayukti<sup>1</sup>. The most commonly used Tantrayukti is the Nirdesha tantrayukti, where in the subject matter is described as lakshanas (relating to or acquainted with characteristic sign or mark) and Udaharanas (examples)<sup>2</sup>. Niruktis or definitions are not given much importance unlike the modern medicine in which the basic principles are being explained with clear cut definitions, the basic terms which describe the various physiological processes are not given proper definitions in the Brihatrayees. Later in the 13<sup>th</sup> century Acharya Sharangadhara, describes a few terminologies with proper definitions and examples<sup>3</sup>. In the Brihatrayees various terms like brimhana (stoutening), Balya (strength promoters), Kandya (voice promoters), Varnya (complexion enhancers), etc. are mentioned in different contexts. But in neither of the contexts a definition is being described.

Unlike the various terms like kanthya (~that which is good for throat), Varnya (~that which promotes complexion), Balya (~that which promotes strength) etc. which can be more or less understood by the term itself, the term Hridya need a more clarification. Among the Mahakashayas, Charaka has also described Hridya Mahakashaya. Here Hridya is the lakshana and the 10 drugs are examples (Udaharanas). In certain other instances, heterogenous types of articles like certain fruits, food articles, milk products and even water is being described as Hridya. Some of them are sweet, some are sour and some are pungent. The term Hridya is used in different contexts with reference to different articles with diverse characteristics. It is

very essential to screen these basic terms and find their meanings in different aspects for better understanding of Hridya in Ayurveda Hence this article attempts to clarify the concept Hridya and the diversities in the Hridya drugs mentioned in different contexts.

#### Hridya in Ayurvedic literature

The term Hridya is mentioned in different contexts in the classics. But the terminology has not been given a clear definition. Mostly the term Hridya is used to describe certain articles in particular fruits, food articles, medicinal plants and a miscellaneous group of items (Table 1) (Table 2). On evaluation, it was observed that Hridya cannot be simply correlated to merely a physical phenomenon. It is more related to the manner in which a particular object or a process evokes a response in one's senses viz taste, smell, touch and the overall mental status of an individual<sup>4-6</sup>. Hridya can be understood as a property with physical and psychological components as they typically imparts a state of pleasure by stimulating the sense organs and the sensory centers of the brain mainly virtue of smell, taste or by any other characters which can create a feeling of satiety or pleasure to the mind and other sense organs. In certain other instances Hridya drugs can be understood as those drugs which impart general nourishment and strength to the body.<sup>7</sup>

The different commentators define Hridya as hridayayahitam and hritayasyahitam (that which is beneficial/good for Hridaya). On critical analysis of the literature and recent studies it can be understood that Ayurveda has included heart and brain in the umbrella term 'hridaya'<sup>8</sup>. The Hridya dravyas can thus be understood as Cardiac or Central Nervous System (CNS)

stimulants which evoke stimulation through various chemo-sensory pathways.

#### Consensus arrived at regarding understanding Hridaya

Heart is a muscular organ and the prime organ of human circulatory system. In Ayurveda Hridaya is described as one of the pratyangas (~accessory organs). More than a physical entity, Hridaya is described as a psychological and spiritual entity. Charaka Samhita describes the association of the sense organs, motor organs, Vijnana (knowledge), Atma and Manas associated with Hridaya by virtue of adhara-adheyabhava.<sup>9</sup> This clearly points out that the sensory and motor, emotional, intellectual and spiritual activities are initiated, perceived and coordinated by Hridaya. Hence Hridaya can be understood functionally as the higher centers of brain and structurally as heart. Various references of Hridaya described in different classics are enclosed in (Table 5) the points of similarity between Hridaya and heart (Table 6).

In regard of the physiological aspect, Hridaya is the seat of Prana-Udana-Vyana-Vayu, Sadhaka pitta and Avalambaka Kapha.<sup>10-12</sup> Some reference quotes Hridaya as the abode of the motor and sensory organs, the objects of the sense organs, knowledge, thinking and reasoning<sup>8</sup>. Hridaya is also the abode of consciousness and mind<sup>9</sup>. Hridaya which is described as mahat, artham, mahaphalam etc. can be understood as brain rather than heart.

