



## Review Article

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### A CRITICAL REVIEW ON HYPOTENSION AND ITS MANAGEMENT FROM AYURVEDIC PERSPECTIVE

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#### ABSTRACT

Hypotension is a major health problem worldwide with a prevalence rate of 29.3% in older adults. It is associated with increased risk of falls, syncope, reduced quality of life and even death due to organ failure. Despite of its increasing incidence in general population and serious complications, hypotension is often neglected in clinical practice and in the field of research. The present article is an effort to learn the clinical significance, risk factors and co-morbidities of hypotension and understand the disease process and management aspects from Ayurvedic perspective. The sources of literary review were Ayurvedic classical text books, research articles published in indexed journals and electronic sources. Thorough literature review revealed that Hypotension should be considered as a condition caused due to Raktakshaya (depletion of blood tissue) and vyanavatakopa (vitiation of Vyana vata, a subtype of vata responsible for circulation and motor activities). Compound formulations found effective in Hypotension and their therapeutic actions are detailed in the management. Efficacy of Ayurveda in both acute and chronic conditions is elucidated here. This work also provides a framework for further studies on the neglected aspect of research on Hypotension.

**Keywords:** Hypotension, Raktakshaya, Vyanavatakopa, Vata, Avarana

#### INTRODUCTION

Hypotension is a frequently diagnosed ailment in clinical practice, but least mentioned in the text books as an independent disease state. The prevalence of hypotension in older adults is reported to be 29.3%.<sup>1</sup> Information from the Malmo Preventive Project suggests that Orthostatic Hypotension occurs in 6% of middle aged individuals and is associated with comorbidities.<sup>2</sup> Hypotension is under recognized as it is typically asymptomatic but it becomes troublesome when there is insufficient perfusion of oxygenated blood to the key organs. It affects the quality of life of the patient and can be life threatening too. The negative effect of hypertension has over shadowed possible health problems associated with hypotension. The ancient science of Ayurveda has the potential to treat both chronic and acute conditions effectively. Even though hypotension is a common condition, very few research works have been done on the management aspect of hypotension in the stream of Ayurveda. So in the present scenario, it is important to derive the possible pathology and treatment protocol of hypotension in Ayurveda. Through this work, an attempt has been made to understand the disease process of Hypotension using fundamental principles of Ayurveda and develop a treatment protocol with effective classical formulations. Bruhatrayi and their commentaries by different authors were referred for this work. References from modern texts were taken to understand the pathophysiology of hypotension and correlate the concepts in Ayurveda. Electronic sources were also used and previous articles published on Hypotension in indexed journals were also referred. References of the classical compound formulations were taken from Samhitas and Sahasrayoga. This paper emphasises on understanding Hypotension as a serious medical condition and efficacy of Ayurveda interventions in the management of Hypotension.

#### Hypotension – An overview

Reduction in systemic blood pressure that is Systolic blood pressure (SBP) lower than 90 mmHg or Diastolic blood pressure (DBP) lower than 60 mmHg is considered to be Hypotension.

#### Causes of Hypotension

The medical conditions that can cause Hypotension include:

- Reduced blood volume: This is the most common cause of Hypotension and it results from a major injury or haemorrhage leading to a severe drop in blood pressure.
- Cardiovascular causes: Bradycardia, heart valve problems and heart failure.
- Endocrine causes: Parathyroid disease, Adrenal insufficiency (Addison's disease), Hypoglycaemia and diabetes can trigger low blood pressure.
- Dehydration: Overuse of diuretics and strenuous exercise can lead to dehydration and hypotension.
- Septicaemia and severe allergic reaction (anaphylaxis)
- Certain medications can cause hypotension like diuretics such as furosemide and hydrochlorothiazide; Alpha blockers, Beta blockers, such as atenolol and propranolol; levodopa containing drugs used in Parkinson's disease; tricyclic anti-depressants and drugs used in erectile dysfunction containing sildenafil particularly when taken with heart medication nitro-glycerine.<sup>3</sup>
- Other causes: Pregnancy, lack of nutrients like vitamins B-12 and folate.

