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Original Article

CORRELATION OF HYPERTENSION AND STRESS – AN AYURVEDIC APPROACH

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Abstract

Hypertension is a disease of cardiovascular system, so heart and blood vessels are mainly considered in the pathogenesis, where genetic factors, environmental factors as well as psychosocial stress play an important role. The impact of stress on the development of hypertension is believed to involve sympathetic nervous system response, which leads to increased heart rate, cardiac output, and BP. According to *Ayurveda,* body and mind both constitute to be the substrata of healthy state and any disease. *Vyana Vayu*, *Avlambaka Kapha* and *Sadhak Pitta* are three doshas situated in the heart. *Vyana vayu* is responsible for the circulaton of rasa from the heart throughout the body. *Charak* states that *Chinta* and *Shoka* are the causes of vitiation of *Vata*. The functions of *Sadhak Pitta* are bravery(*shourya*), fearfulness(*bhaya*), anger(*krodha*), cheerfulness(*harsh*), delusion/(*moha*) by *Chakrapani Dutta*. *Avlambaka kapha* supports heart, can be considered as a contributor in the pathogensis due to resemblance in the site of *Vyana Vayu*. The imbalance in the rhythm of these *doshas* may cause the involvement of physical as well as psychological factors in the pathogenesis of hypertension.

Keywords : Hypertension, Psychosocial Stress, *Vyana Vayu*, *Avlambaka Kapha*, *Chinta*.

INTRODUCTION

Hypertension is a serious medical condition that significantly increases the risk of heart attack, stroke, kidney failure and blindness. It is also called Silent killer because most of the sufferers (85%) remain asymptomatic and as per available reports, in more than 95% of cases of hypertension, underlying cause is not known. Such patients have Essential Hypertension.[1] Prevalence of hypertension has gone up from 5% in 1960s to nearly 12% in 1990s, and more that 30% in 2008.[1] Of the estimated 1.13 billion people who have hypertension, only 1 in 5 patients have blood pressure under control. It is one of the leading causes of premature death worldwide killing nearly 9.4 million people every year globally[1]. Hypertension arises from a complex interaction between genetic, environmental and behavioral exposure such as dietary sodium intake, excess alcohol consumption, physical inactivity. These factors account for most but not all cases of hypertension. Among these factors, stress is also

becoming more accepted because it is crucially related to total human health- including physical, mental and emotional health.

The stressful and hurried lifestyle of present era affects one's mind and homeostasis of body by several psychosomatic mechanism causing many psychosomatic disorders. Almost 82% of India's population is suffering from stress and those in sandwich generation (35-49 years of age) are most affected with approximately 89% of the total affected people, reveals the Cigna's 360 well being survey 2019.[2] The major cause of the stress in the country today are work, health and finance related issues. Stress is not just an environment condition but a combination of particular external environment and a particular person; thus not every person will evaluate and react to any situation in the same way.

Classification of hypertension (according to 7th JNC Criteria)

Category of HTN	Systolic BP(mmHg)	Diastolic BP (mmHg)
Normal	</= 120	</=80
Prehypertensive	120-139	80-89
Hypertension	>/= 140	>/=90
Stage 1	140-159	90-99
Stage 2	>/=160	>/=100

Pathophysiology of Arterial blood pressure : Arterial blood pressure depends on two factors: Cardiac output and Peripheral resistance. Further, Cardiac output depends on the stroke volume and heart rate. Peripheral resistance depends on vascular structure and the vascular function.

Literary review

Emotional stress is the term used to describe the nonspecific biological response of the body to an increased demand made upon it through variety of stressors or stimuli from the environment. Such environmental factors include physical as well as psychological stimuli. Generally, stress response is a reversible physiological response designed to meet the increased demand on the humans during a stressful situation. A classical stress response consists of increased production of neurohumors, hormones, specially cortisol and catecholamines leading to series of resultant physiological and metabolic changes. When such responses exceed the normal limit, it starts producing irreversible changes in the body and thus precipitates a psychosomatic disease. A psychosomatic disease, also

known as psychophysiological disease, is essentially a disorder of stress. It is termed as psychosomatic because the initial cause of such a disease, centres around psyche and but later, the manifestations of the disease are somatic also.