The dasadhamanees (ten subtle channels) may be understood as the cranial nerves. The functions of the shadangas may be understood as the motor activities and the functions of the sense organs, while the ardhapanchakam can be understood as the sensory activities. The cerebrum, the primary cortex and the pre-central gyrus mainly controls the voluntary motor activities. The occipital lobe helps in the perception of objects and aids vision. The temporal lobe helps in hearing and processing auditory stimuli, parietal lobe helps in the perception of touch, taste and language. The frontal lobe helps in planning, judgement and creativity.<sup>13</sup>

The consciousness is defined as the state of awareness of self. It is of two types-arousal and awareness. Arousal is the state in which the person is awake but not responds to the stimuli. Awakening is the state in which the person is awake and responds to stimuli. In the human body, the diffuse system-brain stem, diencephalon, cerebral hemisphere with diffuse reciprocal connection, brain stem, reticular formation, hypothalamus, basal ganglia, and thalamus controls the state of arousal and awareness. Thus, in short, it can be inferred that Ayurveda included brain and heart under one Roof-Hridaya as both the organs performs the reception, interpretation, and transmission of impulses.

#### Similarities between heart and brain

Recent research shows that DNA of heart and brain are similar, but they use that DNA code in different methods<sup>14</sup> also, both brain and heart are made of excitable cells. Intrinsic nervous system of heart has about 40,000 nerve cells which functions equal to the sub-cortical centers of the brain. Heart communicates with the brain and the rest of the body in three different ways documented by solid scientific evidence: neurologically (through transmission of nerve impulse), bio-chemically (through hormones and neurotransmitters), bio-physically (pressure waves) and energetically (electrolyte-fluid interaction)<sup>15</sup>. New discipline called neuro-cardiology shows that the heart is a sensory organ and a sophisticated center for receiving and processing information. The nervous system within the heart enables it to

learn, remember and make decisions independent of the brain's cerebral cortex. Signals by heart continuously send to the brain influences the functions of higher brain centers involved in perception, cognition and emotional processing.

Now it is proved that the thoracic heart has its own functional brain. Heart is not only single pump, but heart is a sensory organ and sophisticated center for receiving and processing information. Thus, in addition to circulation of blood, heart works as brain also. Thus Hridaya can be understood as the heart with its own functional brain. Vyana vayu may be understood as the Autonomous Nervous System of the Heart, Avalambaka kapha may be understood as the smooth muscles and Sadhaka pitta may be understood as the electrical activity of the Heart.

#### Consensus arrived at regarding understanding Hridya

The definition of Hridya is very vague and difficult to understand. Overall, commentaries describe Hridya as something pleasing or that which is good for the body. All the pleasurable sensations of the body attained by virtue of taste, smell, touch and by mere sight can be comprised under the concept Hridya. The act and articles which impart the pleasurable sensation can be understood as Hridya dravya. As such the classical textbooks have references of food articles, flowers, fragrances, etc. described as Hridya dravyas as they have the ability impart the pleasurable sensation in common.

It can be deduced that the Hridya dravyas exert their effect mostly by virtue of its smell (Table 3) and/or by virtue of its taste. It is found that which are Hridya are predominantly Madhura (sweet), amla (sour), Katu (pungent) or a combination of Madhura and amla (Table 4). While describing the Agreya dravyas (list of best drugs), it is mentioned that sour taste is the best Hridya dravya. Charaka has mentioned a group of 10 Hridya dravya<sup>16</sup> in which all the drugs are predominantly sour in taste. Sushruta has mentioned parushakadigana as Hridya where all the drugs are predominantly sour in taste<sup>17</sup> indicating that majority of Hridya dravyas are sour in taste.

Amla rasa is unctuous, hot and light in nature<sup>18</sup> and is predominant in Prithvi (earth) and Agni (fire) mahabhuta<sup>19</sup>. Sour taste is very much pleasing to the sense organs and the sight of sour fruits or by their smell stimulates hyper salivation. While it is being consumed, horripilation appears and tingling sensation of the teeth may be experienced. By reflex action, the muscles of the eyebrows and the eyelids constrict indicating the sensory, motor and the psychological components. Hridaya is the seat of Avalambaka kapha, Sadhaka pitta and Vyana vayu.

