Cardiovascular diseases (CVDs) are the leading cause of death and disability worldwide and accounted for about 30% of global mortality. About 80% of the deaths occur in developing countries. Hypertension or high blood pressure is the most common risk factor for CVD morbidity and mortality. More than a quarter of the world adult population, is currently hypertensive and this figure is projected to rise to 30%, by 2025. Hypertension is important not only for its high prevalence but also because it is a major modifiable risk factor for cardiovascular and kidney disease. It is a matter of great concern for us that almost three quarters of the global population with hypertension live in developing countries, which contributes to widening of existing global health disparities. Furthermore, the onset of CVD is at an earlier age in developing countries and consequently the age at which people die of CVD is considerably younger than in developed countries, leading to widespread social and economic hardship.

Hypertension management therefore is of great public health importance in the developing world, which currently is facing the dual challenge of combating communicable diseases and the emerging epidemic of chronic non-communicable diseases. In this paper, we review screening, diagnosis and management using lifestyle measures and pharmacotherapy. We also will discuss the barriers and challenges to implement this approach and what can be done regarding prevention, screening, lifestyle modification and pharmacotherapy in our country. By adopting a comprehensive population based approach including policy interventions directed at promoting lifestyle changes; a healthy diet (appropriate calories, low in saturated fats and salt and rich in fruits and vegetables), increased physical activity, and a smoking free society, properly balanced with a high risk approach of cost effective clinical care, Bangladesh can effectively control hypertension and improve public health.

**Abstract**

Hypertension is a silent killer. Bangladeshis are racially predisposed to cardiovascular disease, and the increasing burden of hypertension has only added to the problem. Economic constraints and the allure of additional benefits without adverse effects have made lifestyle modifications an attractive proposition in developing and developed countries alike. Blood pressure is a continuum and any increase above optimum level confers additional independent risk of cardiovascular disease. We review screening, diagnosis and management using lifestyle measures and pharmacotherapy. We then discuss the barriers and challenges to implementing this approach and what can be done regarding prevention, screening, lifestyle modification and pharmacotherapy in our country. By adopting a comprehensive population based approach including policy interventions directed at promoting lifestyle changes; a healthy diet (appropriate calories, low in saturated fats and salt and rich in fruits and vegetables), increased physical activity, and a smoking free society, properly balanced with a high risk approach of cost effective clinical care, Bangladesh can effectively control hypertension and improve public health.

**Introduction**

Cardiovascular diseases (CVDs) are the leading cause of death and disability worldwide and it accounted for about 30% of global mortality. About 80% of the deaths occur in developing countries. Hypertension or high blood pressure is the most common risk factor for CVD morbidity and mortality. More than a quarter of the world adult population, is currently hypertensive and this figure is projected to rise to 30%, by 2025. Hypertension is important not only for its high prevalence but also because it is a major modifiable risk factor for cardiovascular and kidney disease. It is a matter of great concern for us that almost three quarters of the global population with hypertension live in developing countries, which contributes to widening of existing global health disparities. Furthermore, the onset of CVD is at an earlier age in developing countries and consequently the age at which people die of CVD is considerably younger than in developed countries, leading to widespread social and economic hardship.

**Diagnosis and screening**

Proper diagnosis with accurate measuring devices is an important first step in the management of hypertension. Screening not only detects hypertension but also provides an opportunity for patient education and therapy. In light of the growing epidemic of CVD in the developing world, WHO recommends that opportunistic screening of blood pressure is done at every visit to the physician’s office. The diagnosis of hypertension should not be made on one single measurement in a physician’s office. If the blood pressure is elevated the individual must have the elevated blood pressure reconfirmed at subsequent visits within one month unless there is a hypertensive emergency or urgency. Classification of hypertension according to the 7th Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) is given below, for all practical purpose it is easy and practical to follow.
Assessment of risk factors for cardiovascular diseases

Global risk assessment considering other concomitant cardiovascular risk factors should be included in the examination of every patient. Global risk assessment is an important tool to assist physicians and other health care providers to identify hypertensive individuals who are most likely to benefit from management including pharmacotherapy.7 Well-established models are Framingham,8 CV life expectancy9 and SCORE.10 Lipid lowering therapy and aspirin should be initiated in all patients at high cardiovascular risk.7,11 A few investigations e.g. routine urine examination, serum creatinine level, chest radiograph and ECG should be done.

