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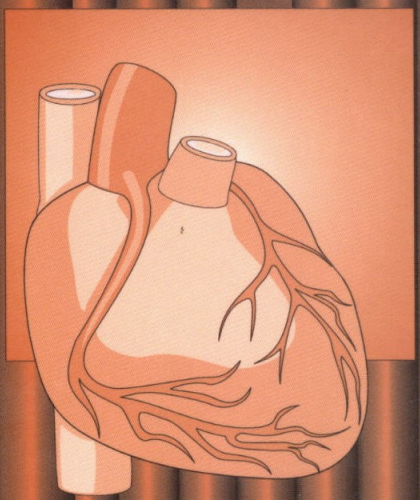
Prevention and Management of Hypertension



WORLD HEALTH ORGANIZATION
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Prevention and Management of Hypertension

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Preface

This publication considers strategies for the prevention and control of a condition that is a major public health problem in all countries of the Eastern Mediterranean Region. The increasing prevalence of hypertension, as clearly shown by several epidemiological studies conducted in the Region in recent years, the general lack of prevention programmes, and the scarcity of resources required for effective management of established cases highlight the pressing need for action. Health authorities in Member States need to establish prevention programmes and to work towards the provision of acceptable standards of health care for people with hypertension.

In view of the above WHO, has, over the last two years, intensified activities to assist countries in initiating hypertension control programmes. An Expert Committee Meeting on Hypertension Control was convened in Geneva in November 1994 during which global guidelines for the prevention, diagnosis and management of hypertension were prepared. These guidelines were published in the WHO Technical Report Series, No.862, *Hypertension Control. Report of a WHO Expert Committee.* Since the needs, circumstances and resources vary from one place to another, these guidelines were carefully reviewed by the Eastern Mediterranean Regional Office and modified according to the situation in the Region. A Regional Consultation was subsequently organized in Beirut, Lebanon in August 1995 at which regional, as well as international experts, discussed and endorsed these modified guidelines.

Although this publication can therefore be considered a regional version of the global guidelines prepared by the Expert Committee in 1994, the situation in the Eastern Mediterranean Region required several important changes in relation to the classification of hypertension, clinical assessment and choice of drugs used initially in the management of hypertension. Integrating health care for people with hypertension into the existing health care systems of Member States is one of the strategies adopted by the Eastern Mediterranean Regional Programme for the Control of Cardiovascular Diseases and special emphasis was therefore made to ensure the relevance of these guidelines and recommendations to primary health care. Based on these guidelines, a quick reference guide for the clinical assessment and management of hypertension in primary health care was prepared during the Beirut meeting and is reproduced at the end of the book.

Although every effort was made to ensure that the recommendations made were responsive to the needs of Member States and consistent with regional circumstances, it should be recognized that there are still considerable differences in the availability of

resources and trained health personnel between countries that may necessitate further adaptation in some places.

It is hoped that this publication will make a positive contribution to the prevention and management of hypertension in the Region and will stimulate national initiatives to respond to this increasing challenge to clinical services and public health.

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Introduction

Like other major noncommunicable diseases, the importance of hypertension is increasing in the Eastern Mediterranean Region. It affects up to 25% of the adult population in some countries [1]. Hypertension predisposes individuals to the development of complications, such as cardiovascular disease and renal dysfunction, and thus leads to increased morbidity and mortality, causes considerable suffering and results in enormous cost.

Strategies for the prevention and management of hypertension include:

- primary prevention (preventing the development of hypertension)
- control of blood pressure and prevention of complications in people with established hypertension.

Efforts directed at the prevention and/or correction of risk factors, such as obesity, physical inactivity, excessive salt intake and adverse dietary habits, can be effective in lowering blood pressure and will contribute to the prevention of hypertension at the community level. A primary prevention programme focusing on the promotion of healthy lifestyles is therefore an essential strategy in the fight against hypertension.

In addition, good control of blood pressure reduces complications, disabilities and mortality in people with hypertension. Thus, good management of hypertension is central to any strategy formulated to control hypertension at the community level. To achieve this objective, appropriate standards of health care for people with high blood pressure should be made available at all levels of the health care system and clinical practice guidelines for the diagnosis and treatment of hypertension need to be developed to improve management and patient care.

Success in managing high blood pressure is influenced by several factors related to the availability of resources and other local circumstances. Accordingly, clinical guidelines should be flexible and should take into consideration the local situation. Although special attention should be given to ensure cost–effectiveness of therapy, the recommendations made in these guidelines should also be scientifically sound and based on proven evidence.

Definition and classification

Definition

The definition of hypertension is arbitrary. This is mainly because the cardiovascular risk increases with increasing blood pressure levels. As a consequence, the dividing line between normotension and hypertension is difficult to establish in individual patients.

Elevation of both systolic and diastolic blood pressures is associated with increased cardiovascular risk. Definition of hypertension should therefore be made using both diastolic and systolic blood pressure criteria. Some of the intervention trials on mild hypertension indicate that cardiovascular events more closely correlate with achieved systolic than with diastolic values [2]. However, persons whose resting values of diastolic blood pressure remain persistently at or above 90 mmHg after repeated measurements are at increased risk of cardiovascular mortality and morbidity, and lowering of diastolic blood pressure values has been clearly shown to reduce the risk of stroke. From epidemiological data on incidence of strokes and coronary events, the range of systolic blood pressure corresponding to diastolic values of 90 mmHg to 105 mmHg is approximately 140–190 mmHg [3], and intervention trials have shown treatment benefits when systolic blood pressure values of $\geq$160 mmHg are lowered [4,5].

The current arbitrary definition of hypertension in adults is taken as a level of systolic blood pressure of 140 mmHg or above and/or a level of diastolic blood pressure of 90 mmHg or above under satisfactory conditions of measurement. It is extremely important to confirm the diagnosis by repeated, accurate measurements over a period of time the duration of which is influenced by the perceived risk to the patient.

Hypertension as a cardiovascular risk factor

Hypertension is one of several risk factors for cardiovascular disease. The known factors are listed in Table 1. When the level of blood pressure is only mildly above the threshold for definition of hypertension, the presence of one or more of these factors may be a more important determinant of the patient's risk, especially of a coronary event, than the increase in blood pressure.

The absolute risk of serious cardiovascular disease varies greatly among individuals with mild hypertension. At one extreme, three to five out of every hundred elderly patients with a history of previous cardiovascular disease will suffer a further serious event each year [4,5,6,7]. At the other extreme, in young individuals with no other risk factors, fewer than one in every thousand will suffer a serious event each year [2,8].

Table 1 **Cardiovascular risk factors influencing treatment**

Modifiable	Not modifiable
Raised systolic blood pressure	Age
Raised diastolic blood pressure	Gender
Smoking	Family history of premature cardiovascular disease
Raised total and low-density lipoprotein cholesterol	Previous cardiovascular events
Reduced high-density lipoprotein cholesterol	Previous cerebrovascular events
Left ventricular hypertrophy	
Hyperglycaemia	
Renal disease	
Microalbuminuria	
Obesity	
Sedentary lifestyle	

Although antihypertensive treatment will reduce risk in both of these patient populations, it may take some decades for clinical benefits to become apparent in young patients at low initial risk.

Organ damage associated with hypertension

If inadequately treated, hypertension increases the risk of vascular damage. Such lesions lead to cardiac, renal and cerebrovascular morbidity and to mortality. The incidence of these different lesions is also dependent upon the level of other risk factors, such as elevated plasma cholesterol, diabetes and tobacco smoking.

Left ventricular hypertrophy has long been considered a complication of hypertension. The risk is considerably greater for the so-called "strain" pattern than for the "voltage" pattern alone, and, on the whole, left ventricular hypertrophy is a more powerful predictor of subsequent adverse cardiovascular events than the other traditional risk factors [9]. The echocardiogram provides a more specific and sensitive assessment of left ventricular hypertrophy. Reversal of left ventricular hypertrophy by antihypertensive treatment can be achieved, with no impairment of systolic function and with improvement of diastolic function. Whether the additional risk associated with left ventricular hypertrophy also regresses with left ventricular hypertrophy reversal remains to be established [10].

Because of the frequent association of hypertension and atherosclerosis, atherosclerotic plaques can often be found in the epicardial coronary arteries of hypertensive patients, especially in those in whom other risk factors for atherosclerosis are found (in particular, high plasma lipids and smoking). Prevention or correction of

coronary atherosclerosis should not be limited to lowering blood pressure but should also include active interventions against these other risk factors.

