



## Physiological concept of Blood Pressure in Ayurveda

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### Abstract

Hypertension is a common disease in present era. Increased blood pressure is a major risk factor for cardiovascular diseases, stroke and kidney diseases leading to high mortality. Every fifth person is found hypertensive. Most adults develop it, in later half of their life. High blood pressure is considered as Tridoshaj vyadhi. This article proves that there is major role of *Doshas, dhatus, srotas* and *Mana* in the regulation of blood pressure, It is found that the high blood pressure is a disorder of *Vata Dosha* due to *Avarana* and can be considered as *Vata radhana Tridoshaja Vyadhi*. In Ayurveda equilibrium of *Doshas, Dhatus, Malas* and *Agni* are considered as healthy state of an individual. While observing hypertension through Ayurvedic aspect one or more of the following possibilities should be considered.

Physiological changes in the form of vitiation of *Dosha* (*Vata* - (*Prana vata, Udana vata, Vyana vata, Samana vata, Apana vata*), *Pitta*- (*Sadhak pitta*), *Kapha*- (*Avalambakakapha*), *Dhatus*- (*Rasa dhatu, Rakta dhatu*) and *Srotas* - (*Medovahasrotas, Manovahasrotas*). *Prasaravastha* of all the *Doshas* along with *Rakta* which circulate all over the body until they get lodged at a site of *Kha-Vaigunya*. This decides the organ of impact of the disease process.

**Keywords:** Hypertention, *Dosha, Dhatu, Avarana, Kriyakal*.

### Introduction

Ayurveda can be described as a real science of life. *Ayurveda* has an upper edge in treating the disease with emphasis on its root cause. The Ayurveda concentrates on achieving the promotion of health, prevention and management of disease for a healthy and happy life in the society. The principles of *Ayurveda* are focused on maintaining good health by good diet and good lifestyle. Increased blood pressure is a common disease in present era. High blood pressure is a major risk factor for cardiovascular diseases, stroke and kidney diseases leading to high mortality. Every fifth person is found hypertensive. Most adults develop it, in later half of their life [1].

Hypertension is an important world wide public health challenge. The WHO rate sHypertension also as one of the most important cause of the premature death world wide [2]. As per W.H.O 16/03/2023 An estimated 1.28 billion adults aged 30–79 years worldwide have hypertension, most (two-thirds) living in low- and middle-income countries, 46% of adults with hypertension are unaware that they have the condition. Less than half of adults 42% with hypertension are diagnosed and treated.

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Approximately 1 in 5 adults (21%) with hypertension have it under control. One of the global targets for noncommunicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030.

In Ayurveda there is no description of such a single disease which can resemble with hypertension. As per *Ayurvedic* principles in case of unknown diseases, the physician should try to understand the nature of diseases through *dosha*, the site of manifestation, etiological factors and then should initiate the treatment[3]. Hence for proper understanding of disease it becomes necessary to know multiple factors like *dosha vriddhi*, *dhatu dushti*, involvement of *srotas* and their role in causation. In Ayurveda, High blood pressure is considered as *Tridoshajvyadhi*. Treatment for Hypertension in *Ayurveda* on the basis of Balancing all three *Doshas*. This article proves that there is a major role of *Doshas*, *dhatu*, *srotas* and *Mana* in increased blood pressure. It is found that Hypertension is a disorder of *Vata Dosha* due to *Avarana* and can be considered as *Vata Pradhana Tridoshajvyadhi*.

#### Aim and Objectives-

- To explain blood pressure in terms of Ayurveda.
- To find out factors involved in blood pressure as per Ayurvedic perspective

#### Literature-

Blood pressure is an important phenomenon for the normal functioning of blood circulation. The regulation of Blood pressure is carried by Myocardial contractility, that pumps the heart continuously and ejects the blood, helps in maintaining normal Blood pressure.