Amla rasa kindles the digestive fire. It increases kapha, pitta and rakta. The normal functions of Sadhaka pitta and Avalambaka kapha is ensured. This in turn helps the individual to attain the deeds which are aspiring for by the proper co-ordination of Buddhi (intellect), Medha (retention power) and Mana (mind). Amla rasa aids all kinds of transmissions in our body. Hence it ensures the proper circulation of rasa dhatu which ultimately results in the nourishment of body. The Prithvi and Agni Mahabhutas nourish the kapha and rakta. It is hot in potency, hence the proper conduction of impulses component of the heart can be inferred.<sup>20</sup>

The drugs belonging to the Madhura Hridya group stands for the tonic/nourishing aspect of Hridya. Madhura rasa by virtue of its properties is pleasing to the sense organs and imparts satiety to the body. They imparts strength to all tissues and sense organs, ultimately increases the Ojus (~innate strength). As Hridaya is the seat of para ojus, the increase in the Ojo dhatu ultimately accounts

for the tonic activity. All the properties corroborates that the articles like ghee, milk, tender coconut water and other Madhura Hridya dravyas as having a tonic effect<sup>21</sup>. Anatomically, Hridaya is formed by the essence of kapha and rakta. Hence the Madhura Hridya dravyas can be attributed to nourish and strengthen the structural aspect of the heart, like maintaining the tone of the cardiac muscles, competence of the cardiac valves etc.

Nagara (~dried ginger) and Lasuna (garlic) are the main drugs coming under Katu Hridya dravyas. Katu rasa in predominant in vayu and Agni mahabhutas, hence it is light, unctuous and hot in nature. By virtue its nature, it is neither pleasing to the sense organs nor nourishing in nature to the body. As such Katu rasa do not have a role to play with the psychological aspect of Hridya. But Katu rasa can prevent the buildup of unctuous substances like fat thereby prevent the formation of plaques. Since Hridaya is one of the seats of Avalambaka kapha, there is always chance for the accumulation of these bhavas in Hridaya. Katu rasa kindles the digestive fire and is carminative in nature thus ensuring the normal functions of Sadhaka pitta. It is attributed for the proper conduction of impulses and dissolution of tiny plaques and has

vasodilator action.<sup>22</sup> This can be attributed to the proper conduction of cardiac impulses and the maintenance of excitability and contractility. However, an increased use of Katu rasa will result in increase of dryness which results in derangement of Vyana vayu as a result the conducting system may get affected resulting in conditions like arrhythmias.

Amla-Katu Hridya dravyas are intended to be used in conditions like ischemic heart disease, arrhythmias, tachycardia etc. Amla-Madhura dravyas are intended to be used in conditions like valvular disease, cardiomyopathy etc.

The drugs like Kachura (*Curcuma zedoaria* (Christm.) Roscoe)<sup>23</sup> act as Hridya by virtue of its smell. Certain regimens like bathing<sup>24</sup> chewing of betel leaves<sup>25</sup> are also considered as Hridya. Hridyam anna<sup>26</sup> is indicated in garbhini paricharya, twaksthavata, bheshajakshapita. On a whole it can be understood that the sense of taste along with the smell, touch and sound helps an individual to understand about his surroundings. If the matter perceived by either of the senses is pleasant and pleasurable to the body, that object may be considered as Hridya.