## Pathophysiology

Regulation of blood pressure takes place via autonomic nervous system as a balance of the sympathetic nervous system and the parasympathetic nervous system. The sympathetic nervous system acts to raise blood pressure by increasing heart rate and constricting arterioles. The parasympathetic nervous system lowers blood pressure by decreasing heart rate and relaxing arterioles to increase vessel diameter.<sup>4</sup> The vast and rapid compensation abilities of the autonomic nervous system are responsible for maintaining an acceptable blood pressure over a wide range of activities and in many disease states. Any variations in these networks can lead to hypotension. Hypotension reduces blood flow and therefore oxygen delivery to organs and tissues, which may cause cellular damage and dysfunction. When insufficient oxygen is delivered, it fails to support tissue metabolic requirements and a person is said to be in circulatory shock.<sup>5</sup>

## Signs and Symptoms

- Dizziness or light headedness
- Fainting (syncope)
- Headache
- Blurred vision
- Irregular heart beat
- Nausea
- Fatigue
- Lack of concentration

Extreme hypotension can result in shock which is a life threatening condition. Signs and symptoms include:

- Confusion, especially in older people
- Cold, clammy, pale skin (extreme pallor)
- Rapid, shallow breathing
- Weak and rapid pulse<sup>3</sup>

## Types of Hypotension

### 1. Acute hypotension

Acute hypotension is a condition often associated with shock, which may be hypovolemic (due to fluid loss in severe haemorrhage, burns, diarrhoea and vomiting), septic, cardiogenic (following myocardial infarction), neurogenic or anaphylactic. It also occurs in patients receiving epidural anaesthesia and those undergoing haemodialysis.

### 2. Chronic Hypotension

Chronic hypotension is most commonly caused in the endocrine disorder called Addison's disease. The patients fail to produce the level of endogenous steroids required to regulate sodium and water retention which leads to hypotension.

### 3. Orthostatic or Postural hypotension

Orthostatic hypotension (OH) is defined as a sustained decrease in systolic blood pressure of 20 mmHg or a decrease in diastolic blood pressure of 10 mmHg within 3 minutes of standing compared with blood pressure from the sitting or supine position or by head-up tilt-table testing. When sustained drop in blood pressure is after 3 min of upright posture, it is called delayed OH. The autonomic nervous system responds to changes in position by constricting veins and arteries and increasing heart rate and cardiac contractility. When these mechanisms fail or the patient becomes hypovolemic, orthostatic hypotension may occur. Some potential causes of orthostatic hypotension include medications; non-neurogenic causes such as impaired venous return,

hypovolemia, cardiac insufficiency; and neurogenic causes such as multisystem atrophy and diabetic neuropathy.<sup>6</sup>

## 4. Postprandial hypotension

Sudden fall in blood pressure after eating occurs mostly in older adults. The underlying mechanism is that the blood flows to our digestive tract after the intake of food. This increases heart rate and constricts certain blood vessels to help maintain normal blood pressure. But in some people these mechanisms fail, leading to dizziness, fainting and falls. Postprandial hypotension is more likely to affect people with high blood pressure or autonomic nervous system disorders such as Parkinson's disease.

## Ayurvedic view

### The disease process of hypotension from Ayurvedic perspective

Hypotension is a clinical condition commonly seen among people and is often missed as a major health challenge. Hypotension can cause serious consequences when it results in the diminished perfusion of blood to vital organs with consequent reduction in supply of oxygen and nutrients. Even though there is no direct reference for this condition in our science, we can easily identify the vitiating factors in terms of doshas (that which vitiates) and dushyas (substrate for vitiation) and derive the possible samprapti (pathogenesis) of Hypotension.