The tension exerted on the wall of arteries by the strength of the contraction of heart is called "Blood Pressure"[4]. Having blood pressure measures consistently above normal may result in a diagnosis of high blood pressure (or hypertension). In adults hypertension is a condition in which the systolic blood pressure is higher than 140 mm of Hg and diastolic is more than 90 mm of Hg on three separate readings recorded several weeks apart[5].

#### Concept of blood pressure as per Ayurveda-

At first, it is essential to understand the physiological aspects of blood pressure

in *Ayurveda* which is fundamentally based on the theory of *Tridosha* [6].

In *Ayurveda* regulation of Blood pressure can be understood by functions of *Prana Vayu*, *Vyana Vayu*, *Sadhaka Pitta*, *Avalambaka Kapha*, *Rasa dhatu* and *Rakta Dhatu* which are situated in *Hridaya* (Heart). According to Ranjit Rai Desai, vitiation of *Vata*, *Pitta*, and *Kapha* (Premordial factors), *asthi meda* etc. affects blood pressure. *Kapha* vitiation (*avalambak kapha*) increases cardiac strength but due to sluggishness of *kapha*, it decreases the *kapha* and on the other hand *Pitta* (*sadhak pitta*) and *Vata* (*vyanvata*) vitiation increases blood pressure. Here one thing must be clarified that term for blood circulation is not the *rakta samvahana* (transportation of blood) but *rasanudhavana* (Circulation of Plasma). *Ayurveda* believes that *rasa* (plasma) is the circulating medium and not the *rakta* (blood) [7].

#### Etiology of blood pressure-

Essential Hypertension is idiopathic where exact etiology of the rise in blood pressure is not yet clear. There are many predisposing factors which cause hypertension as follows.

- a. Alcohol intake (*Madyapan*)
- b. Salt intake (*Lavan*)
- c. Sedentary lifestyle (*Ati Snighda, Madhur & Divaswap*)
- d. Mental Stress (*Krodha, Bhaya, Shoka*)
- e. Physical Strain (*Shrama*)
- f. Seasonal variations (*Rutu Sandhi*)

g. *Nidanarthkara Roga*—*Madhumeha* (Diabetes), *Shoullya* (obesity), *Hridroga* (Heart disease), *Vrikaroga* (Renal disease) are the precipitating diseases to form secondary hypertension [8].

#### Physiological changes in blood pressure as per Ayurveda-

This dynamic change of pressure is regulated by the complex interaction of *Tridosha* as all the functions of the body are regulated by *Tridosha*. [9].

Looking at blood pressure from this perspective we can assume that vitiation of *Vata Dosha* is the main entity of disease, as the *Dhatu gati* or *Vikshepa* is achieved by *Vata* itself [10].

**Prana vayu-** *Prana vayu* is situated in head region and helps in proper functioning of intellect, heart, sense organs and mind. S.A. node/pacemaker generates impulses; the rate of that impulse is

controlled by autonomous nervous system via sympathetic and parasympathetic nerve fibre emerging from brain. Same functions can be correlated by *prana vayu* situated in the *Moordha* (Brain) that controls the *Hridaya* and responsible for *Dhamni dharana* and thus the heart rate controlled by *Prana vayu*[11].

*Hridaya Dhrika* means the *Dharana* of heart is the typical function of *Prana Vayu*. It can be correlated with the vagal inhibition of nervous system[12]. Vasomotor center controls the blood pressure by autonomic nervous system. In the same way *Prana Vayu* also controls the blood pressure by controlling of *Vyana Vayu*. So the pathology of *Prana Vayu* can be a cause of abnormality of heart as well as vessels by developing hypertension.