**Table 1: Various Hridya dravyas and their properties**

Name of the Hridya dravya	Common/Scientific Name	Rasa (Taste)	Guna (Properties)	Dosha karma (Pharmacological action on Doshas)
Toya <sup>37</sup>	Heaven water	Avyaktam	Sheeta	-
Prasavana <sup>38</sup>	Rain water			
Madhu <sup>39</sup>	Honey	Madhura-kashaya	Ruksha	Tridosha shamana
Takra <sup>40</sup>	Butter milk	Madhura- amla	Laghu-ruksha-deepana	Kapha-vata hara
Nalikerodakam <sup>41</sup>	Tender coconut water	Madhura	Snigdha-sheeta	Pitta hara
Navaneeta <sup>42</sup>	Butter prepared from cow's milk	Madhura	Sheeta-deepana	Vata-pitta hara
Kharjuramadya <sup>43</sup>	Alcoholic beverage of palm origin	Kashaya – Madhura	-	-
Sarkaraseedhu <sup>44</sup>	Alcoholic beverage prepared from sugarcane	Madhura	Deepaneeya	Vata hara
Sukta <sup>45</sup>	Acetic fermentation product	Katu	Teekshna-ushna	Kapha hara
Tushambu <sup>46</sup>	Acetic fermentation product	Amla	Deepanam	Kapha-vata hara
Mootram <sup>47</sup>	Urine	Katu	Teekshna-ushna-laghu	Kapha-vata hara
Lohitasali <sup>48</sup>	<i>Oryza australiensis</i> Domin	Madhura	-	Tridosha shamana
Krishna harina <sup>49</sup>	<i>Deer meat</i>	Kashaya-Madhura	Rochana-balya	-
Dadima <sup>50</sup>	<i>Punica granatum</i> L.	Madhura – amla	Deepana	-
Matulunga <sup>51</sup>	<i>Citrus medica</i> L.	Amla	Laghu-deepana	-
Amra <sup>52</sup>	<i>Spondias mombin</i> L.	Madhura-amlam	Guru- brimhana	-
Priyaala <sup>53</sup>	<i>Buchanania cochinchinensis</i> (Lour.) M. R. Almeida	Madhura-amlam	Asya-visodhanam, grahi	Pitta-kapha hara
Draksha <sup>54</sup>	<i>Vitis vinifera</i> Linn.	Madhura	Snigdha-sheeta	-
Kooshmanda <sup>55</sup>	<i>Banincasa hispida</i>	-	-	Tridosha hara
Nagara <sup>56</sup>	<i>Zingiber officinale</i>	Katu	Ushna-laghu-deepana	Kapha-vata hara
Adraka <sup>57</sup>	<i>Zingiber officinale</i>	..	..	..
Bakula <sup>58</sup>	<i>Mimusops elengi</i>	-	Visada-sugandhi	Kapha-pitta hara
patala, <sup>59</sup>	<i>Stereospermum suaveolens</i> (Roxb.) DC	-	Visada-sugandhi	Kapha-pitta hara
Kumkuma <sup>60</sup>	<i>Crocus sativus</i> L	-	Visada-sugandhi	Kapha-pitta hara
Lajamanda <sup>61</sup>	Water boiled with puffed rice.	-	Deepana-pachana-laghu	-
Mudgayoosha <sup>62</sup>	Soup of green gram	-	Deepana	Kapha-medo hara
Patola-nimbayusha <sup>63</sup>	Soup of <i>Luffa acutangula</i> (L.) Roxb. And <i>Azadirachta indica</i> A. Juss.	-	..	..
Amalaki <sup>64</sup>	<i>Phyllanthus emblica</i> L	shadrasa	Laghu-snigdha	Vata-pitta hara
Khada-kambalika <sup>65</sup>	Dietic preparation made of sour articles	-	-	Vata-kapha hara
Panaka of parushaka, kola <sup>66</sup>	Water boiled with <i>Grewia asiatica</i> L.	amlam	Teekshna-hima	-
Karchura <sup>24</sup>	<i>Curcuma zedoaria</i> (Christm.) Roscoe	-	Rochana-deepana-sugandhi	-
Naranga <sup>67</sup>	<i>Citrus aurantiaca</i> Swingle	Madhura-amlam	-	-
Rasala <sup>68</sup>	Food preparation with fruits	-	Brimhana, Vrishya, Snigdha	-
Hridyaoushadguna <sup>69</sup>		-	-	-
Yavaneeshadava <sup>70</sup>	A dietic preparation	-	Jihvavisodhanam, Bhaktarochanam	-

Kanaka binduarishta <sup>71</sup>	A fermented preparation	-	-	-
Parooshakadigana <sup>7</sup>	Group of drugs starting with Parushaka	-	Pipasagham, Ruchipradam	-

**Table 2: Miscellaneous group of Hridya dravyas**

References	Therapeutic indications
Hridya anna <sup>26</sup>	Twak asrita vata chikitsa
Hridya dravyas with Madhura, Amla, Lavana rasa. <sup>72</sup>	Virechana
Hridya yusha for kavalagraha <sup>73</sup>	Vamana-virechana vyapat
Hridyagandhimodaka <sup>74</sup>	Virechana
Antarabhaktaannakala <sup>75</sup>	Hridya and manobalakara
Tamboolasevana <sup>25</sup>	
Snanam <sup>24</sup>	Deepana, shramahara