Lifestyle modifications

Lifestyle modification, is beneficial for both nonhypertensive and hypertensive individuals. For patients with hypertension and other cardiovascular risk factors such as hyperlipidemia, obesity and diabetes, lifestyle measures are even more important.12

- Maintaining a diet low in salt and saturated fats and high in fresh fruit and vegetables and low fat dairy products (DASH diet).
- 30-60 min of moderate intensity dynamic exercise (walking, as well as jogging, cycling or swimming) 4-7 days of the week will lower blood pressure.
- Weight reduction in overweight individuals.
- Smoking cessation to reduce global cardiovascular risk.
- Discouraging of alcohol consumption in those who drinks and also it is a social taboo in Bangladeshi society.

Table I

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic BP mm Hg</th>
<th>Diastolic BP mm Hg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Pre hypertension</td>
<td>120-139 or 80-89</td>
<td></td>
</tr>
<tr>
<td>Stage 1 hypertension</td>
<td>140-159 or 90-99</td>
<td></td>
</tr>
<tr>
<td>Stage 2 hypertension</td>
<td>&gt;=160 or &gt;=100</td>
<td></td>
</tr>
</tbody>
</table>

Reproduced from the 7th Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7)6

Thresholds for therapy

In patients without any additional cardiovascular risks, drug therapy should be initiated if the blood pressure is sustained above 160 mmHg systolic or 100 mmHg diastolic.7 For patients with additional risk factors treatment can be initiated for sustained blood pressure greater than 140 mmHg systolic or for diastolic blood pressure greater than 90 mmHg. For patients with diabetes or renal disease, treatment should be initiated if the blood pressure is sustained greater than 130 mmHg systolic or 80 mmHg diastolic.

Target Blood pressure during pharmacotherapy

In most patients blood pressure should be lowered to less than 140 mmHg systolic and less than 90 mmHg diastolic.7 For patients with renal disease or with diabetes, the blood pressure target is less than 130 mmHg systolic and less than 80 mmHg diastolic.

Initial pharmacotherapy for uncomplicated hypertension

The reduction in cardiovascular events in uncomplicated hypertension is dependant on the degree of blood pressure lowering and not on the specific blood pressure medication class used to lower blood pressure.7,13-15 Initial therapy should be selected from classes of drugs proven to reduce cardiovascular events including low dose thiazide type diuretics, beta blockers in patients under age 60, angiotensin converting enzyme (ACE) inhibitors, long acting calcium channel blockers (CCBs) and angiotensin receptor blockers (ARBs). Beta blockers should not be selected as initial therapy in those over age 60 as they are less effective in the elderly.7,16-18

Specific pharmacotherapy for compelling indications

Table II outlines initial therapeutic options for patients with specific indications for pharmacotherapy.

Barriers and challenges in Bangladesh

Less than a third of hypertensive patients receive recommended levels of treatment even in rich and developed nations.19 Low levels of awareness and inadequacy of treatment are of an even greater magnitude in the developing world particularly in Bangladesh.20 This underscores the large gap between available evidence and clinical practice that could be improved to reduce the widespread health consequences of uncontrolled hypertension particularly in the Bangladesh.

Economic burden

Multiplicity of health care providers including alternative care givers, lack of capacity and
affordability of physician services in our country adversely impacts hypertension care. Patients often pay out-of-pocket for their health care. Besides imposing considerable economic burden, this often drives many families into poverty particularly those with chronic conditions such as hypertension requiring life long care. Consequently, many stop treatment altogether or become non-adherent.