**Udana vayu**—*Udana vayu* is situated in *Urasthana* perform functions like *Prayatna* (volition/will), *Utsah* (Efforts), *Urja* (Energy), *Bala* (Strength), *Varna* (Complexion), *Poshana*[13]. All these *Karmas* are performed in whole body. All the organs, directly or indirectly do their function (Efforts) with the help of energy and strength which is provided by *Udana vayu*. Heart beats approximately one lakh times per day, continuous without taking rest, for this effort heart needs extra strength and energy which is provided by *Udana vayu*. *Vyana vayu*—*Vyan Vayu* Situated in *Hridaya* performs the function like *Gati* (movements), *Prasarna* (extension), *Akunchana* (flexion), *Unmesha-nimesha* (blinking)[14]. This is responsible for contraction, relaxation and various movements in human body. With the help of *Vyan Vayu*, heart will be contracts and propels blood continuously to all over body. When the disturbed *prana vayu* covers the *vyana vayu* here is disturbance in the autonomic functions of *vyana vayu*. This Stress can cause increased blood pressure by increased tone of sympathetic nervous system to produce catecholamine's that increase blood pressure. So, it is proves that the involvement of *Vyana Vayu* in regulation of blood pressure. Description of *Hridya* and process of *rasa vikshepana* (Circulation) by *Vyana vayu* is helpful to understand the disease. *Acharya charaka* clearly mentioned that *vyana vayu* a component of *vata dosha* constantly forces the blood out of the heart and distributes it.

### **Samana vayu-**

After the digestive process *Samana Vayu* helps in the transport of *Rasa* into the heart from the digestive organs. Apart from the heart it circulates in the whole human body[15]. Thus it proves that the *Samana Vayu* has an important role in the blood circulation and blood pressure.

### **Apana vayu-**

Vitiation of *Apana Vayu* hampers the excretion of *Purisha* and *Mutra*[16]. Situated in *Pakvadhana*, *Guda*, *Vrishana*, *Basti*, *Medhra*, *Nabhi*, *Uru*, *Vankshana* and *Shroni* Performs expulsion of *Mutra*, *Purisha*, *Shukra*, *Garbha*, *Artava*, Normal functions of all *Doshas* including all *Vayus* depend upon the normal direction of *Apana Vayu*. *Acharya Charak* has quoted that if there is obstruction in the path of *Apana vayu* i.e. in *Gudasthana* then there verse direction of *Apana Vayu* vitiates *Samana Vayu*, *Vyana Vayu*, *Prana Vayu*, *Udana Vayu* and *Pitta-Shleshma*. Thus It can be said that all the normal functions of body are depend upon the normal function of *Apana Vayu*. Thus indirectly the circulatory functions remain under the control of *Apana Vayu*. *Mutra* and *Purisha* have been considered as *Mala*, which are able to produce diseases if not excreted at their regular intervals[17]. It is clear that there is some effect of excretion of *Mutra* on regulation of the body fluid. Vitiation of *Apana vayu* hampers the excretion of the *Mutra*, so the body fluid level becomes imbalance which may affect the maintenance of normal blood pressure. Similarly in modern science,  $\text{Na}^+$ ,  $\text{K}^+$ , urea, uric acid like waste substances are constituents of the urine, which have to be excreted at regular intervals. Retention of these substances cause toxic effects on the body and also alters the fluid balance. So, these are affecting homeostasis of human body which may affect blood pressure.

### **Sadhaka Pitta-**

*Sadhak pitta* is situated in *Hridaya* responsible for *Buddhi*, *Medha*, *Utsaha*, *Abhiman*, *Shaurya*, *Bhaya*, *Krodha*, *Harsha*, *Moha*[18]. *Sadhaka Pitta* helps to keep away *Raja* and *Tama*, which hampers *Chetana* to do its normal functions and makes *Mana* free from such *Avarana* of *Raja* and *Tama*. So, *Mana* becomes more efficient, it turns, enhances *Buddhi*, *Medha*, *Abhimana* etc. eventually helps "*Atma*" to achieve its goal. Psychological disturbances hamper the normal

function of *Sadhaka Pitta* affect the heart rate and cardiac output, which in result high blood pressure.