Systolic function is often preserved in hypertension, but untreated hypertension may lead to congestive heart failure. Indeed, before antihypertensive treatment became feasible or common, congestive heart failure was one of the commonest complications of hypertension. Progressive left ventricular dilation, when hypertrophy is associated with coronary atherosclerosis or small coronary artery disease, marks the development of cardiac failure. Meta-analysis of controlled clinical trials, including those on hypertension in the elderly, indicates that antihypertensive therapy can reduce congestive heart failure incidence by about 50% [11].

Although stroke has multiple causes, hypertension is the most important modifiable risk factor. The relation between stroke incidence and blood pressure is continuous and particularly steep. All types of stroke (haemorrhagic, lacunar and thrombotic) are associated with hypertension. Antihypertensive treatment has been shown to be particularly effective in reducing stroke incidence, a 5–6 mmHg reduction in diastolic blood pressure reduces stroke incidence by about 40% [12].

The well known increased prevalence of atherosclerotic complications in hypertensive patients leads to an increased incidence of atherosclerotic lesions in the carotid arteries of hypertensive patients. Severe carotid stenoses are known to be a frequent cause of stroke and ulcerated plaques can be the source of emboli which provoke ischaemic strokes or transient ischaemic attacks.

The kidney is an important target of organ damage caused by hypertension. Severe and malignant (accelerated) hypertension often leads to renal insufficiency within a few years, mostly as a consequence of fibrinoid necrosis of small renal arteries. In less severe forms of hypertension, renal damage due to arteriosclerosis is mild and develops more slowly [13]. The development of renal damage in hypertension is commonly heralded by proteinuria (a urinary protein excretion of >300 mg/d). The term microalbuminuria has been used for the past decade to define an abnormally elevated urinary albumin excretion (30–300 mg/d) in the absence of clinical proteinuria as measured by standard laboratory methods. Microalbuminuria and proteinuria have been found to be an independent risk factor for all-cause and cardiovascular mortality [14]. Reduction of proteinuria can be achieved by effective blood pressure reduction [15].

Causes of hypertension

Primary hypertension

In over 95% of cases of hypertension no specific cause can be identified. These cases are diagnosed as having primary (or essential) hypertension.

Secondary hypertension

In a small minority of people with hypertension, a specific cause can be identified; these patients are diagnosed as having secondary hypertension. Adequate attention should be paid to these curable or reversible causes of hypertension. The major causes of secondary hypertension are as follows:

- renal, e.g. renal parenchymal disease, renovascular causes and others like renin-producing tumours;
- drugs, e.g. oral contraceptives, corticosteroids, liquorice and carbenoxolone, sympathomimetics, and non-steroidal anti-inflammatory drugs;
- endocrine, e.g. acromegaly, Cushing syndrome, primary hyperaldosteronism, congenital adrenal hyperplasia, phaeochromocytoma and carcinoid;
- coarctation of the aorta and aortitis;
- pregnancy-induced hypertension.

Hypertension is common in patients with renal disease and may occur even at normal glomerular filtration rates. Chronic glomerulonephritis is the most common cause of secondary hypertension. In renal artery lesions the principal lesions causing renal artery stenosis are arteritis in some parts of the world and atheroma and fibromuscular hyperplasia in others. Successful surgical correction of a renal artery stenosis or percutaneous transluminal renal angioplasty may often, though not invariably, alleviate hypertension and thus avoid or reduce the use of antihypertensive agents. Renal artery stenosis may be seen as severe and symptomatic hypokalaemia, secondary to excessive aldosterone secretion.

Hypertension may be drug-induced. Hormonal preparations and non-steroidal anti-inflammatory drugs are the drugs most capable of inducing a rise in blood pressure.

Primary hyperaldosteronism is found in fewer than 0.5% of hypertensives; the plasma potassium level is typically low and plasma renin is suppressed. Cushing syndrome is associated with hypertension in at least 70% of patients with the syndrome, independently of the subtype and the duration. Overactive adrenal medullary tissue within or outside the adrenal medulla itself, called phaeochromocytoma, can produce sustained or paroxysmal hypertension.

Hypertension can be caused by coarctation of the aorta which is a congenital narrowing of the aorta, usually adjacent to the insertion of the ductus arteriosus, and in which the femoral pulses are diminished or absent, and delayed in comparison with the radial pulses.

Classification

Classification is important in determining the most appropriate type of management for each individual. Classification also considers the additional risks represented by associated factors and the development of hypertension-related organ damage.

Hypertension has been classified according to the degree of blood pressure elevation into mild, moderate and severe hypertension. However, these terms do not truly refer to the severity of the overall risk to the patient but simply to the extent of the blood pressure elevation at the time of the assessment. The severity of the clinical condition also depends on the overall cardiovascular risk of the patient due to concomitant risk factors such as age, gender, smoking habits, plasma lipids (see Table 1), and, in particular, associated organ damage.

The extent of organ damage often, but not necessarily, correlates with the level of blood pressure elevation, and the rate of progression of organ damage varies from one individual to another depending on many factors, most of which are incompletely understood. The presence of signs of organ damage confers an increase in cardiovascular risk at any level of blood pressure. Objective signs of organ damage include left ventricular hypertrophy, retinal changes and arterial disease, heart failure, stroke, microalbuminuria and elevation of the plasma creatinine concentration.

Thus, for practical reasons as far as the management of hypertension is concerned, it is recommended that hypertension is classified as follows:

- hypertension with no other cardiovascular risk factors and no target organ damage
- hypertension with other cardiovascular risk factors
- hypertension with evidence of target organ damage
- hypertension with other cardiovascular risk factors and evidence of target organ damage.

Diagnosis and assessment

Blood pressure measurement

Hypertension can only be diagnosed by measurement of blood pressure. Blood pressure is conventionally measured by using a mercury sphygmomanometer. There are several sources of inaccuracies. These include: technical inaccuracies, some of which are avoidable, the inherent variability of blood pressure, and the tendency for blood pressure to increase in the presence of a physician or less markedly a nurse, commonly known as "white-coat" hypertension [16]. A false diagnosis of hypertension is generally reached due to hasty measurements or incorrect techniques or the tenseness of the patient.

Before measurement commences the patient should be seated for several minutes in a quiet room. The arm muscles should be relaxed and the forearm supported such that the cubital fossa is at heart level (fourth intercostal space). Care should be taken to avoid tight sleeves. Blood pressure may also be measured with the subject supine or standing, and in each position the arm should be supported at heart level. A cuff of suitable size is applied evenly to the exposed upper arm. The standard cuff available in many countries may be too small. A cuff for adults must have a bladder 13–15 cm wide and 30–35 cm long so as to encircle the average arm. Larger cuffs are needed for fat arms and smaller cuffs for children. Inadequate cuff size may result in overestimation of the true blood pressure [16]. The cuff is rapidly inflated until the manometer reading is about 30 mmHg above the level at which the pulse disappears, and then slowly deflated approximately 2 mmHg at a time. During this time the Korotkoff sounds are auscultated through a stethoscope placed over the brachial artery. The pressure at which repeated and clear sounds are first heard is the systolic blood pressure. The diastolic blood pressure is the pressure at which the sounds disappear (phase V). The use of muffling sounds (phase IV) gives significantly higher diastolic blood pressure values and is to be avoided.

If the blood pressure is greater than 140/90, it should be repeated and both values should be recorded. Both systolic and diastolic blood pressure should be measured at least twice over a period of no less than three minutes; all the readings should be recorded and the mean value for both systolic and diastolic blood pressure should be used. It is also recommended that on the first visit the blood pressure should be measured on both arms. In elderly and diabetic people with confirmed hypertension, measurement with the patient in the lying position and again after standing for one to five minutes should also be performed on initial assessment in order to rule out postural hypotension.

Among conventional instruments, mercury sphygmomanometers are the most reliable. Aneroid manometers are subject to inaccuracies and, whenever used, should be calibrated and regularly checked against a mercury column. Automatic and semi-automatic devices with a digital display should also be calibrated and periodically checked. Beat-to-beat blood pressure measurement is feasible by direct intra-arterial monitoring in the ambulatory patient, but should be reserved for particular research conditions. Non-invasive beat-to-beat blood pressure monitoring is also possible from the finger, using a special instrument, with the patient seated or supine, but a portable devices is being developed for use with the ambulatory patient.

The mercury sphygmomanometer is generally used to measure blood pressure in the outpatient clinic, in the doctor's office or at the patient's bedside. Semi-automatic and automatic devices and, sometimes, aneroid or mercury sphygmomanometers are increasingly being used at home for self-measurement of blood pressure by the patients themselves or by a relative. Home assessment of blood pressure has the undoubted advantage of providing more numerous measurements and in a quieter setting than blood pressure measurement in the doctor's office. However, there are also drawbacks, such as a greater potential for technical and observer error than with clinic measurements. There is also a lack of adequate information on the diagnostic and prognostic significance of home readings.

