

## Brief update on management of hypertension in diabetic patients

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### Abstract

Nowadays there is increased prevalence of co-morbidity of hypertension and diabetes. Hypertension has become such a bigger health problem as it does not show any manifestation of it until it gets seriously complicated. High blood pressure is the major cause of premature deaths which comes around 7.6 million (about 13.5% of the global total) worldwide. Non-insulin dependent diabetes mellitus (NIDDM) is a global pandemic. By 2025 it is been projected that around 300 million people will have NIDDM worldwide. WHO projects that diabetes will be the 7th leading cause of death in 2030. Diabetes and Hypertension often termed as co-morbid disease as there is greater tendency of both the complication occurring together. The prevalence of hypertension among T2DM patients varies across countries and is reported to range from 20.6% to 78.4% in the Southeast Asian region, and 9.7% to 70.4% in the African region, in India it is 6.4% to 55%. To reduce the complications of diabetes in co-morbidity, hypertension should be in the range of 130/90 mmHg for that apart from allopathic system of therapy ayurvedic and unani system of therapy and certain lifestyle changes can be undertaken as these systems do not have drawbacks such as side effect, long duration treatment, and high cost therapy.

**Keywords:** Hypertension, Diabetes, Co- morbidity, Pharmacotherapy, Ayurveda, Unani.

### Introduction<sup>(1,2,3)</sup>

Hypertension is defined as a condition of increased systolic and diastolic blood pressure for more than 140 mm Hg/ 90mm Hg. Hypertension has become such a bigger health problem as it does not show any manifestation of it until it gets seriously complicated. Diabetes is a systemic endocrine disorder associated with unresponsiveness of insulin or insulin receptors to lower the hyperglycemic state of body. Diabetes and Hypertension often termed as co-morbid disease as there is a greater tendency of both the complication occurring together. Both these co-morbid disease are related to each other in the following physiological trait

**Increased Fluid Volume:** Diabetes has the tendency of increasing blood volume in peripheral vessels resulting in raised blood pressure.

**Increased Arterial Stiffness:** Diabetes also decreases the elasticity of blood vessels which results in increase in the vascular load that leads to increased average blood pressure.

**Impaired Insulin Handling:** Impaired production of insulin is directly associated with increase in blood pressure.

In addition to the foresaid factors the co-morbidity also likely to occur as they share following risk factors:

**Body Mass:** Obesity is the most common risk factor associated with both Diabetes and hypertension.

**Diet:** Diet rich in fat and processed sugar is the basic cause of co-morbidity as it contributes to malfunctioning of vital organs.

**Activity Level:** Decrease in physical activity leads to loss of elasticity of blood vessels causing hypertension

and it also affect physiological process of endocrine glands affecting the release of insulin.

### Symptoms<sup>(3)</sup>

These are following symptoms of co-morbidity:

1. Headache: This occurs usually in morning hours. It is throbbing and usually frontal.
2. Dizziness: The patients feel unsteadily.
3. Epistaxis: This occurs due to increased pressure, causing rupture of the capillaries of the nose. The bleeding reduces circulating volume, and lowers the BP.
4. Retinopathy: This occurs due decrease in the flexibility of ciliary body as the intraocular pressure increase in vitreous body.
5. Nephropathy: It occurs due to increase in peripheral blood volume which in turn increases the load in collecting duct of kidney.

### Management of Hypertension

Management of hypertension in diabetic patient is very much important as it increases the complications and there by reduces life expectancy of the patient. As hypertension leads to diabetes, for normalizing diabetes hypertension should be below 130/90mm Hg.

1. **Non-Drug Therapy:**<sup>(4,5)</sup> Non drug therapy mainly aims at life style changes like exercise which decreases blood pressure and improves insulin sensitivity and diet restriction like limitations of salt and sugar intake. Excessive sodium intake can decrease the beneficial of effect of antihypertensive drugs

2. **Clinical Approach:** For maintaining high blood pressure in the range of 130 /90 mmHg the classes of antihypertensive drugs can be used are as follows:

a. **Angiotensin Converting Enzyme (ACE) Inhibitors:**<sup>(6,7)</sup> ACE inhibitors are a good choice for people who have diabetes as it does not affect blood sugar levels and also have beneficial effect on diabetic renal disease and neuropathy. E.g. Captopril, Enalapril.

**Adverse effect:** ACE inhibitors are generally well tolerated, but these drugs can cause a dry irritating cough, lifethreatening angioedema (rarely), a dry metallic taste in the mouth, neutropenia (captopril only), and acute renal dysfunction (especially in patients with intercurrent illness causing dehydration).

b. **Diuretics:**<sup>(7,8)</sup> Thiazide diuretics have their effect on decreasing peripheral blood volume in geriatric patients with NIDDM. E.g. Chlorthalidone, hydrochlorothiazide

**Adverse effects:** Thiazide diuretics are associated with a widerange of adverse effects, including hypokalaemia, hypomagnesaemia, hyponatraemia, gout, glucoseintolerance, erectile dysfunction, and mild hyper-calcaemia.

c. **Angiotensin II Receptor Blockers (ARB):**<sup>(7,9)</sup> ARB has its beneficial effect on NIDDM, hypertension. ARB therapy has antihypertensive effect along with renoprotective effect in NIDDM patients also lowers albumin excretion in case of microalbuminea. E.g. Candesartan, lisinopril, valsartan.

**Adverse effects:** The side-effect profile for ARBs is very similar to that of ACE inhibitors, except for the coughing, angioedema, and the metallic taste. ARBs remain the best tolerated medication in practice.

d. **Renin Inhibitors:**<sup>(7,10)</sup> Renin- angiotensin-aldosterone System (RAAS) is used as new approach in antihypertensive treatment. First direct renin inhibitor, aliskiren which is approved by USFDA is used in the treatment of hypertension in diabetic patient. Aliskiren is also beneficial in preventing the progression of chronic kidney disease. E.g. Aliskiren.