#### **Avalambaka Kapha-**

Located in *Urdhvapradesha* (with *Hridaya*), the contribution of *Avalambak kapha* is to make *Avalambana of Hridya* with *Ahara rasa* and *rasa dhatu* together with its potency [19]. The normal rhythmicity, conductivity, excitability, contractility, tone and refractory period of cardiac muscle can be correlated with *Avalambana karma* of *Hridaya*, therefore it can be said that *Avalambak kapha* has some role in the regulation of blood pressure. *Avalambaka Kapha* residing in cardiovascular system ensures smooth transport of *Rasa-rakta* through blood vessel. When it vitiate, it causes sticking of lipids in cardiovascular system. This augments peripheral resistance and lead to manifestation of high blood pressure. *Kapha* vitiation may influence the viscosity of blood. Due to increased viscosity increase blood pressure may set up [20].

#### **Role of Rasa dhatu-**

*Hridaya* and ten *Dhamanis* are described as *mula of Rasavaha Srota*. In *Hridaya roga* (heart diseases) the main *Dhatu* affected is *Rasa*. These facts support the vitiation of *Rasa* and *Rasa vaha Srota* in blood pressure.

#### **Role of Rakta dhatu-**

As per *Acharya Sushruta* the *Mula sthan* (origin) of *Rasa vaha Srotas* is *Raktavahini Dhamani* (Vascular System). The symptomatology of *Raktavaha Srota dushti* as per *Acharya Charaka* closely relates to the symptoms of hypertension [21]. The complications of hypertension are encephalopathy, ischemic attacks and strokes. These disorders are closely resembles to the disease *Mada*, *Murchha* and *Sanyasa* which are described in *Vidhi sonitiya adhyaya* of *Charaka Samhita*. The *Srotas* vitiates in these disorders are *Rasavaha*, *Raktavaha* and *Samgyaa vaha Srotas* [22]. This supports affection of *Rakta vaha Srotas* in association of *Rasa* and *Manovaha Srotas* in increased blood pressure.

#### **Role of Medovaha Srotas-**

Function of *Medovaha srotas* is closely related to the lipid metabolism. Abnormal lipid metabolism such as hypercholesterolemia, decreased HDL, increased triglyceride, increased LDL bring about

endothelial dysfunction, atherosclerosis leading to manifestation of high blood pressure.

#### **Role of Manovaha Srotas-**

Mind cannot be carried by anything. Mind is all pervasive due to its properties of oneness and minuteness. Mind is responsible for perception of sense objects and is also associated with the organs of action for the discharge of their actions. Therefore the mind is a dual organ. All inputs of sensor information and all discharges of motor/functional information pass through the mind. Mind carrying channels are not mentioned among the list of channels by *Acharya Charak* or *Sushruta*, but the word *manovaha srotas* has been mentioned in some other contexts.

Peoples exposed to repeated psychogenic stress have more tendencies to develop hypertension. Stress activates the sympathetic nervous system directly and sympathetic over activity in turn interact with high sodium intake, rennin-angiotensin and insulin resistance to mediate the pathogenesis of hypertension.

#### **Concept of Avarana (occlusion of normal functioning) in blood pressure-**

Blood circulation is the main function of *Vata* (*Vyanavata*), its impairment is certain in Hypertension. It may be impaired by its own *Prakopa* (aggravation) due to *Vataja Nidanas* (etiological factors for *Vata*) or it may get vitiated by the influence of other *Doshas* and *Dhathus*. This is where the concept to occlusion of normal functioning of *Vata* plays an important role in the cause of hypertension. The normal course of *Vata* can be occluded by *Pitta*, *Kapha*, *Rakta* and *Medas* [*Charaka Samhita*, *Chikitsa Sthana*; 28/61–69]. These *Anya-Dosha Avarana* pathologies can be considered under the hypertension due to increased hormonal decreased sodium excretion, change in the chemical constituents in the blood and atherosclerotic changes in the arteries due to lipid deposition. Another type of occlusive pathology happens when there is *Anyonya Avarana* of *Vata* (mutual occlusion between subtypes of *Vata*). The subtypes of *Vata* such as *Prana* and *Vyana Vata* obstruct each other and cause the disease [*Charaka Samhita*, *Chikitsa Sthana*, 28/200–215]. This condition can be considered as hypertension due to hampered autonomic nervous system as it plays an important