In 1979, a national survey showed that, "emotional stress, worry and anxiety" was considered the more likely cause of high blood pressure, ahead of overweight (26%) and hereditary(12%).[3] Acute psychogenic stress such as forced mental arithmetic stimulates the sympathetic activation, leads to the transient elevation of blood pressure, which is associated with increased heart rate, visceral vasoconstriction and high cardiac output.[4,5.6] The sympathetic stimulation caused due to psychological stress leads to Renin secretion.[7] Sympathethic predominance is a risk factor for developing sustained hypertension[8] and for developing cardiovascular disease in those with sustained hypertension.[9,10] markers of sympathetic activity such as Norepinephrine level gets higher in Hypertensives than normotensives, both at baseline and when confronted with a psychosocial stressor.[11,12,13]

It is presumed that the individual's genetically determined personality i.e. his psychosomatic makeup plays a great role in the development of specific psychosomatic disease in a particular type of individual. Probably an individual develops the psychosomatic disease of a particular system or organ which is genetically weak. This is the reason why the same stress factor produces different types of stress diseases in the different individuals. Ayurveda has very seriously emphasized the role of Deha prakriti which can be related with this theory.[14,15] A genetic component is proved from studies on blood pressure variations in twins and from the observation that of identical twins, the first to become hypertensive is the one with exposure to greater psychological stress.[16,17]

Ancient review

In Ayurveda, the life process has been contemplated as the collectively combined state of *Sharira*(Physical body), *Indriya*(developed sensory organs), *Satva*(Mind) and *Atma*(Conscious element). The state of *Arogya*(health) or *Vyadhi*(disease) surrounds these four pillars as *Sharirendriya Satvaatmasamyogo Dhari Jivitam.*[18] Hence, Every disease is psychosomatic and *mana* is chiefly responsible for attaining good health. A healthy person is the one whose *doshas* and *agni* are in equilibrium, whose functional activities of the tissues and excretory system are in normal balance and the soul, senses and mind are in stable condition. Therefore cheerful state of mind is necessary for the good healthy life.[19]

There are no direct references for hypertension and stress in ayurvedic texts by the name as well as by their pathological aspect. According to the meaning of the word "Stress" – *Tanaav, Ayas* and *Bhar* in many dictionaries, It can be correlated with *Buddhi, Dhruti, Smriti vibhransa*, which ultimately leads to *Pragyaparadh*. *Pragyapardha* is stated as one of the causative factors for nearly all diseases, especially psychological disorders. Due to *Pragyaparadha*, intellectual functions of a person are disturbed due to which the person is not able to differentiate between ethical and unethical things, which results in numerous psychological disorders. Stress is the outcome of such condition associated with depression, negative thoughts. The root cause of this imbalance between physical and mental health is vitiated bodily humors- *Vata, Pitta, Kapha* including *Raja and Tama*. Various *Manas Bhavas* (Psychological conditions) like *Chinta*(worry), *Udvega*(anxiety), *Shoka*(grief), *Bhaya*(fear), *Krodha*(Anger) are mentioned in texts. When these *manas bhavas* cross the physiological limits, they

are considered as *Manasika Vikara*, which is a pathological state, adversely affecting the mind and the body.

