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AYURVEDIC PERSPECTIVE ON PEDIATRIC HYPERTENSION

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ABSTRACT

All individuals wish to lead a long, healthy, and disease-free life and naturally hope the same for their children. However, changes in lifestyle and dietary habits—such as lack of regular physical activity, increased consumption of junk food, oily and spicy diets, and exposure to contaminated or unhealthy foods—have contributed significantly to the rising burden of lifestyle-related disorders. Hypertension is one such condition. Hypertension is regarded as a complex disorder and a major contributor to cardiovascular morbidity and mortality. Although it was traditionally considered a disease of adulthood, the age of onset is gradually shifting towards younger populations due to ongoing changes in diet and lifestyle, making it an important public health concern. In children and adolescents, hypertension can lead to early target-organ damage, while its long-term consequences include structural and functional alterations in vital organs such as the heart, kidneys, eyes, and brain.[1] Given the diverse etiological factors involved, the pathophysiology of hypertension is multifactorial. In this context, an attempt has been made to understand hypertension through Ayurvedic principles and to explore its management from an Ayurvedic perspective.

KEYWORDS: Ayurveda, Pediatric Hypertension, Life style disorder.

INTRODUCTION

Hypertension in children is defined as systolic or diastolic blood pressure exceeding the 95th percentile for age, gender and height, on at least three separate occasions, 1-3 weeks apart. Even though HTN is not common in pediatrics, we may come across with some situation where monitoring of blood pressure becomes important. Certain conditions with HTN indicates serious underlying diseases of either renal, cardiac or any other origin. Prompt identification and management modify cardiovascular trajectories, helps preventing premature adult heart disease or target organ damage.

Other definitions of HTN include.
1. White coat HTN - Some children may show blood pressure higher than the 95th percentile in clinic or hospital setting, while it is below 90th percentile in familiar environments. These patients do not need pharmacological treatment, but require blood pressure monitoring.
2. Masked HTN - normal BP during health care visits but elevated in the ambulatory setting, it can be often seen in patients with kidney disease and obesity.

Pediatric hypertension is no longer a rare curiosity—it's a silent epidemic affecting 3–5% of children worldwide, with rates climbing to 10% among obese youth. These figures represent a significant public health concern, as childhood hypertension frequently tracks into adulthood, establishing early cardiovascular risk.[2]

Different stages of HTN.[3]

BP category	**Age <13 y**	**Age ≥13 y**
Normal BP	<90th percentile for age, sex, and height	<120/<80 mm Hg
Elevated BP	90th–<95th percentile for age, sex, and height	≥120/<80 to 129/<80 mm Hg
Stage 1 hypertension	≥95th percentile–95th percentile plus 11 mm Hg	130–139/80–89 mm Hg
Stage 2 hypertension	≥95th percentile plus 12 mm Hg	≥140/≥90 mm Hg

CLASSIFICATION

Primary hypertension typically emerges in older children and adolescents, strongly associated with elevated body mass index and positive family history.[4] Primary hypertension is uncommon in children below the age of 10 years and is usually diagnosed only after secondary causes have been ruled out.[5] A positive family history and increasing body mass index (BMI) are the most important risk factors for the development of essential hypertension.[6] Primary hypertension is often associated with other components of metabolic syndrome, which together increase the risk of future cardiovascular disease.[7] These associated risk factors include low levels of high-density lipoprotein cholesterol, elevated triglycerides, central (abdominal) obesity, and insulin resistance or hyperinsulinemia.[8] Although primary hypertension is the most common form of hypertension in adults, its origins can often be traced back to childhood. Therefore, routine measurement of blood pressure should be an integral part of the physical examination in children of all age groups to allow for early detection, timely evaluation, and appropriate management. It is recommended that blood pressure be measured at least once a year in all children above 3 years of age and at every clinical visit during adolescence.