role in the regulation of blood pressure. *Acharya Charaka* and *Sushruta* have enumerated and explained many different types of mutual occlusions of *Dosha* and occlusion of one *Dosha* by other *Dosha* or *Dhatu* and in many of these conditions; symptoms of hypertension such as giddiness, headache, and fatigue have been mentioned. These conditions are: *Pittavritavata*, *VyanavritaPrana*, *PittavritaPrana*, *PittavritaVyana*, *PittavritaSamana* and *PittavritaUdana* [Charaka Samhita, Chikitsa Sthana, 28/221–230]. Other conditions where these symptoms are seen together are *Amashaya gata Vata* [Sushruta Samhita, Nidana Sthana, 1/32–39]. *Rakta Dushti* & *Pradoshaja Vikara* [Charaka Samhita, Sutra Sthana, 24/5–10] and *Pittaja Hridroga* [Charaka Samhita, Sutra Sthana; 17/32]. *VyanaVata* is said to be responsible for *Sweda* (sweat) and *Asruk Sravana* (ejection of blood) and if it gets vitiated it produces diseases which will affect the entire body [Charaka Samhita, Sutra Sthana, 24/11–16]. This can be correlated to hypertension as excessive perspiration is a symptom of hypertension.

#### **Samprapti based on Kriyakala-**

In *Ayurveda*, a disease should have specific *rupa* (*lakshana*) to be called a *Vyadhi*, and in mild and moderate form hypertension being asymptomatic so it is not described as a disease in *Ayurveda*. In the different stages of a disease, *Prasaravastha* is the stage where the *Doshas* move out from their respective sites and specifically of *VyanaVata*, *Prana Vata*, *Sadhaka Pitta* and *Avalambaka Kapha* along with *Rakta* in their disturbed states and circulate all over the body, causing certain mild, non specific symptoms [Sushruta Samhita, Sutra Sthana, 21/28]. This in turn hampers the functions of the respective *Srotas* in the beginning and later on they also bring about structural changes as well, leading to *Kha-Vaigunya*. Then, these *Doshas* get lodged at susceptible sites can be (heart, brain, kidneys, eyes and blood vessels) of *Kha-Vaigunya*. It is at this stage that the actual *Sthana Samshraya* (vitiated *Doshas* getting stuck in a particular site) and *Vyakta Avastha* (manifestation of specific symptoms) occur, causing diseases of these vital organs. Later, in the *Bheda avastha* (complicated stage), there occurs severe

damage to these organs, making the disease *Asadhya* (incurable) and sometimes leading to death itself.

#### **Conclusion**

In *Ayurveda* equilibrium of *Doshas*, *Dhatu*, *Malas* and *Agni* are considered as healthy state of an individual. While observing high blood pressure through *Ayurvedic* aspect one or more of the following possibilities should be considered.

1. Improper life-style and food habits, psychological stress factors with or without genetic predisposition provokes and vitiates all the three *Doshas* to trigger the causes for high blood pressure.
2. Physiological changes in the form of vitiation of *Dosha* (*Vata* (*Prana vata*, *Udanavata*, *Vyanavata*, *Samanavata*, *Apanavata*), *Pitta* (*Sadhak pitta*), *Kapha* (*Avalambakakapha*), *Dhatu* (*Rasa dhatu*, *Rakta dhatu*) and *Srotas* (*Medovahasrotas*, *Manovahasrotas*).
3. The concept to *Avarana* (occlusion of normal functioning) of *Vata* plays a major role in the cause of increase blood pressure.
4. *Prasaravastha* of all the *Doshas* along with *Rakta* which circulate all over the body until they get lodged at a site of *Kha-Vaigunya*. This decides the organ of impact of the disease process (either in brain, heart, kidneys, eyes or blood vessels).

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