**Table 3: Hridya dravyas by virtue of smell**

Virtue of smell	Virtue of taste	Manobodhana dravyas
Kachura <sup>23</sup>	Priyala <sup>53</sup>	Kushmanda <sup>55</sup>
Tamboola <sup>25</sup>	Rasala <sup>68</sup>	Sarkaraseethu <sup>44</sup>
Bakula <sup>59</sup>	Parushakadigana <sup>7</sup>	Antarabhakta aushadha kala <sup>45</sup>
Patala <sup>59</sup>		
Kumkuma <sup>59</sup>		

**Table 4: Hridya dravyas by virtue of taste**

Madhura Hridya	Amla Hridya	Katu Hridya	Madura-amla Hridya
Madhu <sup>39</sup>	Takra <sup>40</sup>	Sukta <sup>45</sup>	Amra <sup>52</sup>
Navaneeta <sup>42</sup>	Tushambu <sup>46</sup>	Mootra <sup>47</sup>	Dadima <sup>50</sup>
Nalikerodaka <sup>41</sup>	Dadima <sup>50</sup>	Adra <sup>24</sup>	Priyala <sup>53</sup>
Kharjura <sup>23</sup>	Matulunga <sup>51</sup>	Nagara <sup>56</sup>	Naranga <sup>67</sup>
Lohitasali <sup>48</sup>	Amalaki <sup>64</sup>	-	-
-	Prushaka <sup>66</sup>	-	-
-	Kola <sup>66</sup>	-	-

**Table 5: Description of Hridaya in classics**

Description	Charaka Samhita	Sushruta Samhita	Sharangadhara Samhita
Classification	Pratyanga <sup>76</sup>	Do <sup>77</sup>	-
Origin	-	Kapharakta prasadjam <sup>78</sup>	-
Location	-	-	In the chest between the breast <sup>79</sup>
Shape	Pundareeka sadrisa <sup>80</sup>	Kamala mukulakaram <sup>81</sup>	-
Site of origin	Rasa vahasrotas, pranavaha srotas,ojus <sup>82</sup>	Do	-
Entities supported	Shadangam, angam, vijnanam, indriyani, artha panchakam, atma, cheta <sup>83</sup>	-	-
Specific site	Chetana <sup>84</sup>	Do	-

**Table 6: Similarity between Hridaya and Heart**

Description	Point of similarity
Located in the Uras in between the stanas <sup>79</sup>	Position of heart in the thorax
Kapha- rakta prasadjam <sup>78</sup>	Muscular organ with extensive vascularisation
Moola Sthana of Pranavaha and Rasavaha Srotases <sup>82</sup>	Relation with pulmonary vein, pulmonary artery superior and inferior vena cava and aorta which helps in the circulation of blood and gaseous.
The rasa which reaches Hridaya stays there for a while and is then circulated to the whole body by vyanavayu <sup>85</sup>	Like the process of blood circulation
Adomukhapundareeka sadrishata <sup>80</sup>	Heart with its apex pointing downwards.
Jagrat –vikasati, prasupta-sankochayati <sup>86</sup>	The expanded and contracted state can be understood as the diastole and systole respectively

## DISCUSSION

From the analysis of literature, the term Hridya can be understood as any substance that imparts a feeling of pleasure by virtue of taste and/or smell. In the past the physiology of taste perception was limited only to taste buds but evidence shows that the localization of taste receptors is not restricted to oral cavity, not even to certain tissues/organs, but rather evenly distributed over the entire body. The taste receptors, along with several taste signal transduction molecules, have been demonstrated to be located in

many extra oral locations (e.g., stomach, intestines, liver, pancreas, respiratory system, heart, brain, kidney, urinary bladder, adipose tissue, testis, spermatozoa, lymphocytes and endocrine glands)<sup>27</sup> Scientists suggested that these extra oral taste cell-related elements that are mainly solitary or clustered cells, not grouped in buds, may be part of a large diffuse chemosensory system (DCS). Scientific studies showed that DCS may have crucial physiological roles. DCS seem to be involved in detection of irritants, control of airway surface liquid secretion, innate immunity, microbial population, regulation of appetite, cell