Secondary HTN more prevalent in younger children which is associated with severe HTN & other clinical features for example Renal, cardiac disorders etc.

ETIOLOGY FOR SECONDARY HTN[9]

Cause	**Conditions**
Renal (50-60%)	Chronic Glomerulonephritis & nephrotic syndrome Chronic pyelonephritis Hydronephrosis Vesiculo-ureteral reflux nephropathy Renal tumors
Cardiac (10-20%)	Coarctation of aorta Mid aortic syndrome Pulmonary hypertension
Endocrine (5-10%)	Cushing syndrome Neuroblastoma Pheochromocytoma Congenital adrenal hyperplasia Hyperaldosteronism Hyperthyroidism
Medications (2-5%)	NSAID ADHD stimulant medications Corticosteroids (Mineralocorticoids)

Based on these etiological factors, pathophysiology of hypertension varies so here is a samprapti postulated for the same.

1) For Renal cause- in case of Chronic Nephrotic syndrome

Structures of glomerular nephron act as a filter Prevents large molecules like albumin from passing through Bowman’s capsules & Renal tubules: Injury to these structures causes excessive protein loss leading to hypoalbuminemia. Fluid overload, impaired sodium excretion, activation of RAAS and sympathetic nervous system, and vascular constriction together raise systemic vascular resistance and blood pressure.[10]

In ayurveda- Atipravrutti of mutra (excess loss of kleda), leads to eliminating of prakuta kleda, which causes severe Dhatu kshaya in turn causes vata prakopa, Vyana vayu prakopa leads to Increased vascular resistance causing increased blood pressure.[11]

2) For Cardiac causes- in Pulmonary hypertension

Due to increased pulmonary vascular resistance there is right ventricular hypertrophy & failure because of which there is reduced LV filling leading to reduced cardiac output. Due to reduced cardiac output there is decrease in renal perfusion leads to RAAS-SNS activation. When RAAS-SNS activated, there is increase in renin and aldosterone which further causes systemic vasoconstriction and fluid retention. This causes systemic hypertension.[12]

In Ayurveda- Due to pranavaha sroto dutsi, there is Kapha that creates obstruction in the normal movement of Rasa, rakta and vyana vayu in the alveolar bed. This further aggravates vyana vayu creating kaphavaruta vata condition with symptoms as गत्रस्तम्भ, चेष्टासङ्ग & गुरुगात्रता (creating pulmonary hypertension), because of this there is further decreased propulsion of rasa & rakta causing increased arterial resistence leading to systemic hypertension.

3) For Endocrine causes – in case of thyroid dysfunction

Thyroid dysfunction causes alteration in the cardiac function (hyperthyroidism) and vascular tone (hypothyroidism) activating RAAS which further causes fluid retention and vasoconstriction leading to hypertension in children.[13]

In ayurveda- we can understand this in 2 different forms-
In hyperthyroidism (pitta-vata) - as there is increased basal metabolic rate in the body, it causes increased pitta and dhatvagni, due this there is hyper-functioning of sadaka pitta (prakopa) which causes vyana vayu dusti. Due to vyana vayu dusti there is increased heart rate and cardiac out causing hypertension.

In hypothyroidism (kapha-vata) – here there is reduced basal metabolic rate which causes dhatu agni mandya where in there is kapha prakopa caused. So, this prakopita kapha causes srotorodha causing increased vascular resistance leading to hypertension.

4) For medication

Medications can be an important cause of HTN especially in adolescents. These medications include steroids, ADHD stimulant medications, and chronic use of non-steroidal anti-inflammatory drugs (NSAIDs). In case of steroids (mineralocorticoids), due to its mineralocorticoid action there is increase in sodium and water retention which causes increased intravascular volumes leading to increased cardiac output causing hypertension.[14]

In ayurveda- Medicines interfering at the level of neuro transmitter, vascular permeability, etc causes Dhatu agni mandya, so Rasa–Rakta Dhatu Dushti happens which causes Srotorodha (especially Rasavaha & Mutravaha Srotas) leads to (due to sodium and water retention) Shotha (Fluid overload). This in turn activates Vyana Vayu vitiation (RAAS activation- vasoconstriction) ending up causing hypertension.