### Nidana (Causes)

Food habits and activities that increase vatadosha (the dosha responsible for movement and cognition) like ruksha (dry), sheeta (cold), laghu (light food), alpa anna (less food), ati vyayama (excess physical exercises) atigamana (excess travel), Dhyana (excess thinking), kreedha (other improper physical activities), vishamacheta (improper postures).<sup>7</sup> Those which results in rakta dhatukshaya (depletion of blood tissue) like, excess intake of lavana (salt), kshara (alkaline), amla (sour) and katu rasa (pungent) in aharas; viharas (activities) like atyadanamkrodha (excessive anger), atapa (exposure to sunlight), anala (exposure to fire), srama (exhaustion), abhigata (trauma) and Ajeerna (indigestion).<sup>8</sup>

### Samprapti (Pathogenesis)

In case of hypotension, we can see the two attributes of vata vitiation that is dhatukshaya (depletion of tissues) and avarana (occlusion).

Due to nidanas, the Agni (metabolic factor) in the Koshta (gastrointestinal tract) is affected, which in turn affects the ahara paka (digestion of food) and Dhatu Parinama (transformation of tissues). The first formed rasa dhatu (plasma) itself is affected and the second dhatu formed from the improper Rasa dhatu won't be sufficient both quantitatively and qualitatively to fulfil the bodily functions. Since Vyana vayu (a subtype of vata responsible for circulation and motor activities) resides in Hridaya (heart) and is responsible for the circulation of first formed improper rasa dhatu and both shares the same seat Hridaya, the Vyana vayu also get vitiated. When Ranjaka pitta (one of the subtypes of pitta that imparts colour to the blood) combines with the vitiated rasa, the rakta dhatu which is formed will also be vitiated. Due to Vyana vayu vitiation, improper circulation of rasa rakta dhatu occurs leading to dhatu kshaya of rasa and rakta. The affected srotas (structural or functional channels) are Rasavaha (channels carrying nutritive fluids) and Raktavaha srotas (channels carrying blood tissue).

In the second case, due its own nidanas, vata especially Vyana vayu gets vitiated. The anuloma gati (normal downward pathway) of Vyana vata gets affected and results in Vimargagamana (abnormal pathway). In its Vimargagati, it gets avarana by Prana vata and the normal functioning of Vyana vayu is hampered. Prana vata is located in Murdha (head) and moves through the paths of Urah (chest) and Kanta (throat) and is responsible for sustaining buddhi (intellect), all indriyas (sense organs) and Dhamanis (vessels).<sup>9</sup> The avarana by Prana vata will result in sarvendriyanamsunyatwa (loss of ability of sense organs), Smriti kshaya (loss of memory) and bala kshaya (loss of physical strength).<sup>10</sup> Since, Hridaya is the common seat for Vyana vata and Pranavaha srotas, there is involvement of Pranavaha srotas also. Pratibadhauchvasa (restricted respiration), alpapauchvasa (shallow respiration) are manifested in Pranavaha Srotodushti (vitiation of channels which carry Prana vata),<sup>11</sup> which can be seen in hypotension, especially in shock. Hence, the pathological

factors involved in the samprapti of Hypotension are Vyana vayu, Prana vata, Ranjaka pitta, rasa dhatu and rakta dhatu.

So, Hypotension can be considered as a rakta kshaya and vyanavatakopa janya vyadhi.

#### Lakshanas (Symptoms)

Utsaha bhramsha (lack of enthusiasm), bala bhramsha (diminution of physical strength), chittotplava (excitement), jwara (fever), Sarvanga roga (diseases affecting whole body), Nistoda (pricking type of pain), angasuptata (numbness of body parts), parushasphutithatwak (rough, dry or cracked skin), mlanatwak (lustreless skin), sarvendriyanamsunyatwa (loss of ability of sense organs), smriti kshaya (loss of memory) and bala kshaya (loss of physical strength).