Ambulatory blood pressure monitoring is an interesting research technique which is used to investigate blood pressure variability, behavioural influences on arterial pressure, and the time-course of the effects of antihypertensive therapy. It is also used, as are home blood pressure readings, to provide a supplementary source of information for diagnostic and therapeutic decisions. While these procedures are of potential clinical interest, there are several issues to be resolved before their widespread use in the clinical setting can be recommended.

It is now established that both home blood pressure and ambulatory blood pressure values averaged over 24 hours are several millimetres of mercury lower than values measured in the clinic; this difference between clinic and ambulatory blood pressure becomes greater with advancing age and at higher clinic blood pressures. The causes of these differences between blood pressure values measured in various settings and by various methods are not clear, although the "white-coat" effect may be a factor. It is therefore important that the health professional bear these differences in mind when assessing blood pressure.

Clinical assessment of people with hypertension

Objectives

Assessment of the individual with high blood pressure has the following objectives:

- to confirm a persistent elevation of blood pressure
- to assess the overall cardiovascular risk
- to evaluate existing organ damage or concomitant disease
- to search for possible causes of the hypertension.

Clinical assessment includes history taking, physical examination and laboratory investigation. Laboratory investigation can be more or less extended according to the evidence obtained by history, physical examination and initial laboratory tests. Blood pressure assessment can also be supported by home blood pressure measurements, provided the differences between clinic and home readings are borne in mind.

History taking

The risk factors associated with hypertension should be assessed by determining the following:

- family history of hypertension and cardiovascular disease
- family and personal history of hyperlipidaemia
- family and personal history of diabetes mellitus
- smoking habits
- obesity, amount of physical exercise.

The possibility of secondary hypertension should be investigated, particularly in the presence of the following clues:

- young age
- family history of renal disease (polycystic kidney)
- evidence of renal disease, urinary tract infection or haematuria
- use of oral contraceptives, liquorice, carbenoxolone, nasal drops, non-steroid anti-inflammatory drugs, etc. (hypertension due to drugs)
- episodes of sweating, headache, anxiety (phaeochromocytoma)
- episodes of muscle weakness and tetany (hyperaldosteronism).

Special emphasis should be placed on symptoms of possible organ damage. These include:

- brain and eyes: headache, vertigo, impaired vision, symptoms of transient ischaemic attacks, sensory or motor deficits
- heart: palpitations, chest pain, shortness of breath, ankle swelling
- kidney: thirst, polyuria, nocturia, haematuria
- peripheral arteries: cold extremities, intermittent claudication.

Physical examination

Accurate physical examination should focus on signs suggesting secondary hypertension and possible signs of organ damage.

Signs suggesting secondary hypertension include:

- features of Cushing syndrome
- skin signs of neurofibromatosis (phaeochromocytoma)
- palpable kidneys (polycystic kidney)
- diminished and delayed femoral pulses and reduced blood pressure in the leg (aortic coarctation or aortitis)
- precordial or chest murmurs (aortic coarctation or aortitis)
- abdominal bruit (renal artery stenosis).

Signs suggesting organ damage include:

- vascular bruits
- motor or sensory deficits
- retinal changes
- abnormal apical impulse, cardiac arrhythmias, ventricular gallop, pulmonary rales, dependent oedema
- absence, reduction, or asymmetry of peripheral pulses, ischaemic skin lesions.

Laboratory investigations

The minimum laboratory investigation needed is a matter of debate. The type and extent of investigations will vary from one place to another according to the availability of resources. It is therefore agreed that investigations should progress from the most simple to the more complicated. It is always better to repeat simple tests for which the results are doubtful, than to perform a complex investigation at an early stage. The

younger the patient, or the higher the pressure, or the faster the development of hypertension, the more detailed the diagnostic examination should be, and the more extensive the search for potentially curable causes of arterial hypertension.

Although the type of investigations should be determined in each country where guidelines are developed, laboratory investigations could be classified into recommended tests, additional tests and extended evaluation.

Recommended tests should be performed on all hypertensive patients. These tests are simple and cheap yet provide basic information about additional risk factors and renal and cardiac function. They are as follows:

- urine analysis (dipstick test to be complemented later by urinary sediment examination)
- plasma creatinine and/or blood urea nitrogen
- plasma potassium (sodium is often measured in the same sample)
- random blood glucose
- serum cholesterol
- haematocrit and/or haemoglobin
- electrocardiogram.

Additional tests may be usefully performed when the facilities are available and additional information is desirable. These include:

- fasting plasma triglycerides and high-density lipoprotein cholesterol
- plasma uric acid
- chest X-ray
- echocardiography.

Extended evaluation should be performed by the hospital doctor or specialist for a more detailed study of complicated hypertension or to search for a curable cause of hypertension whenever the history, physical examination, or simpler tests suggest this possibility.

Management

General principles

- Correct diagnosis is essential. Repeated measurements, using correct techniques, are needed to confirm the diagnosis of hypertension.
- Most people with sustained arterial hypertension have no identifiable cause for the condition. However, any identifiable cause discovered in the clinical assessment of the individual should be treated in the appropriate manner.
- Since treatment for hypertension is usually lifelong, the patient and the physician are committed to a long-term association.
- Treatment should not only aim at lowering blood pressure, but should also be integrated into an overall programme of management of associated risk factors and conditions.
- The active involvement of the person with hypertension, and his/her family, in treatment, self-care and follow-up is of paramount importance.
- Education of the person with hypertension, and his/her family, should be considered an integral part of management. Without proper education and counselling, the therapy objectives will be difficult to achieve in many patients.
- Treatment of cases should be individualized and the treatment plan should be tailored to the needs of each case.
- The health care system (primary health care clinic, tertiary centres and private health care services) should ensure that people with hypertension have access to the appropriate standards of health care and proper follow-up.
- Record-keeping is essential for the management and follow-up of cases.

Objectives of treatment

- The aim of the treatment should be to achieve the maximum tolerated reduction in blood pressure.
- The treatment should also aim to correct other associated cardiovascular risk factors.

Therapy targets

- In young patients with mild hypertension, it is desirable to lower blood pressure levels to 140/90 or less.
- In elderly patients, it is desirable to lower blood pressure to a level of 140/90.
- In patients with isolated systolic hypertension the goal of treatment should be to lower systolic blood pressure to 140 mmHg or less if this is tolerated.

Blood pressure measurements by ambulatory methods are on average several millimetres of mercury lower than clinic blood pressure values [17]; therefore, target blood pressure, when assessed by these techniques, should be set at a lower level to avoid undertreatment.

Nonpharmacological therapy

Nonpharmacological therapy, in the form of lifestyle measures, is essential:

- to lower blood pressure in the individual patient
- to reduce the need for antihypertensive drugs
- to prevent, treat or remove associated risk factors.

A structured programme of lifestyle measures should therefore be an integral component in the overall management plan for the hypertensive. Such measures should be used before considering drug treatment, especially in those with mild hypertension.

Nonpharmacological measures recommended include those that contribute to lowering blood pressure and measures for the prevention and treatment of associated risk factors. They are:

- weight reduction
- reduction of alcohol intake
- reduction of salt intake (no added salt and avoidance of salty and pickled food)
- regular dynamic physical exercise
- avoidance of tobacco use
- adherence to healthy dietary patterns to avoid obesity and high lipid levels (reduction of fat intake and increase in consumption of fibre rich foodstuff)
- good control of diabetes.

A more detailed account on nonpharmacological measures is found in the section on Community prevention of hypertension.

Pharmacological therapy

Classes of hypertensive drugs

There is general agreement that five groups of drugs are effective as first line drugs for the treatment of patients with hypertension [7,8]. These are diuretics, β-blockers, angiotensin-converting enzyme (ACE) inhibitors, calcium channel blockers and α–blockers. However, the Regional Consultation on Hypertension Management, held in Lebanon in August 1995, recommended **diuretics and β-blockers as the preferred first line drugs** as they can be successfully used initially in the majority of cases.

Other classes of drugs such as centrally acting agents (e.g. methyldopa and reserpine) may also be used in certain situations. Details on all these classes of drugs are given in Annex 1. In addition, the WHO essential drugs list for cardiovascular diseases can be found in Annex 2.

Combination of drugs

Combination therapy is usually used when there is no clear response to monotherapy. In this case, it is reasonable to substitute the first drug with a compound belonging to a different class. If a single drug has been partly effective, it may be preferable to add a small dose of a second drug rather than to increase the dose of the first [18]. Effective combinations utilize low doses of compounds from different drug groups. This permits the addition of different primary actions while minimizing the homeostatic compensations that limit the fall in pressure. Combination therapy also minimizes side-effects by allowing the use of drugs in low doses. For reasons of convenience, cost and increased patient compliance, preparations that combine two drugs in a single tablet or capsule may be appropriate for many hypertensive patients once the need for and dose of constituent drugs have been established.