CHIKITSA

Chikitsa primarily focuses on correcting the underlying pathology or primary disease, the management of which itself leads to reduction of hypertension.

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By eliminating the cause or balancing it with opposite qualities, the disease resolves on its own. Based on this chikitsa can be implemented. This holds good for Primary hypertension.

Hetu Viparita Chikitsa- for the disease manifestation Nidhana is the base foundation, so by removing or avoiding the root or the base of the disease, we can avoid the roga.

Vyadhi Viparita Chikitsa- Vyana Vāyu plays a major role in the pathogenesis. Therefore, therapies aimed at regulating Vāta doṣa are essential. Basti therapy is considered the most effective treatment for controlling aggravated Vāta and restoring the normal movement (*gati*) of Vāta. Supportive therapies such as Abhyanga and Nāḍi Sveda help in pacifying aggravated Vāta doṣa and may promote vasodilatation by improving circulation. In pediatric practice, Basti is regarded as the principal modality of Kāya Śodhana. Among the different types of Basti, Nirūha Basti performs *Śodhana* (purificatory action), supports tissue healing, and helps in reducing the manifestations of aggravated Vāta. It may also aid in stabilizing Vyana Vāyu, thereby potentially influencing mechanisms such as the renin–angiotensin–aldosterone system (RAAS). Anuvāsana Basti, due to its unctuous nature, helps in pacifying Vāta doṣa and provides Bṛṃhaṇa (nourishing) effects. The long-term regulation of blood pressure occurs through the renin–angiotensin–aldosterone system (RAAS), which functions as an important endocrine regulatory mechanism. The lower part of the gastrointestinal tract has abundant parasympathetic innervation. Stimulation of this region through Basti therapy may influence autonomic activity, potentially reducing the activity of the RAAS pathway. It may also activate the depressor region of the vasomotor centre, resulting in vasodilatation and thereby contributing to a reduction in blood pressure.[15]

DISCUSSION

Pediatric hypertension is emerging as an important public health issue due to the growing prevalence of sedentary lifestyles, unhealthy dietary habits, and increasing rates of childhood obesity. Early identification and management of hypertension in children are therefore essential to prevent long-term complications such as cardiovascular disease, renal dysfunction, and other target-organ damage in adulthood.

From an Ayurvedic perspective, hypertension does not directly correspond to a single disease entity described in classical texts; however, its clinical manifestations can be understood through the involvement of Vata dosha, particularly Vyana Vayu, along with disturbances in Rasadhi dhatu. Vyana Vayu plays a crucial role in maintaining the circulation of blood and nutrients throughout the body, and any disturbance in its normal function can lead to altered hemodynamics and increased vascular resistance, which may manifest as elevated blood pressure.[16]

Thus, Ayurveda provides a holistic understanding of pediatric hypertension by integrating the concepts of dosha imbalance, dhatu involvement, and srotas dysfunction, emphasizing both preventive and therapeutic approaches.

CONCLUSION

Pediatric hypertension is an emerging health concern that requires early detection and timely intervention to prevent long-term cardiovascular complications. The increasing prevalence of lifestyle-related risk factors among children highlights the importance of routine blood pressure monitoring and preventive strategies in pediatric practice.

Therapeutic approaches such as Basti, Abhyanga, and Swedana, along with appropriate dietary and lifestyle modifications, may help regulate Vata dosha, improve circulation, and support cardiovascular health. These principles highlight the holistic and preventive potential of Ayurveda in understanding and managing pediatric hypertension. Further clinical research and integrative studies are required to validate these concepts and strengthen their application in modern pediatric healthcare.[17]

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