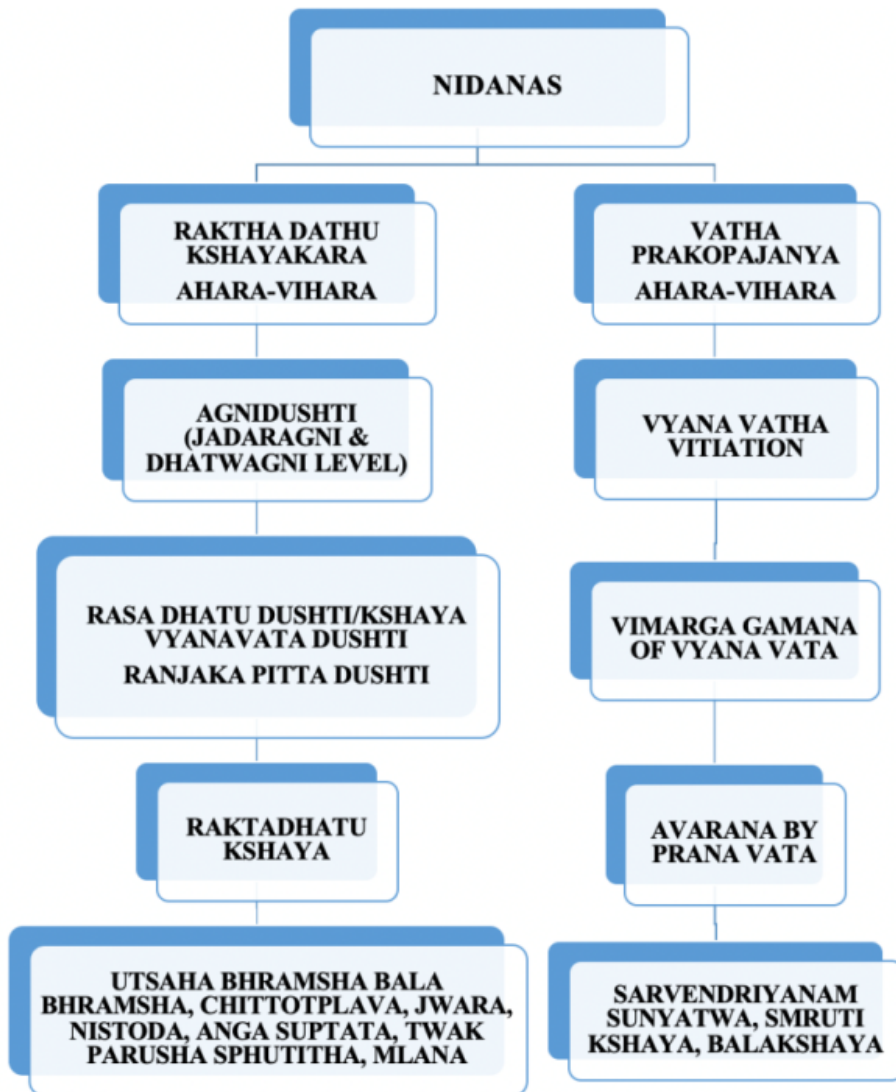


Figure 1: Illustration of samprapti of Hypotension – An Ayurvedic perspective

## Management aspects of hypotension from Ayurvedic perspective

The clinical significance of Hypotension and its serious consequences are often ignored unlike in case of Hypertension. So, it is the need of the hour to postulate an effective management of the disease by using Ayurvedic principles. We have already understood the samprapti (disease process) of Hypotension and its manifestation due to rakta kshaya and the avarana of vitiated Vyana vayu. The major goal of the treatment is to pacify Vyana vayu, remove the avarana and cause proper formation of Rasadi dhatus. Based on the samprapti and lakshanas (symptoms) seen in hypotension, we can adopt the following treatment protocol for an effective management of the condition.

- Agni deepana (increase metabolic fire)
- Vata anulomana (downward movement of vata)
- Avarana chikitsa (remove occlusion)
- Rakta dhatu vardhana (augmentation of blood)
- Pandu roga chikitsa (treatment of anaemia and related diseases)
- Hridroga chikitsa (treatment of heart diseases)
- Madamurcha Sanyasa Chikitsa (treatment of intoxication, fainting, loss of consciousness)
- Rasayana chikitsa (rejuvenation therapy)

### Agni deepana

The line of treatment should begin with Agnideepan drugs which help in proper ahara paka and proper formation of first formed rasa dhatu which in turn pacifies the vitiation of Vyana vayu. This also causes proper functioning of Dhatwagni and leads to proper dhatu Parinama.