The main regulation of the mental health is governed by Mana(mind). A factor which establishes the connection between the Soul and Body regulating the functions of the Indriya is defined as a Manas.[20] *Indriyabhigraha* (control of sense organs), *Svasyanigraha* (self restraint), *Uha* (hypothesis) and *Vichara* (consideration) represent the action of mind.[21] Acharyas have mentioned that only Hridaya is the seat of Chetana in the body. It indicates that Hridaya is the actual seat of Manas also.[22, 23,24] It has been explained that Prana and whole Indriyas are situated in Uttamanga i.e. Sira. Among the whole Indriyas, Manas is the supreme because it is the controller of them.[25] So it represents that Manas is situated in Uttamanga i.e. Sira. Acharya Charaka states that Sarva Sharira is Adhisthana of Atindriya i.e. mind.[26] In Charaka Acharya has mentioned that the channels of the whole body transport the Tridosha, similarly Manas is transported through same channels to provide Chetana to all the living cells of the body. Charak states that *Raja* and *Tama* are the chief pathogenic factors of the mind and due to them *Manas Vikaar* like – *Krodha*(Anger), *Lobha*(Greed), *Moha*(infatuation), *Irshya*(envy), *Shoka*(sorrow), *Chittodvega*(Anxiety), *Bhaya*(Fear), *Vishaad*(Depression) are produced.[27]*Vata* is mainly responsible for the activities of mind. It is the controller and stimulator of mind.[28] Sushruta also explains that all manas vikaras are produced due to various types of *Ichcha*(desire) and *Dvesha*(hate).[29] These various types of desire and hates are precipitated by Raja and Tama. Hence, Raja and Tama are the causative factors of mental disorders.
There are different opinions regarding ayurvedic nomenclature for hypertension such as:

S.No.	Nomenclature	Scholar
1.	*Dhamni prapurana*	*G.N. Saraswati*
2.	*Rakta Gata Vata*	Y.N. Upadhyaya
3.	*Dhamni Pratichaya*	A.D.Athawale
4.	*Siragata Vata*	G.N. Chtaurvedi K.N. Shastri
5.	*Avrita Vata Roga*	R.K.Sharma
6.	*Vyana Bala*	Brihaspati Triguna
7.	*Shleshmavrita Vyana*	Prof. SN Tripathi

Factors involved in pathogenesis of Hypertension

Hypertension is a cardiovascular disease, so heart and blood vessels are mainly considered in the pathogenesis of this disease. *Vyana Vayu , Sadhaka Pitta and Avlambaka Kapha* are the three doshas situated in the heart. Heart is also responsible for circulation of *Rasa* and *Rakta* throughtout the body. The factors contributing to the pathogenesis of Hypertension are :

1. ***Hridaya***
   - *Hridaya* (heart) is formed by *Kapha and Rakta* in the fetus during development of organs in the gestation period.[30]
   - It is also considered as *Chetana Sthana*.[31,32,33]
   - It is mentioned as the root of *Rasa and Rakta Strotas*, which constricts and relaxes in order to carry out the circulation of *Rasa* And *Rakta* throughout the body with the help of *Vyana Vayu*.[34]
   - Heart rate regulation is done by 3 components[35]-

   a. Vasomotor centre-
      i. Vasoconstrictor area- increases Heart rate by sending acceleration impulses to heart through sympathetic nervous system, which causes constriction of vessels.
      ii. Vasodilator area- decreases Heart rate by sending inhibitory impulses to heart through vagus nerve, which leads to dilatation of blood vessels.

   b. Motor (Efferent) nerve fibres to heart –
      i. Parasympathetic fibres from Medulla Oblongata which passes through vagus nerve.
      ii. Sympathetic fibres from upper thoracic segment of spinal cord (T_1 to T_4)

   c. Sensory(Afferent) nerve fibre from heart- Receives information via Glossopharyngeal nerves and vagus nerve from periphery particularly from baroreceptors.

2. ***Vyana Vayu***
   - Location : *Hridaya* (heart) and whole body
   - Functions:
     - All movements in the body- *Prasarana* (Extension), *Akunchana*(Flexion), *unmesha-nimesha* (blinking)[36]
     - *Rasa Samvahan* (circulation), *Sweda- Asrika Sravana, Dhatu tarpana* [37]
     - Contraction and dilatation of the blood vessels are also governed by *Vyana Vayu* throughout the body. It suggests involvement of *vyana vayu* in regulation of Blood pressure.