An additive effect has been shown when combining:

- a diuretic with a β-blocker or an ACE inhibitor or an α–blocker
- a β-blocker with a dihydropyridine calcium channel blocker
- an ACE inhibitor with a calcium channel blocker.

Combination of drug treatment and lifestyle measures

A number of treatment trials have indicated the ability of lifestyle changes to maintain blood pressure control with less use of antihypertensive drugs. The lifestyle measures studied were: weight reduction [19], potassium increase [20] and sodium restriction [21].

Management plan for hypertension

Blood pressure levels, sustained ≥140/90 and ≤180/105

The decision to treat should be based not only on the diastolic and systolic blood pressure, but also on the total cardiovascular risk and related organ damage in the individual patient, which requires an assessment of associated risk factors. However, with lower levels of blood pressure, below 105 mmHg diastolic and 180 mmHg systolic, usually referred to as mild hypertension, the decision to treat should only be taken after careful assessment over a period of weeks or months. In practice, when the initial blood pressure averages between 90 mmHg and 105 mmHg diastolic or between 140 mmHg and 180 mmHg systolic, measurements should be repeated on at least two further occasions during the next four weeks. With repeated measurements both systolic and diastolic pressures often fall substantially. Before labelling a subject as hypertensive and deciding to initiate medical treatment, it is necessary, therefore, to identify those people with a sustained high or increasing blood pressure.

All individuals should be given advice to modify their lifestyle, as appropriate, by stopping smoking, reducing obesity, limiting alcohol and dietary saturated fat, restricting salt intake and engaging in regular, mild, dynamic exercise. Management decisions should be made after discussion with the patient and his/her family outlining the risks and benefits of various intervention strategies.

Of the five groups of first line drugs only diuretics and β-blockers have been used in long-term studies demonstrating that lowering the blood pressure reduces morbidity and mortality. However, the choice of antihypertensive drugs in the individual will depend on:

- socioeconomic factors that determine the availability of the drugs in different places
- risk profile
- the presence of target organ damage
- side-effects of the drugs
- the presence of coexisting disorders.

Most of the antihypertensive drugs when given orally require a period of three to six weeks to achieve a maximal hypertensive effect.

Within two to four weeks of the initial measurements, the following steps should be taken depending on blood pressure levels.

1. If the blood pressure falls below 90 mmHg diastolic and 140 mmHg systolic within four weeks, it should be monitored at three-monthly intervals for a year, and annually thereafter.

2. If the blood pressure remains between 90 mmHg and 105 mmHg diastolic or 140 mmHg and 180 mmHg systolic then the following measures should be taken.
   a) If the total cardiovascular risk is high, especially if there is evidence of target organ damage, lifestyle measures should be reinforced and drug treatment should be instituted.
   b) If the total cardiovascular risk is low and there is no evidence of target organ damage, lifestyle measures should be reinforced and blood pressure monitored for three to six months, depending on the level of the blood pressure. At the end of this period the following steps should be taken.
      i) If blood pressure is between 90 mmHg and 95 mmHg diastolic or 140 mmHg and 160 mmHg systolic, but there are no other cardiovascular risk factors present, lifestyle measures and blood pressure monitoring should continue.
      ii) If the blood pressure is still above or equal to 95 mmHg diastolic or 160 mmHg systolic, drug treatment should be instituted although it can be delayed in premenopausal women without risk factors.

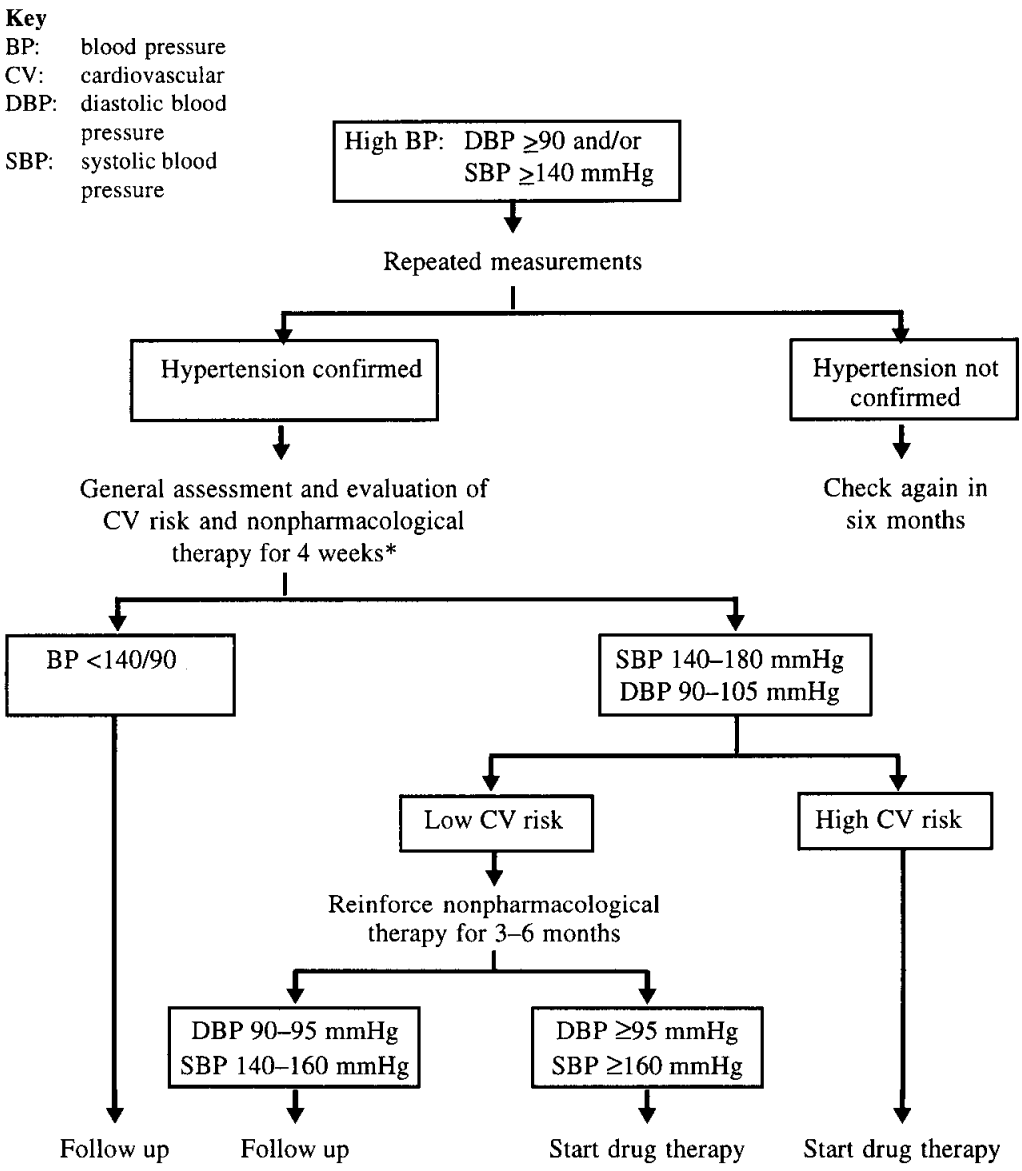
A simplified scheme for the management of hypertension is give in Figure 1.

Blood pressure levels, sustained ≥180/105

People with average diastolic blood pressure in the range 105–120 mmHg and/or systolic blood pressure ranging from 180 mmHg to 210 mmHg should be referred for immediate evaluation and assessed carefully for target organ damage, for associated cardiovascular risk factors, and for history of previous antihypertensive therapy. Drug therapy should not be delayed in patients with target organ damage or with a high risk profile. People with hypertension should be seen after two weeks of active therapy. If the fall in blood pressure is inadequate, another drug from a different pharmacological group should be added and blood pressure should be measured at frequent intervals and patients followed accordingly. Lifestyle measures and patient education are equally important in this group of patients.

People with diastolic blood pressure averaging more than 120 mmHg and/or systolic blood pressure greater than 210 mmHg require immediate drug therapy while necessary laboratory evaluation is being carried out. Most of these require more than one drug in order to control their hypertension.

Individuals who continue to have high blood pressure in the moderate and severe range after therapy with three or more drugs for at least one month have resistant hypertension, and require extended evaluation.



Important. Patients with diastolic pressures of 105 mmHg or over and/or systolic pressures of 180 mmHg or over should be referred for immediate evaluation. Drug therapy should not be delayed in patients with target organ damage or those with high risk.