### Vata anulomana and avarana chikitsa

Vata anulomana here implies that the pratiloma gati (reverse movement) of vata should be corrected to its normal anuloma gati (downward movement) with the drugs having vata anulomana and Srotoshodhana (purificatory) property as mentioned in the avarana Samanya chikitsa sutra (general treatment principle of occlusion).<sup>12</sup> From the context of anyonyaavarana chikitsa (treatment of mutual occlusion of vata), “Swam sthanamgameyedevamvritaanetaanvimargagan” we can learn that in this case, Prana vata should be protected and the Vyana vayu moving in an abnormal pathway should be brought back to its normal path.<sup>13</sup> This can be achieved if proper vata anulomana and Srotoshodhana is done. Thus, Vyana vayu will regain its normal function of circulating rasa-rakta dhatus.

### Rakta dhatu vardhana

‘Raktamjeevamiti’ is the dictum that is ‘life is with blood’. Hypotension may result in organ failure caused by diminished perfusion of blood to vital organs which is an emergency condition and requires immediate care. Rakta dhatukshaya treatment principle should be adopted here. From the context ‘Samaanesamaanagunabhuyishte...raktamaapyaayate raktena’<sup>14</sup>, Acharya has mentioned that the diminished rakta dhatu has to be increased using rakta vardhana upayas (measures to increase blood) in the form of aushadha (medicine) and ahara (food). This will ensure good quality and quantity of rakta and other dhatus. It will increase the blood volume and systemic blood pressure.

## Pandu roga chikitsa

The disease Panduroga is manifested with the involvement of vitiated Hridaya and Dasha Dhamanis (ten vessels) and from the context ‘Pandvamayo shonitago’<sup>15</sup> rakta dhatu is vitiated in Pandu roga. Hence, the treatments prescribed in Pandu roga should be adopted here. As mentioned in the context of Pandu chikitsa, ‘Yathadoshamvisishtam cha...’ the medicines should be administered according to the vitiated dosha and specific to the condition.<sup>16</sup>

### Hridroga chikitsa

The pathology of Hypotension starts with rasa dhatu and Vyana vayu vitiation leading to dhatu kshaya and avarana by Prana vata. As Hridaya is the site of Vyana vayu and is also the origin of both Rasavaha and Pranavaha srotas, Hridroga chikitsa sutra (treatment principle of Hridroga) should be adopted. As mentioned in the context of Hridroga chikitsa, ‘Tasyaanulomanakaryamsuddhilanghana paachanehi’,<sup>17</sup> that is, generally vata gets obstructed and vitiates after entering the amasaya. So, Shroto shodhana (purificatory) and pachana (digestive) therapies should be done which results in vata anulomana.

Severe hypotension can lead to hypovolaemia and shock with signs of dehydration, extreme pallor and fatigue, low cardiac output, low central venous pressure. These manifestations are similar to the lakshanas of Pittaja Hridroga (heart disease caused due to pitta vitiation) which are trishna (thirst), Osha (burning sensation pertaining to an area), daha (burning sensation all over body), Hridaya Klama (weakness of the heart), Murcha (fainting) etc.<sup>18</sup> In such cases, medicines like, draksha rasa (grapefruit juice), Ikshurasa (sugarcane juice), kakolyadiganasiddha Mahisha ghrita (buffalo’s ghee processed with Kakoli (*Roscoea procera*), meda (*Polygonatum verticillatum*), mahameda (*Polygonatum cirrhifolium*), Jeevaka (*Malaxis acuminta*) with milk can be given internally and Sheetal Pralepa / Pariseka (cold anointing and affusion) can be done externally. Intake of draksha (grapes), Sita (sugar), Kshoudra (honey) and Parushaka (*Grewia asiatica* fruit) in the diet should be advised.<sup>19</sup>