**Adverse effects:** The most prominent adverse effect of antihypertensive therapy is hypotension due to excessive antihypertensive therapy.

3. **Combination Therapy:**<sup>(11)</sup> Diabetes and hypertension constitute a particularly dangerous combination with respect to cardiovascular morbidity and mortality. All patients with diabetes and hypertension should be treated with a regimen that includes an ACE inhibitor or ARB. If one is not tolerated, the other should be given. If blood pressure targets are to be achieved, a thiazide diuretic should be added. For beneficiary effect on nephropathy thiazide diuretics should be added.

4. **Treatment based on Herbal remedies:**<sup>(12)</sup> Herbal medicine has made many contributions to commercial drug preparations manufactured today Natural treatment of essential hypertension can be boost to lower blood pressure values into the normal range provided lifestyle changes are taken seriously. Hence, in this present article several herbs are reviewed related to their efficacy in treatment of hypertension which are as follows :-

a. **Ashwagandha:**<sup>(13)</sup>

**Biological name:** *Withania somnifera* Linn

**Synonyms:** Varahakarni, Vajigandha

**Family:** *Solanaceae*

**Action on hypertension:** The effect of Ashwagandha was studied on the cardiovascular and respiratory systems in dogs and frogs. The study found that the hypotensive effect was mainly due to autonomic ganglion blocking action and that a depressant action on the higher cerebral centers also contributed to the hypotension. Stress as a major cardiovascular risk factor leads activation of sympatho-adrenal and hypothalamic pituitary adrenal (HPA) axis and causes oxidative stress. Ashwagandha possesses a potent anti stress effect and alleviates stress induced changes and provides cardio-protection.

b. **Sarpagandha:**<sup>(14)</sup>

**Biological name:** *Rauwolfia serpentina*

**Synonyms:** Dhawala vitapa, Chandramara

**Family:** *Apocynaceae*

**Action on hypertension:** Rauwolfia serpentina is a well proven antihypertensive drug. Reserpine, the purified alkaloid of *R. serpentina*, shows antihypertensive activity by acting on the vasomotor centre which leads to generalized vasodilatation, with a lowering of blood pressure and has depressant action on the cerebral centers. Studies have shown Sarpagandha to have anti adrenergic and anti-depressant property.

c. **Jatamansi:**<sup>(15)</sup>

**Biological name:** *Nardostachys jatamansi*

**Synonyms:** Bhoottjata, Tapaswini

**Family:** *Valerianaceae*

**Action on hypertension:** Jatamansi is one of the main sesquiterpene found in *Nardostachys jatamansi* which has been reported as antihypertensive through animal studies. Oily extract of Jatamansi which has been found to have anti-oxidant, anti ischemic and anti arrhythmic potentials. It also increases high density lipoprotein levels, which are protective lipids.

d. **Arjuna:**<sup>(16)</sup>

**Biological name:** *Terminalia arjuna*

**Synonyms:** Dhawala, Kakubha

**Family:** *Combretaceae*

**Action on hypertension:** Terminalia arjuna bark contains chemicals such as; triterpene glycosides, arjunetoside, together with oleanolic, arjunolic and arjunic acids and a cardenolide. Arjuna bark works as a heart tonic, helps to maintain normal blood pressure, promotes proper blood flow and normal homocysteine

levels. Arjuna bark helps to reduce the effects of stress and nervousness on the heart. Arjuna bark rich in Co-enzyme Q-10 has been used in Ayurveda for treatment of hypertension. It protects LDL cholesterol from damage through oxidation.

e. **Punarnava:**<sup>(17)</sup>

**Biological name:** *Boerhavia diffusa* Linn

**Synonyms:** Sothaghi

**Family:** *Nyctaginaceae*

**Action on hypertension:** The aqueous extract of *Boerhavia diffusa* root is found act as calcium channel antagonist and has diuretic properties which contributes to its antihypertensive action.

#### 5. Unani Therapy for hypertension

- a. **Cupping therapy (Hijama):**<sup>(18)</sup> Cupping Therapy is Unani approach for treatment of hypertension in diabetic patient where vacuum cups are used on selected body parts of patient. Cupping therapy regulates the blood flow in the body which in turn results in lowering of blood pressure. According to medical studies when there is irregularity in blood supply to vital organs like heart, brain, kidney results in compensatory pathological feedback response resulting in high blood pressure. Cupping therapy regulates proper blood supply to all the vital organs and result in treatment of hypertension. Cupping therapy only control normal range of blood pressure.
- b. **Sweating in steam bath:**<sup>(19)</sup> Sweating in a steam bath is beneficial in treatment of hypertension as sweating eliminates all the toxins from the body and also lowers the peripheral blood volume. Release of toxin lowers the burden of liver kidney which in turn influences the blood flow positively.

#### Conclusion

Hypertension is the leading cause of cardiovascular disease. Although Non drug therapy along with allopathic clinical approach to treat hypertension in both single dose treatment as well as combined therapy significantly lowers the hypertension but they show some adverse effect like edema, headache, heart failure constipation, fatigue drowsiness hypokalemia, etc. has been shown. Due to its advantage over allopathic therapy which is fewer side effects, prolong action, low cost therapy we can suggest that herbal and Unani therapy may used for the treatment. Herbal therapy which use of some herbal plant like ashwagandha, arjuna, jatamansi, sarpagandha Punarnava etc. were widely grown in India. Unani therapy may also help to control on elevated blood pressure which includes cupping therapy and steam bath technique.

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