* The period of 4 weeks can be extended if a significant response is shown.

Figure 1 **A simplified scheme for management of hypertension**

Causes of lack of response to therapy include:

- lack of patient compliance
- "white-coat" effect
- inadequate drug dosage
- inappropriate drug combinations
- expansion of blood volume
- the presence of secondary forms of hypertension
- excess salt and alcohol intake.

Follow-up of people with hypertension

The main task of follow-up is to ensure that the target systolic and diastolic blood pressure is reached and maintained and that other risk factors are controlled. Gradual and careful lowering of blood pressure will minimize side-effects and complications and will improve the patient's compliance.

As a rule, antihypertensive therapy should be maintained indefinitely. Cessation of therapy in patients who were correctly diagnosed as hypertensives is usually followed, sooner or later, by the return of blood pressure to pretreatment levels.

Education of people with hypertension

Education is an essential component of the management plan for every case of hypertension. In most countries of the Region, there is a serious lack of effort to educate people with hypertension and their families. Another important barrier to optimal management is that people with hypertension often do not realize that they have a role to play in controlling their blood pressure. There are also many misconceptions and myths that constitute an important obstacle to good control and impede compliance with therapy. Examples of such misconceptions encountered in this Region include the belief that the absence of symptoms indicates blood pressure is normal and that headache indicates elevated blood pressure. Many people, and unfortunately some health care professionals, also believe that treatment should be stopped when blood pressure is brought under control. There are people who refuse to take medications because of the fear of adverse effects, such as impotence.

Self-care should be considered a strategy for management of hypertension. Health professionals should recognize this fact and the need for education of every patient with hypertension. Communication with each patient should be established at diagnosis and continued during follow-up visits. Other members of the family should also be involved

in the education process, particularly in issues related to dietary treatment and other nonpharmacological lifestyle measures.

At the first contact, the implications for the individual of being labelled hypertensive call for careful communication, including consideration of prognosis and the advantages of medical care. The inclinations of the hypertensive regarding drugs or non-pharmacological treatment can be explored at this early stage; this may help to understand the person better and to ensure his/her cooperation and compliance. Compliance with the recommended therapeutic/preventive regimen requires continuing educational efforts on the part of the health workers responsible. One special task of the communication/education process is to identify and correct misconceptions regarding hypertension (e.g. treatment is necessary only when suffering from a headache or dizziness).

Beyond the one-to-one setting, the communication/education process can be extended to group education and it should involve spouses and members of the family. Community programmes may facilitate behavioural changes that have been recommended to individuals. Certain people may need the reinforcement that a group can provide in order to implement changes in lifestyle. Those with strong social support tend to adhere better to recommended antihypertensive therapy.

Hypertensive emergencies

The following conditions need rapid reduction of blood pressure and require hospitalization with immediate intervention:

- severe hypertension with papilloedema or haemorrhages in the optic fundus (malignant and accelerated hypertension);
- hypertension complicated by acute left ventricular failure, cerebrovascular accident, acute coronary event, acute aortic dissection, or hypertensive encephalopathy;
- hypertensive crisis of phaeochromocytoma;
- eclampsia.

There are a number of therapeutic options that can be followed in the management of hypertensive emergencies. The choice depends upon the clinical situation and the experience of the physician in charge. Drugs used include intravenous frusemide, sublingual or intravenous infusion of nitroglycerine, and nifedipine capsules chewed and swallowed. In situations where immediate reduction of blood pressure is necessary, intravenous sodium nitroprusside infusion, small dose diazoxide intravenous bolus or infusion, and intravenous labetalol are very effective. In the hypertensive crisis of phaeochromocytoma, phentolamine should be administered. Careful monitoring is

essential in all cases of intravenous therapy. The potential dangers of sudden reduction of blood pressure should be kept in mind.

Hypertension under specific conditions

Hypertension in pregnancy

Hypertension during pregnancy (toxaemia of pregnancy, pre-eclampsia and eclampsia) is the major cause of premature birth and perinatal death and is also responsible for one-fifth to one-third of all maternal deaths [22]. It is a major health problem in developing countries.

Hypertension in pregnancy is defined on the basis of diastolic blood pressure measurement by sphygmomanometry using phase IV Korotkoff sounds. Lateral recumbency at 15–30° from horizontal is the posture of choice in order to eliminate the haemodynamic changes due to the pregnant uterus [23]. Diagnosis of hypertension requires at least two consecutive measurements of 90 mmHg or more, four or more hours apart, or one measurement of 100 mmHg or more. As diastolic blood pressure is approximately 10 mmHg lower than nonpregnant values, diastolic blood pressure >85 mmHg should be considered abnormal.

Pre-eclampsia and eclampsia are characterized by hypertension with proteinuria (>300 mg/d), and sometimes coagulation and/or liver abnormalities. Oedema is no longer used as a criterion. Pre-eclampsia and eclampsia occur primarily in primigravidae after the 20th gestational week and most frequently near term. Pre-eclampsia may progress rapidly without warning to the convulsive phase known as eclampsia. Differentiating mild from severe pre-eclampsia may be dangerously misleading, because one quarter of women with eclampsia have mild disease or minimal elevations of blood pressure prior to convulsing.

Suspected patients should be hospitalized. If pre-eclampsia or severe hypertension occur beyond the 36th gestational week, delivery is the therapy of choice. When problems arise earlier, delivery may be delayed in selected patients under strict supervision. If there is evidence of advanced disease (especially with thrombocytopenia or abnormal liver function tests) or symptoms of impending eclampsia, delivery is indicated regardless of gestational age.

For acute, severe hypertension (diastolic blood pressure ≥105 mmHg) in pre-eclampsia and eclampsia, intravenous hydralazine is indicated, aiming for a gradual reduction of diastolic blood pressure to 90–100 mmHg. Magnesium sulfate remains the treatment of choice to prevent eclamptic convulsions.

The diagnosis of chronic hypertension in pregnancy rests on the evidence of hypertension prior to pregnancy or prior to the 20th gestational week. The vast majority

of patients in this category have mild to moderate, uncomplicated hypertension and experience a normal pregnancy. Drug therapy for chronic hypertension in pregnancy remains controversial. If diastolic blood pressure is >95 mmHg, methyldopa and β-blockers are the safest agents, although β-blockers may cause some retardation of fetal growth. Diuretics can be used transiently when blood pressure is difficult to control. All inadequately studied antihypertensive drugs are prohibited in pregnancy, and sodium restriction is not recommended. Bed rest, however, may be useful. For the poorly controlled hypertensive, the mother's well-being takes precedence over the fetus, and if the pharmacological approaches indicated above fail she should be treated as if she were not pregnant.

Hypertension in the elderly

Hypertension is more common in individuals aged 65 years or older, among whom isolated systolic hypertension is particularly common. In absolute terms, hypertension is a much greater risk factor of cardiovascular events in the elderly than in younger people. In North American populations, among those with mild hypertension, the 10-year risk of a major cardiovascular event ranges from <1% in individuals aged 25–34 years to >30% in those aged 65–74 years [24].

Correspondingly, numerous intervention trials have shown that the absolute benefit of antihypertensive therapy is particularly high in the elderly. The results of the European Working Party on High Blood Pressure in the Elderly trial, published in 1985 [25], demonstrated the beneficial effect of antihypertensive medication in the elderly. In addition, the results of three prospective placebo-controlled therapeutic trials in elderly hypertensives were reported in 1991 and 1992 [6,26,27]. All demonstrated a significant reduction in cardiovascular morbidity or mortality.

In the elderly, efforts should be made to avoid sudden drops in blood pressure and orthostatic hypotension. It should also be remembered that in elderly patients the blood pressure elevation can often be controlled by low-dose medication, e.g. diuretics.

Hypertension with diabetes

Hypertension is commonly associated with diabetes [28]. Patients with hypertension and diabetes mellitus are especially vulnerable to cardiovascular and renal complications; therefore, the control of hypertension and dyslipidaemia, as well as cessation of smoking, are particularly important. Hypertension should be detected early and treated aggressively if the contribution to increased morbidity and mortality in diabetes is to be avoided. In patients with incipient diabetic nephropathy, treatment may be instituted at blood pressure values as low as 130/85; ACE inhibitors are recommended in this case.

Lifestyle modifications are beneficial for the control of hyperglycaemia, dyslipidaemia and hypertension, which often occur in obese patients with insulin resistance. The syndrome of insulin resistance very closely parallels non-insulin-dependent diabetes mellitus. Insulin resistance can be improved by weight reduction and exercise.