### Madamurcha Sanyasa Chikitsa

In Hypotension, there is involvement of Rasavaha and Raktavaha srotas along with samjnavaha srotas (channels of consciousness) which causes the impaired functioning of indriyas (senses) and Rajo dosha (factor of mind) vitiation leading to confusion and may cause shock or syncope. The samprapti of Madamurcha Sanyasa fits well in the condition of shock due to severe hypotension. Here, the treatment prescribed for Madamurcha Sanyasa has to be adopted judiciously considering the vitiated dosha and bala (strength) of the patient. Tikshna nasya (penetrating nasal administration) in the form of Pradhamana (nasal inhalation of powdered drugs) is also called as sanjnaprabodhaka nasya (nasal administration to regain consciousness), with drugs like Vidanga (*Embelia ribes*), maricha (*Piper nigrum*), Vacha (*Acorus calamus*) act as beneficial to clear the srotas and overcome the avarana. The Pradhamana nasya has been mentioned by Acharya Charaka in Siddhi sthana as ‘Sarvasharira Shroto shodhaka’ (purifying all channels in the body).<sup>20</sup> This context clearly enlightens the fact that emergency management is described in Ayurveda.

### Rasayana chikitsa

Rasayana chikitsa is suitable once the patient attains Agnideepti (increase of metabolic fire) and proper vata anulomana.

Administration of Shilajatu rasayana, Brahma rasayana, Amalaka Avaleha, Chyavanaprasham, Agastya rasayana as mentioned in the context of Hridroga chikitsa helps in regaining bala of the patient.<sup>21</sup> Lasuna rasayana is said to be effective in all types of avarana except pitta samsrishta (associated with pitta). So, it can act beneficial in Hypotension where avarana of Vyana vata by Prana vata is one of the main pathological factors. Nagabala rasayana can also be given in this condition due to its Hridya (comforting), rasayana (rejuvenating), Snehana (unctuous) and Balya (strengthening) property.

### Formulations used in management of Hypotension

There are several formulations mentioned in various contexts in our classical texts which are used for the management of Hypotension. Based on the treatment approach plan and the condition of the patient, a physician should wisely select the suitable formulations. Some of the formulations that are found effective in cases of Hypotension in clinical practice are listed below. Their indications and therapeutic actions are also mentioned here.

### Kashaya

#### Drakshadi Kashaya

Vata pitta jwara (fever caused due to vitiation of vata and pitta), Murcha (fainting), daha (burning sensation), srama (fatigue), bhrama (giddiness), pipasa (thirst)<sup>22</sup>

#### Rasonadi Kashaya

“Peethamunmargagamvatamanulomayatikhshanaat” (immediately corrects the upward movement of vata to its normal downward direction)<sup>23</sup>

#### Punarnavadi Kashaya

Rasa-rakta-mamsa prasadana (nourishment of plasma, blood, muscle tissue), deepana, pachana, purisha anulomana (expulsion of faeces)<sup>24</sup>

### Arishta and Asava

#### Draksharishta

Agnimandya (weakness of digestive power), shwasa (respiratory ailments like Bronchial Asthma), kshaya (depletion), Daurbalya (weakness), mala shodhaka (excretion of waste products)<sup>25</sup>

#### Lohasava

Pandu (anaemia), agnimandya, Hridroga, shwasa<sup>26</sup>

#### Dasamoolarishta

Shwasa, kshaya, dhatukshaya (depletion of dhatus), vata vyadhi (diseases due to vitiation of vata), pandu, agnimandya, karshya (emaciation) daurbalya<sup>27</sup>

#### Ashwagandharishta

Murcha, agnimandya, vataroga<sup>28</sup>

#### Balarishta

Agnimandya, Daurbalya, Vata roga, karshya<sup>29</sup>

### Gulika

#### Dhanwantharam gulika

“Marutasyaanulomani” (downward movement of vata), shwasa, Hridroga, Yakshma (emaciation)<sup>30</sup>