**Suggestions for prevention of hypertension in the community**
Developing countries cannot afford the resource intensive management of established hypertension and associated CVD that has been shown to be of limited success even in developed countries.\textsuperscript{22} Substantially, greater gains in population health can be achieved by even a modest lowering of the population mean blood pressure. Such gains could be sustainable over time and can yield greater reductions in associated CVD events. Therefore, the major thrust of management of hypertension in such settings should be on primary prevention efforts through a comprehensive population based approach directed at lifestyle changes (a healthy appropriate calorie diet which is low in saturated fat and salt additives and

<table>
<thead>
<tr>
<th>Indications</th>
<th>Initial therapy</th>
<th>Second-line therapy</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated systolic hypertension without other compelling indications</td>
<td>Thiazide diuretics, ARBs, or long-acting dihydropyridine CCBs</td>
<td>Combinations of first-line drugs</td>
<td>Hypokalemia should be avoided in people who are prescribed diuretics</td>
</tr>
<tr>
<td>Diabetes mellitus with nephropathy</td>
<td>ACE inhibitors or ARBs</td>
<td>Addition of one or more of thiazide diuretics, cardio selective beta-blocker, long-acting CCBs or use of an ARB/ACE inhibitor combination</td>
<td>Combination of first line drugs or addition of cardio selective beta-blockers and/or long-acting CCBs</td>
</tr>
<tr>
<td>Diabetes mellitus without nephropathy</td>
<td>ACE inhibitors, ARBs, or thiazide diuretics or long acting dihydropyridine CCBs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angina Pectoris</td>
<td>Beta-blockers (strongly consider adding ACE inhibitors)</td>
<td>Long-acting CCBs</td>
<td>Avoid short-acting nifedipine</td>
</tr>
<tr>
<td>Prior myocardial infarction</td>
<td>Beta-blockers and ACE inhibitors (ARBs if ACE intolerant)</td>
<td>Combinations of additional agents</td>
<td></td>
</tr>
<tr>
<td>Heart Failure</td>
<td>ACE inhibitors (ARBs if ACE inhibitor intolerant), beta-blocker, spironolactone in selected patients</td>
<td>Hydralazine/ isosorbide dinitrate; thiazide or loop diuretics as additive therapy</td>
<td>Avoid nondihydropyridine CCBs</td>
</tr>
<tr>
<td>Past cerebrovascular accident or TIA</td>
<td>ACE inhibitor/diuretic combinations</td>
<td></td>
<td>Blood pressure reduction reduces recurrent cerebrovascular events</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>ACE inhibitors (diuretics as additive therapy)</td>
<td>Combinations of additional agents (ARBs if ACE inhibitor intolerant)</td>
<td>Avoid ACE inhibitors and ARBs if bilateral renal artery stenosis</td>
</tr>
<tr>
<td>Left ventricular hypertrophy</td>
<td>ACE inhibitors, ARBs, CCBs, thiazide diuretics (beta-blocker for patients under 60 years)</td>
<td></td>
<td>Avoid Hydralazine and minoxidil</td>
</tr>
<tr>
<td>Peripheral arterial disease</td>
<td>Does not affect treatment recommendations</td>
<td></td>
<td>Avoid beta-blockers with severe disease</td>
</tr>
</tbody>
</table>

Table II

*Therapeutic options for treating hypertension*

Modified & reproduced from the Canadian Hypertension Education Program.
rich in fruits and vegetables, increased physical activity, and a smoking-free society), properly balanced with a high-risk approach of cost-effective clinical care. The health care delivery system needs to emphasize early detection and treatment of individual patients at high risk with the most cost-effective drugs. Existing networks of primary health care centers in developing nations should be optimally utilized and categories of healthcare providers, who can detect, educate, and monitor hypertensive patients can be expanded to include nurses and multi-purpose health workers. Though the current networks focus primarily on communicable diseases and reproductive health, networks could be used for opportunistic screening for hypertension and CVD risk assessment. A good model in optimal use of existing services for hypertension management was reported from South Africa, where a nurse led clinical protocol based in primary care clinics succeeded in achieving hypertension control in 68% of patients.23

Conclusion
Hypertension is a major cause of CVD morbidity and mortality in Bangladesh and presents an important opportunity to improve public health. Adequate scientific knowledge exists regarding prevention, treatment, and management to reduce the disease burden associated with uncontrolled hypertension. Important initiatives that require consideration include organization of medical societies in SAARC nations to create region-specific management recommendations, a sharing of knowledge, expertise, and tools by developed nations and development of national policies and regulations to facilitate healthy environments.

References