No antihypertensive agent is absolutely contraindicated for use in the diabetic population, but caution is needed with several of them. In particular, high dose diuretics may worsen glucose intolerance, β-blockers may mask the symptoms of hypoglycaemia and prolong recovery from it. Guidelines for the management of hypertension in diabetes are detailed in the WHO Eastern Mediterranean regional document *Management of diabetes mellitus* [29].

Management of hypertension in primary health care

Hypertension is common in the Eastern Mediterranean populations. Epidemiological studies conducted over the last two decades both confirm the high prevalence of high blood pressure, which sometimes exceeds 25% of the adult population, and also indicate low awareness rates [1,30]. According to these studies, in some Eastern Mediterranean populations, up to 75% of people found to have hypertension were unaware of their high blood pressure prior to the survey. In addition, a substantial proportion of those who were aware of their hypertension did not take treatment and it was uncontrolled. These findings call for the initiation of activities to promote the early detection of high blood pressure, to improve the management of hypertension at all levels of health care, and to strengthen prevention and control measures. As a first and major step, there is a pressing need to integrate health care for people with hypertension into the primary health care systems of Member States.

The diagnosis, clinical assessment, and treatment of hypertension in the primary health care setting should generally follow the principles and the guidelines already discussed. However, resources vary from one country to another and these variations can affect the standards of health care delivery. It was therefore felt necessary, during the WHO Regional Consultation on Hypertension Management held in Beirut in August 1995, to identify acceptable standards of health care for people with hypertension that could be applied in countries of the Eastern Mediterranean Region. A summary report of this meeting is given in Annex 3.

In addition to the recommendations made during the consultation, the participants endorsed both clinical guidelines for the optimal management of hypertension and also a quick reference guide for hypertension suitable for use by the primary health care physician. The latter provides guidelines for ascertaining the diagnosis of high blood pressure, assessing the clinical state of the person with hypertension, screening for risk

factors and signs of target organ damage, detecting curable causes of hypertension, conducting the essential investigations, and ensuring rational management and good control of blood pressure. The guide also provides examples of indicators or process measures that can be used for a medical audit to evaluate the performance of the health care facility in the management of hypertension. The quick reference guide is reproduced at the end of the book.

Community prevention of hypertension

General approaches

Complications arising from hypertension can be prevented. There are two approaches to prevention; one focuses on reducing the risk of developing high blood pressure in the population as a whole, and the other on the identification of individuals with high blood pressure who are at an increased risk of complications. The high risk approach seeks to protect individuals who are more susceptible to the complications of high blood pressure, while the population approach seeks to control the causes of incidence.

The two approaches can and should be used in combination. A shift in the population distribution of blood pressure to a lower range will benefit the whole range of risk, and combined with targeted interventions of persons who are at a higher individual risk will provide a complete response to the high blood pressure problem. The detection and treatment of individuals serves to heighten community awareness of the problem and facilitate the implementation of a population-based strategy. Changes in population behaviour, will facilitate the individual patient's adherence to lifestyle interventions.

The risks of high blood pressure and the benefits of effective interventions to reduce it have been convincingly demonstrated over a wide range of high blood pressure. The greater the cumulative risk of cardiovascular events and other adverse outcomes, the greater the benefit of effective blood pressure reduction and, therefore, the greater the need for early and effective intervention. However, because the risk relationship between blood pressure and cardiovascular diseases is continuous and progressive, complications occur even within the conventionally defined normotensive range.

It is also clear from the Multiple Risk Factor Intervention Trial (MRFIT) follow-up data that, even under optimal conditions, the treatment and control of hypertension will influence no more than 70% of the blood pressure-related cardiovascular disease in the community [31]. Furthermore, such optimal conditions are seldom achieved. In the National Health and Nutrition Examination Survey III in the United States of America, 35% of the participants with a systolic blood pressure of ≥140 mmHg or diastolic blood pressure ≥90 mmHg reported a lack of awareness of their blood pressure elevation, only 49% of those with high blood pressure were receiving drug therapy, and only 21% of those treated had a blood pressure less than 140/90 [32]. In addition, the intervention may occur late in the natural history of the disease and will not eliminate the risk of complications. This highlights the need to consider the primary prevention of hypertension.

The prevention of high blood pressure is principally linked to the elimination of modifiable risk factors which contribute to it. This approach attempts to shift the whole blood pressure distribution in a more favourable direction by altering some of the society's norms of behaviour and promoting common community health behaviour. The resultant gains will be spread across the whole spectrum of blood pressure distribution and will encompass the entire risk-prone range of blood pressure. It has been estimated that a 2 mmHg downward shift in the entire distribution of systolic blood pressure is likely to reduce the annual mortality from stroke, coronary heart disease and all other causes by 6%, 4% and 3%, respectively [33]. The corresponding benefits from a 3 mmHg downward shift in systolic blood pressure have been estimated to be 8%, 5% and 4%, respectively.

The adoption of healthy lifestyles by communities collectively and the adherence to them by individuals personally requires behavioural changes. In order to achieve such changes, there needs to be a collaborative effort between health professionals, policy makers, industry, media and other opinion makers, as well as a sustained campaign targeting all sections and ages of the community.

Lifestyle measures for prevention and treatment

Introduction

Since lifestyle components such as dietary patterns, obesity, physical activity and alcohol consumption have been recognized as important risk factors for the development of high blood pressure, interventions to reduce the risk of developing hypertension should be initiated. Such interventions will also contribute to lowering blood pressure in people with hypertension. Thus lifestyle measures are applicable to both the primary prevention approach and the individual case management approach.

In the individual patient they are helpful as nonpharmacological therapy in:

- lowering blood pressure
- avoiding or reducing the need for antihypertensive drugs
- controlling associated risk factors.

In the population as a whole they are of benefit in:

- reducing the risk of developing high blood pressure, and
- reducing the risk of developing other lifestyle-related disorders.

Evidence that lifestyle measures are helpful in accomplishing these objectives is now available. The effects of counselling on reduction of dietary sodium and alcohol use,

weight loss and regular physical activity have been evaluated in various combinations in three clinical trials of the primary prevention of hypertension in individuals at high risk of developing hypertension. The incidence of hypertension was reduced by 54% in the primary prevention of hypertension study [34], by 20% to 35% in the hypertension prevention trial [35], and by 51% in the weight loss group and 24% in the sodium restriction group in the trials of hypertension prevention [36].

The interventions with documented efficacy from trial results have been identified as weight reduction, reduction of alcohol intake, physical activity and sodium moderation.

Interventions with limited or unproven efficacy have been noted to be stress management and supplementing the diet with potassium, fish oil, calcium, magnesium or fibre.

Weight reduction

Several trials have demonstrated the effect of weight loss on the primary prevention of hypertension [37]. Raised blood pressure is closely correlated with increased body weight. In particular, the accumulation of fat on the trunk or abdomen is closely correlated with hypertension, hyperlipidaemia and diabetes. Weight reduction lowers blood pressure in the majority of hypertensive patients who are more than 10% overweight, and also has beneficial effects on associated risk factors such as the lipid profile and insulin resistance. Overweight hypertensive patients should therefore be counselled to undertake a structured and supervised weight reduction programme by both reducing dietary calorie intake and increasing energy expenditure through regular physical exercise. Such a programme should be maintained for three to six months in patients with mild or borderline hypertension before prescribing antihypertensive drugs.

Reduction of alcohol intake

Regular alcohol consumption raises blood pressure in both men and women in different ethnic groups, and contributes significantly to the prevalence of hypertension in populations where drinking is a habit. Reduction of alcohol intake over a period of one to four weeks results in a lowering of blood pressure. Randomized cross-over studies of hypertensive as well as normotensive subjects showed that reducing alcohol intake by 80–85% resulted in a reduction of systolic blood pressure and diastolic blood pressure in both groups [38].

Physical activity

Regular exercise may be beneficial for both prevention and treatment of hypertension. Sedentary and unfit normotensive individuals have a 20–50% higher risk of developing

hypertension, when compared with more active controls [39]. Exercise lowers systolic and diastolic blood pressure by 5–10 mmHg [40]. Dynamic isotonic exercise such as walking is more effective than static isometric exercise such as weight lifting. Strenuous exercise such as running does not seem to have an advantage over milder levels of exercise, such as brisk walking for 30–60 minutes daily or three to five times weekly.

A meta-analysis of 22 studies revealed that, in methodologically adequate studies, a mean systolic blood pressure reduction of 6.4 mmHg and a mean diastolic blood pressure reduction of 6.9 mmHg was achieved through prescribed exercise. Another meta-analysis of 30 randomized controlled trials of lower extremity aerobic exercise revealed a 3 mmHg reduction in systolic blood pressure and diastolic blood pressure. Thus, the beneficial effects of exercise, though modest, are useful in lowering blood pressure for purposes of prevention as well as control [41].