#### Chandraprabha vati

Tridosha hara (pacification of Tridoshas), vata anulomana, Balya, Rasayana, deepana, pachana, Vibandha hara (removes obstruction), daurbalyahara<sup>31</sup>

#### Trijatakadi/ Eladi gulika

Shwasa, aruchi (distaste), Murcha, Mada, bhrama hara, vata shamana (pacify vata)<sup>32</sup>

#### Mandooravataka

Pandu hara, deepana, pachana, vata shamana<sup>33</sup>

### Choorna

#### Annabhedi sindooram

Rakta prasadana and vardhaka (augments and nourishes blood), deepana, Balya, avarana dosha hara (removes occlusion or covering of doshas), kapha vata shamana, pandu hara<sup>34</sup>.

#### Talispatradi choorna

Deepana, pandu hara, Mudhavata anulomana (downward movement of obstructed vata)<sup>35</sup>.

#### Hinguvachadi choorna

Hridroga, pandu roga, aruchi, shwasa, agnisada hara<sup>36</sup>.

### Ghrita

#### Dadimadi ghrita

Deepana, Mudhavata anulomana, Hridroga, pandu, vata roga hara<sup>37</sup>.

#### Shadpala ghrita

Srotoshodhana, “Urdhwaanilaanjayet” (wins over the upward moving vata), deepana<sup>38</sup>.

### Lehya

#### Dasamoolaharitaki Leahya

Kaphavata shamana (pacifies kapha and vata vitiation), vata anulomana, deepana, pachana, mala anulomana, srotoshodhana<sup>39,40</sup>.

#### Drakshavalehya

Pandu, kamala (jaundice), Vibandha (obstruction), agnisada, daurbalya<sup>41</sup>.

### DISCUSSION

It is believed that Ayurveda can only treat chronic diseases and not acute ones. But this belief is wrong and misleading the people. Ayurveda has great potential in treating acute or emergency diseases. Hypotension is a commonly seen condition which if ignored or left untreated can lead to life threatening conditions. This condition thus requires immediate care. There is no direct correlation of Hypotension in Ayurveda classical text books. But with thorough reading of our science, we can find references in different contexts about such condition. Hypotension should be considered as a rakta kshaya and Vyana vatakopajanya vyadhi. Due to Vyana vayu vitiation, improper circulation of rasa rakta dhatu occur leading to dhatu kshaya. The Vimargagamana of Vyana vayu occurs and leads to avarana by Prana vata. All the formulations mentioned here have mainly vata anulomana, shroto shodhana and deepana and rakta dhatu prasadana and vardhaka properties. The treatment principles mentioned in the chikitsa Prakarana of Hridroga, pandu, Mada,

Murcha and Sanyasa are well adopted here. Tikshna nasya in the form of Pradhmana creates a sudden reflex action and helps in gaining back the consciousness in patients suffering from Murcha or Sanyasa. Rasayana therapy helps in regaining the strength of the patient and improves the functioning of vital organs. This treatment approach has a major role in both curative and preventive aspect.

## CONCLUSION

The principles of this ancient holistic health care system of Ayurveda help in the maintenance of good health and prevention of diseases. Despite being a common condition seen among people, it is observed that Hypotension is often ignored of proper treatment which leads to serious consequences. Therefore, an effective treatment approach in Ayurveda for Hypotension is required. The study of literature revealed some references that describe the possible pathogenesis of Hypotension in terms of vitiating factors. Understanding Hypotension from Ayurvedic perspective helped in developing an effective treatment protocol for the condition. The formulations mentioned in the study are clinically found effective in Hypotension. It has come into light that Ayurveda can not only be useful in managing chronic conditions but acute cases as well. It can be concluded that the above treatment protocol for Hypotension should be well adopted in the clinical practice. This work can serve as a foundation for further research studies on Hypotension in the field of Ayurveda.

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