Evaluation

Evaluation of patients with documented hypertension has three objectives:

- To identify known causes of high blood pressure
- To assess the presence or absence of target organ damage
- To identify other cardiovascular risk factors or concomitant disorders that may define prognosis and guide treatment

Data for evaluation is acquired through medical history, physical examination, laboratory tests, and other special diagnostic procedures

Medical History

- Duration and level of elevated blood pressure, if known
- Symptoms of coronary artery disease (CAD), heart failure, cerebrovascular disease, peripheral vascular disease and CKD
- Diabetes mellitus, dyslipidaemia, obesity, gout, sexual dysfunction and other co-morbid conditions
- Family history of high blood pressure, obesity, premature CAD and stroke, dyslipidaemia and diabetes
- Symptoms suggesting secondary causes of hypertension
- History of smoking or tobacco use, physical activity, dietary assessment including intake of sodium, alcohol, saturated fat and caffeine
- Socioeconomic status, professional and educational levels
- History of use / intake of all prescribed and over-the-counter medications, herbal remedies, liquorice (*Yashtimadhu/ Jestamadha*), illicit drugs, corticosteroids, NSAIDs, nasal drops. These may raise blood pressure or interfere with the effectiveness of antihypertensive drugs

- History of oral contraceptive use and hypertension during pregnancy
- History of previous antihypertensive therapy, including adverse effects experienced, if any
- Psychosocial and environmental factors

Physical Examination

- Record three blood pressure readings separated by 2 minutes, with the patient either supine or sitting position and after standing for at least 2 minutes.
- Record height, weight and waist circumference.
- Examine the pulse and the extremities for delayed or absent femoral and peripheral arterial pulsations, bruits and pedal oedema.
- Look for arcus senilis, acanthosis nigricans, xanthelasma and xanthomas.
- Examine the neck for carotid bruits, raised JVP or an enlarged thyroid gland.
- Examine the heart for abnormalities in rate and rhythm, location of apex beat, fourth heart sound and murmurs.
- Examine the lungs for crepitations and rhonchi.
- Examine the abdomen for bruits, enlarged kidneys, masses and abnormal aortic pulsation.
- Examine the optic fundus and do a neurological assessment.

Laboratory Investigations

- Routine
    - Urine examination for protein and glucose and microscopic examination for RBCs and other sediments.

Table 6 : Factors influencing risk of cardiovascular disease

Risk factors for coronary artery disease (RF)	Target organ damage (TOD)	Associated clinical conditions (ACC)
• Age > 55 years*	• Left ventricular hypertrophy detected by ECG and/or echocardiogram	• Cerebrovascular disease
• Male sex		- Transient ischemic attack
• Post-menopausal women	• Microalbuminuria/ proteinuria and/or elevation of serum creatinine (1.2-2.0 mg/dl)**	- Ischemic stroke
• Smoking and tobacco use		- Cerebral haemorrhage
• Diabetes mellitus	• Urinary ACR (albumin creatinine ratio)***	• Heart disease
• Family history of premature coronary artery disease (Males < 55 years, Female < 65 years)	• Ultrasound or radiological evidence of atherosclerotic plaques in the carotids	- Myocardial infarction
	• Hypertensive retinopathy	- Angina
• Increased Waist:hip ratio		- Coronary revascularization
• Obesity and Obstructive Sleep Apnoea (OSA)		- Congestive heart failure
• High LDL or Total cholesterol		• Renal disease
• Low HDL cholesterol and High triglycerides		- Diabetic nephropathy
• High sensitivity C-reactive protein (hs-CRP)		- Renal failure (serum creatinine > 2.0 mg/dl)
• Estimated GFR <60 mL/min (MDRD)		• Vascular disease
• Lipoprotein-a is a genetic risk factor		- Peripheral arterial disease including non-specific aortoarteritis
		- Aortic dissection
		• Advanced hypertensive retinopathy
		- Haemorrhages or exudates
		- Papilledema

*Coronary artery disease is known to occur 10 years earlier in South Asians than in other ethnic groups.; **Microalbuminuria 30-300mg/24hours; ***Albumin-Creatinine Ratio(ACR) ≥22 (M) or ≥31 (F) mg/g creatinine

Table 7: Risk stratification of patients with hypertension

Stage	Other risk factors and disease history	Blood pressure (mm Hg)		
		Stage 1	**Stage 2**	**Stage 3 (severe hypertension)**
		SBP 140-159 or DBP 90-99	SBP 160-179 or DBP 100-109	SBP>180 or DBP>110
I	No other risk factors	Low risk	Medium risk	High risk
II	1-2 risk factors[a]	Medium risk	Medium risk	Very high risk
III	3 or more risk factors or TOD[b] or diabetes	High risk	High risk	Very high risk
IV	ACC[c]	Very high risk	Very high risk	Very high risk

Risk strata (typical 10 year risk of stroke or myocardial infarction): Low risk = Less than 15% Medium risk = about 15-20% High risk = about 20-30% Very high risk = 30% or more [a]See Table 6; [b]TOD: Target Organ Damage see Table 6; [c]ACC: Associated clinical conditions, including clinical cardiovascular disease or renal disease see Table 6

- - Haemoglobin, fasting blood glucose, serum creatinine, potassium and total cholesterol
  - 12-lead electrocardiogram
- Additional investigations in special circumstances can include
  - Fasting lipid profile and uric acid
  - Echocardiogram
- Other specific tests to rule out secondary causes of hypertension where there is a high index of suspicion are described under "secondary hypertension".
- At the present state, tests for hs-CRP and microalbuminuria are not recommended for routine clinical use due to cost considerations. However, for certain situations, these can be useful in risk stratification.

- The cost of investigations in the context of the needs of an individual patient and resources available is an important consideration. In patients with essential hypertension where there is a resource crunch, one may be required to initiate therapy without carrying out any laboratory investigations.

Factors Influencing Risk

Before initiating therapy, patients' overall risk should be assessed considering the presence or absence of additional risk factors; extent of target organ damage and other associated clinical conditions. The presence of one of these three would decrease the threshold for initiation of drug therapy even at lower levels of BP, in that order.

The prognosis of these patients and the choice and need for urgency of therapy, will be dependent on the overall risk stratification (Table 7).