Sodium moderation

Both epidemiological observations and clinical trials show an association between dietary sodium intake and blood pressure [42,43]. Individuals vary substantially in their responses to changes in dietary sodium chloride. Black people and elderly people may be more sensitive to salt reduction. An average daily intake below 6 g/d of sodium chloride should be the aim.

A meta-analysis of 18 clinical trials in people with hypertension revealed a blood pressure reduction of 4.9/2.6 in one to two months, associated with a 56 mmol to 105 mmol reduction in daily sodium intake [44]. A larger meta-analysis of 78 trials of sodium restriction, one quarter of which included normotensives, demonstrated that observed and predicted blood pressure reductions were similar in the trials lasting over five weeks, suggesting the effects of sodium restriction may take several weeks to become evident [45].

Lifestyle measures for treatment of associated risk factors

Tobacco

Tobacco smoking is a major cardiovascular risk factor. People with hypertension who smoke have a two to threefold greater incidence of stroke and coronary heart disease than hypertensives with comparable blood pressures who do not. Stopping smoking rapidly reduces this risk [46]. Persuading hypertensive individuals not to smoke is therefore the most effective single way the doctor has to reduce their risk and repeated assistance to stop smoking is most important. Smoking control is also an integral part of any effort in multifactoral primary prevention of cardiovascular disease in populations.

Lipids

High serum cholesterol, high low-density lipoprotein cholesterol, and low high-density lipoprotein cholesterol levels appear to increase the risk of atherosclerotic complications of hypertension. Nutritional counselling and, when appropriate, drug treatment are indicated to control these risk factors. Hypertriglyceridemia is a more debated cardiovascular risk factor, frequently associated with insulin-dependent diabetes mellitus, non-insulin-dependent diabetes mellitus and insulin-resistance. Increased physical activity together with nutritional counselling are both recommended for treating hypertriglyceridaemia. Since increased physical activity is also likely to reduce body weight and blood pressure, it is most appropriate in hypertensive patients with hyperlipidaemia and glucose intolerance.

Diabetes

Diabetes requires a comprehensive plan of care which will include specific nutritional counselling and appropriate use of insulin and oral hypoglycaemic drugs. Several of these lifestyle measures (regular exercise, moderate weight reduction and low fat, high carbohydrate, high fibre diet) can improve insulin sensitivity and may help reduce the contribution of insulin resistance to increased blood pressure. Guidelines for the management of diabetes mellitus and prevention of its cardiovascular complications can be seen in the WHO Eastern Mediterranean regional document *Management of diabetes mellitus* [29].

Conclusion

In summary, the prevention of hypertension involves:

- reducing the risk of developing high blood pressure in the population as whole and
- the identification of individuals with high blood pressure who are at an increased risk of complications.

The two approaches are complementary and not conflicting. A shift in the population distribution of blood pressure to a lower range with benefits across the whole range of risk, along with targeted interventions of persons who are at a higher individual risk will together provide a comprehensive preventive strategy for hypertension.

From the perspective of the developing countries, including those of the Eastern Mediterranean Region, the prevention of hypertension is imperative. These are societies in epidemiological transition, with lifestyle changes accompanying economic development and modernization. Major epidemics of cardiovascular disease have been projected to occur in the coming decades in these countries. Campaigns for mass

screening, case detection and long-term pharmacotherapy with adequate compliance from the patient will face barriers of prohibitive costs, inadequate or overburdened health infrastructure, and socioeconomic constraints that will curtail the continued commitment of scarce resources to such therapy. This makes primary prevention the major goal in the developing countries and they should focus on strategies to modify the lifestyle of the population as a whole.

While developing strategies to control hypertension, the following needs should be fulfilled.

- *Data collection.* There is a need for valid and representative estimates of the prevalence of high blood pressure and the risk factors predisposing to high blood pressure as well as other cardiovascular risk factors. Such data will provide the basis for prioritizing and planning public health strategies in individual countries. Where such data are presently not available, cardiovascular risk factor surveys should be conducted in population samples.
- *Early detection.* There is a need to detect individuals with high blood pressure and initiate appropriate interventions early in the natural history of their disease. Although mass screening is neither appropriate nor feasible, all possible opportunities for early case detection in health care settings, as well as self-referral for evaluation through increased public awareness, must be utilized.
- *Health care services.* The health care system must be capable of responding to the needs of individuals with high blood pressure by providing appropriate management to lower their blood pressure. Health care services should be adequate in terms of trained personnel as well as diagnostic and treatment facilities.
- *Coordination.* There is a need to integrate primary prevention of hypertension with the prevention of coronary artery disease, stroke, and other noncommunicable diseases, such as diabetes, through a comprehensive noncommunicable disease control programme focusing on the promotion of healthy lifestyles. This should be established in close coordination and collaboration with all governmental and nongovernmental agencies concerned.
- *Community participation.* The community must be empowered, through education, to contribute effectively to the prevention and control of high blood pressure.
- *Medical audit.* There is a need to establish effective systems of medical audit to monitor the process and quality of care provided to people with hypertension.

A more detailed account of the primary prevention of cardiovascular disease, including hypertension and community-based intervention programmes, is included in the WHO regional technical publication *Prevention and control of cardiovascular diseases* [30].

In conclusion, with regard to the Eastern Mediterranean Region, strategies for the control of hypertension should emphasize the need for reliable baseline data providing representative estimates of the prevalence of hypertension and other cardiovascular risk factors. In addition, they should focus on the pressing need to initiate primary prevention intervention programmes and also the need to increase the awareness about hypertension. Finally, strategies should give consideration to promoting early detection and timely intervention, as well as strengthening national capabilities to respond to the increasing needs of newly discovered cases of hypertension.

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Annex 1

An outline of the major groups of antihypertensive drugs

Diuretics

Diuretics, such as the thiazides, have been widely used as first line antihypertensive therapy and have been shown to be clearly effective in the prevention of cardiovascular morbidity and mortality, especially stroke [1]. In large doses, there is evidence that diuretics may cause a variety of unwanted metabolic effects (principally potassium depletion and reduced glucose tolerance [2]), and impotence [3]. These adverse effects can be reduced if the dose is kept as low as possible. Low-dose diuretics remain effective not only in lowering elevated blood pressure, but also in reducing cardiovascular morbidity and mortality [4,5,6,7]. Diuretics are inexpensive, and are also valuable as ancillary treatment to enhance the effectiveness of many other antihypertensive drugs. A combination of thiazide diuretics with potassium-sparing drugs or with angiotensin-converting enzyme (ACE) inhibitors may prevent potassium depletion.

β-blockers

β-blockers are safe, inexpensive and effective. They are widely used in subjects of all ages with hypertension of all degrees of severity. They have been part of the treatment regimen in many of the major studies that have demonstrated reduction in morbidity and mortality attributable to lowering blood pressure [1]. There is a choice of short-acting and long-acting preparations.

There is a large variety of β-blockers available, some that are cardio-selective, some with intrinsic sympathomimetic activity, and some with α–blocking or vasodilator properties [8,9]. Although β-blockers have been shown to be useful in the secondary prevention of myocardial infarction [10], they have not been shown to have an advantage over diuretics in the primary prevention of myocardial infarction in hypertensive patients [8]. Major contraindications include asthma, heart failure and heart block.

ACE inhibitors

ACE inhibitors (such as captopril, enalapril and lisinopril) have been demonstrated to be safe and effective in lowering blood pressure. The most common adverse effect with ACE inhibitors is a persistent dry cough. Angio-oedema is a very rare though serious side-effect. ACE inhibitors can cause a precipitate fall in blood pressure in patients with renal impairment and those receiving diuretic therapy. They should be started at low doses in patients with impaired renal function and should be avoided in the presence of bilateral renal artery stenosis [8,9]. ACE inhibitors are contraindicated in pregnancy, particularly in the second half of pregnancy since they may increase fetal and neonatal death [11]. ACE inhibitors have not yet been shown to decrease cardiovascular morbidity and mortality in hypertensive patients. However they have been shown to reduce morbidity and mortality, including coronary events in patients with congestive heart failure and after myocardial infarction in subjects with reduced ejection fraction [12,13]. They have been shown to be effective in reducing the development of left ventricular hypertrophy in hypertensive patients [14]. ACE inhibitors have also been shown to retard the progression of renal disease in patients with insulin-dependent diabetes mellitus and moderate renal impairment [15].