proliferation and relaxation/contraction of muscles, bronchia, urinary bladder and vessels and regulation of heart activity<sup>28</sup>. Sweet receptor is involved in insulin secretion: (a) indirect mechanism—activation of sweet receptor transduction pathway in enteroendocrine L cells led to the release of glucagon-like peptide-1 (GLP-1), which in turn enhanced insulin release from the pancreas (b) direct mechanism—sweet taste receptor expressed in pancreatic  $\beta$ -cells stimulates insulin secretion. Sweet taste receptor expressed in pancreatic beta-cells activates the calcium and cyclic AMP signaling systems and stimulates insulin secretion<sup>29</sup>. Insulin is recognized as the principal anabolic hormone in the body and regulator of mammalian target of rapamycin complex (mTORC), which activates cell growth and protein translation and suppresses autophagy Concerning erythrocytes (~rakta) and neurons (~majja), it is also well known that they are glucose dependent (“sweet taste dependent”) cells, requiring glucose for their energetic.<sup>30</sup>

Ayurveda claims that sour taste is beneficial for heart. The most common compound having sour taste in our diet is ascorbic acid, a well-known antioxidant. Plasma level of vitamin C is a validated biomarker for fruit and vegetable intake, which reflect recent dietary intake of vitamin CA 20  $\mu\text{mol/L}$  increase in plasma vitamin C concentration (1 standard deviation) was associated with a 13% relative reduction in risk of atrial fibrillation in women, but there was no such association in men. In another cohort study, even a small increase of 2  $\mu\text{mol/L}$  in plasma vitamin C was also associated with small reductions in anthropometric and metabolic cardiovascular risk factors study.<sup>31</sup> Concerning the sour taste transducers, TASK-1 (one of the main K2P channels claimed to mediate sour taste in humans) might have a functional importance in controlling the atrial size, repolarization of the cardiac action potential, maintenance of heart rate variability and cardiac conduction system activity and has been proposed as a potential pharmacological target in case of atrial fibrillation<sup>32</sup>

Ayurveda states that pungency dilates and opens the channels. According to modern science, a TRP-mediated vasodilation is induced by various dietary pungent agonists (e.g., carvacrol from oregano—TRPV3 agonist, eugenol from cloves—TRPV4 agonist), as well as by heat, and several mechanisms are involved (e.g., decrease in the intracellular  $\text{Ca}^{2+}$  of arterial myocytes, stimulation of nitric oxide, prostaglandin I<sub>2</sub>—PGI<sub>2</sub> and endothelium-derived hyperpolarizing factor, EDHF production in endothelial vascular cells)<sup>33</sup>. Apart from this some articles exhibited their Hridya property by virtue of smell. In our daily life, several fragrances appear and a sense of smell plays an important role in the physiological effects of mood, stress and working capacity. Fragrance is a volatile chemical component with a molecular weight of < 300 Da, humans perceive via the olfactory system. In the olfactory process, the fragrant molecules in the air attach to the cilia of olfactory receptors in the olfactory epithelium, located in the nasal cavity. Then the guanine nucleotide binding protein (G-protein) coupled receptors (GPCR) are activated and electrical signals are generated. Subsequently, the electrical signals are transmitted to the brain by olfactory sensory neurons via olfactory bulb and higher olfactory cortex<sup>34</sup>. Consequently, these electrical signals modulate the brain functions including memory, thoughts and emotions. Many studies describe that the inhalation of fragrances highly affect the brain function since the fragrance compounds can cross the blood-brain barrier and interact with receptors in the central nervous system<sup>35</sup>. Furthermore, many studies have suggested that the olfactory stimulation of fragrances produces immediate changes in physiological parameters such as blood pressure, muscle tension, pupil dilation and skin temperature and pulse rate and brain activity<sup>36</sup>.

## CONCLUSION

Hridaya is considered as the abode of the sense organs and mind. Though the description of Hridaya in some instances refers to the anatomical heart, function of heart and in some other instances points out as the functions of the brain and the central nervous system. Recent research demonstrates that Heart is not only single pump but is a sensory organ and sophisticated center for receiving and processing information. Thus, in addition to circulation of blood, heart works as brain also. The understanding Hridya as mere Cardiotonic agent is very absurd. While portraying the concept Hridya, the motor, sensory and psychological components should be taken contemplated. Any stimuli that impart a sense of pleasure to the respective sense organ and hence impart a sense of pleasure in Hridaya can be considered as Hridya.

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