3. ***Apana Vayu***
   - Location : *Pakwadhan, Guda, Vrishana, Basti ,Medhra, nabhi, Shroni* [38]
   - Function : excretion of *Mutra, Purisha, Shukra, Garbha, Artava* [39]
   - 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 *Mutra*, so body fluid level becomes imbalanced, which may affect equillibrium of regulatory system of normal blood pressure.
   - In modern science, Retention of Sodium, Potassium, Uric Acid disturbes the body fluid balance and stimulates all regulatory system like Renin Angiotensin system.[40]

4. ***Sadhaka Pitta***

- Location : Hridaya
- Function :
  - *Buddhi, Medha, Utsaha, Abhimana* [41]
  - *Shaurya, bhaya, krodha, harsha, moha* [42]
- Dalhan explains that Sadhak Pitta dispels the Kapha and Tama from Hridaya and thus enables the mana to perceive the things clearly.
- Adrenaline and Noradrenaline functions can be correlated with Sadhak Pitta. In the conditions like fear, anger, grief the adrenal glands are stimulated and increase secretion of Adrenaline. It further affects the heart rate and cardiac output , which in turn affects the blood pressure.[43]

5. **Avlambaka Kapha**
   - Location: *Urah pradesha (Hridaya)* [44]
   - Functions: *Avalambana*(Strengthen) of the heart with *Ahararasa* and *Rasadhatu.*
   - The normal rhythmicity, conductivity, excitability, contractility, tone and refractory period of cardiac muscles can be correlated with *Avalambana karma* of Hridaya by *Avlambaka kapha* .

6. ***Rasa Dhatu***
   - Meaning of *'Rasa'* itself explains the continuous movement**.**[45]
   - *Rasa dhatu* circulates throughout the whole body and its main seat is *Hridaya* [46]
     - *Chintyanam cha Ati Chintanat*(Stress) has been mentiond as direct cause of *Rasavaha Strodushti*.[47] This affects functions of *Hridaya* also, which further leads to the dysfunction of *rasa samvahan.* According to *Chakrapani*, *Rasa Samvahan* includes circulation of not only *Rasa Dhatu* but also blood and other body fluids which take part in the circulation over whole body. Therefore, Dysfunction of *Rasa Samvahan* causes raised blood pressure.[48]

Conclusion

While observing hypertension through *Ayurvedic spectacle* one or more of the following three possibilities should be considered.

1. Pathophysiological changes in the form of vitiation of *Dosha(Vata, Pitta* and *Kapha), Dhatu and Mala Dushti.*
2. Structural changes as complications of long term hypertension on various organs like heart, blood vessels, kidney etc.
3. Psychological changes i.e. disturbances at the level of *Mana (Manovaha Strotas Vikara).*

Hridaya and Rasa Dhatu are the main constituents of the circulatory system. And these influence directly Mana as described by various Acharyas. Vata plays an important role in connecting the circulatory system with manovaha strotas. Several mechanisms such as resetting of the baroreceptor reflexes and structural autoregulation in the peripheral vasculature may operate to sustain blood pressure at high level once it is raised. These mechanisms are somehow disturbed by stress also, which affect the blood pressure regulatory system temporarily. It has been suggested that repeated episodes of heightened cardiovascular reactivity could contribute to hypertension development by promoting vascular remodeling.[49] These pathological changes in turn, could alter the long term regulation of blood pressure by kidneys, resulting in shift in the blood pressure set point to higher levels. Poor cardiovascular recovery could contribute to hypertension development through same mechanisms that have been proposed for heightened cardiovascular reactivity.[50]

Considering all the factors whch contribute in the pathogenesis if Hypertension, along with pharmacological therapy, non pharmacological measures should also be adapted which includes physical activity, improved dietary habits as well as stress management to combat the physical and mental health as well.

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