Calcium channel blockers

There are three major groups of calcium channel blockers with distinctly different properties: the phenylalkylamines (verapamil), dihydropyridines (nifedipine) and benzothiazepins (diltiazem). Calcium channel blockers are effective in lowering blood pressure [8,9]. Side-effects include tachycardia, headache, flushing and ankle oedema (especially with rapidly acting dihydropyridines), and ankle oedema and constipation (with verapamil). Calcium channel blockers do not appear to have untoward metabolic effects, but their long-term safety is less well established than β-blockers and diuretics. There is no evidence so far from long-term trials that calcium channel blockers can lower morbidity or mortality in hypertension. A safety profile has not been established in early pregnancy.

α-blockers

α adrenoreceptor blockers (such as prazosin) are safe and effective in lowering blood pressure [8,9]. The main side-effect is postural hypotension, which may be seen after the first dose and which can be a particular problem in elderly patients and in subjects with autonomic neuropathy. Assessment of standing blood pressure is therefore essential. There is some evidence that α–blockers may have advantages in subjects with

hyperlipidaemia or glucose intolerance [8]. As with the other newer agents, there have been no long-term clinical trials demonstrating reduction in mortality or morbidity in hypertensive subjects treated with α–blockers.

Other classes of drugs

Centrally acting drugs are also effective antihypertensive agents and have been used for many years. They have been used in several controlled clinical trials, mostly in association with diuretics, which have proven the ability of antihypertensive therapy to reduce cardiovascular events [1]. In particular, methyldopa remains an important, well validated agent to treat hypertension effectively in pregnancy [8,9]. Methyldopa also has the advantage of being safe in asthmatics and in heart failure. Adverse effects can be minimized with low doses. The use of reserpine has diminished because of its central nervous system side-effects. However, in comparative studies, low doses of reserpine given concurrently with a diuretic were as well-tolerated as a combination of a diuretic with propranolol or methyldopa [16]. The major advantage of reserpine is that it is much less expensive than other antihypertensive drugs. If consideration of cost–effectiveness should favour the use of centrally acting drugs, such as reserpine, in low-income populations, it is recommended that they be used in combination with diuretics and in much lower doses than commonly prescribed in earlier years.

Direct vasodilators, such as hydralazine and minoxidil, are also quite effective in lowering blood pressure, but some of their side-effects (tachycardia, headache, sodium and water retention) make it difficult to use them as monotherapy.

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Annex 2

WHO essential drugs list for cardiovascular diseases[1]

Antianginal drugs

glyceryl trinitrate	tablet (sublingual), 500 mg
*isosorbide dinitrate	tablet (sublingual), 5 mg
*verapamil (6)	tablet, 40 mg, 80 mg (hydrochloride)
*propranolol	tablet, 10 mg, 40 mg (hydrochloride) injection, 1 mg (hydrochloride) in 1-ml ampoule

Complementary drug

atenolol (B)	tablet, 50 mg, 100 mg

Explanatory notes

When the strength of a drug is specified in terms of a selected salt or ester, this is mentioned in brackets.

* Example of a therapeutic group. Various drugs can serve as alternatives.

Numbers in parentheses following the drug names indicate:

(1) Specific expertise, diagnostic precision, individualization of dosage or special equipment required for proper use;

(2) In renal insufficiency, contraindicated or dosage adjustments necessary;

(3) Special pharmacokinetic properties;

(4) Adverse effects diminish benefit/risk ratio;

(5) Limited indications or narrow spectrum of activity;

(6) Sustained release preparations are available. The fact of proper sustained release of the dosage form should be documented.

Letters in parentheses following the drug names indicate the reasons for the inclusion of *complementary drugs*:

(A) When drugs in the main list cannot be made available;

(B) When drugs in the main list are known to be ineffective or inappropriate for a given individual;

(C) For use in rare disorders or in exceptional circumstances.

[1] Source: *The use of essential drugs. Model list of essential drugs (Eighth list). Sixth Report of the WHO Expert Committee.* Geneva, World Health Organization, 1995 (WHO Technical Report Series, No.850).

Antidysrhythmic drugs

lidocaine	injection, 20 mg (hydrochloride)/ml in 5-ml ampoule
*propranolol	tablet, 10 mg, 40 mg (hydrochloride) injection, 1 mg (hydrochloride) in 1-ml ampoule
verapamil (5) (6)	tablet, 40 mg, 80 mg (hydrochloride) injection, 2.5 mg (hydrochloride)/ml in 2-ml ampoule

Complementary drugs

atenolol (B)	tablet, 50 mg, 100 mg
isoprenaline (C)	injection 1 mg (hydrochloride)/ml
*procainamide (B)	tablet, 250 mg, 500 mg (hydrochloride) injection, 100 mg (hydrochloride)/ml in 10-ml ampoule
*quinidine (A) (4)	tablet, 200 mg (sulfate)

Antihypertensive drugs

*hydralazine	tablet, 25 mg, 50 mg (hydrochloride) powder for injection, 20 mg (hydrochloride) in ampoule
*hydrochlorothiazide	tablet, 25 mg
*nifedipine (6)	capsule or tablet, 10 mg
*propranolol	tablet, 40 mg, 80 mg (hydrochloride)

Complementary drugs

atenolol (B)	tablet, 50 mg, 100 mg
methyldopa (B) (4)	tablet, 250 mg
*reserpine (A)	tablet, 100 mg, 250 mg injection, 1 mg in 1-ml ampoule
*sodium nitroprusside (C) (1,5)	powder for preparing infusion, 50 mg in ampoule
*captopril (B)	scored tablet, 25 mg

Cardiac glycosides

digoxin (2)	tablet, 62.5 mg, 250 mg oral solution, 50 mg/ml injection, 250 mg/ml in 2-ml ampoule
Complementary drugs	
digitoxin (B) (3)	tablet, 50 mg, 100 mg injection, 200 mg in 1-ml ampoule

Drugs used in vascular shock

dopamine	injection, 40 mg (hydrochloride)/ml in 5-ml vial

Antithrombotic drugs

acetylsalicylic acid	tablet, 100 mg
Complementary drug	
streptokinase (C)	powder for injection, 100 000 IU, 750 000 IU in vial

Annex 3

Hypertension in the Eastern Mediterranean Region

Summary report of the WHO regional consultation on hypertension management

The World Health Organization's Regional Office for the Eastern Mediterranean held a Regional Consultation on Hypertension Management in Beirut, Lebanon, from 4 to 5 August 1995. The consultation was organized in recognition of the increasing importance of high blood pressure as a major public health concern in countries of the Region and as part of the WHO regional plan for the prevention of cardiovascular diseases.

Data available from several Member States indicate that hypertension is emerging as a considerable challenge to public health and an important cause of morbidity and mortality. According to surveys conducted in these countries over the last few years, high blood pressure may affect up to 20–26% of the adult population, but the awareness rate among the hypertensive people detected by such surveys has been consistently low; up to 70% of people with elevated blood pressure may not be aware of their condition. Hypertension is associated with the development of serious and potentially fatal complications, such as cardiovascular and renal diseases, thus causing considerable suffering and enormous health costs.

Primary prevention is critically important. Lifestyle factors which contribute to the development of high blood pressure, and which are modifiable and open to the prospects of healthy change include excess body weight, low levels of physical activity, excess consumption of salt, and excess consumption of alcohol. In order to provide optimal care for people with high blood pressure and to reduce the development of hypertensive complications, good management is also essential. Appropriate standards of health care should be made available at all levels of the health care system, particularly primary health care.

During the consultation, experts in hypertension from the Region discussed with WHO advisers the standards of health care required for the optimal management of hypertension. They endorsed clinical guidelines as well as a quick reference guide, suitable for use in the Eastern Mediterranean Region particularly in primary health care.

Aware of the increasingly negative impact of hypertension on public health in Member States, and the importance of initiating efforts for the prevention of hypertension, the participants called upon ministries of health:

- To initiate active programmes for the prevention and control of hypertension in their countries. Health authorities should work closely with the medical and other health professions, as well as with nongovernmental organizations and community leaders, to plan, implement and evaluate such programmes.
- To promote data collection on the prevalence of hypertension and its risk factors which are necessary for planning public health strategies in individual countries.
- To ensure the availability of acceptable standards of care for people with hypertension at all levels of the health care system and to strengthen educational activities targeting health professionals, people with hypertension and their families as well as the community. Effective systems of medical audit should be established, whenever feasible, to monitor the quality of health care delivered to people with hypertension.
- To take measures, as part of a comprehensive national plan, to initiate community intervention activities to prevent hypertension through promotion of healthy dietary patterns, prevention of obesity, smoking control, and promotion of physical activity. Such measures, which include legislative actions as well as educational activities, will also be effective in the primary prevention of other cardiovascular diseases and diabetes.

The participants in the consultation were as follows:

Professor O. Abdel-Aziz (Egypt)
Professor M.M. Ibrahim (Egypt)
Dr S. Mabrouk (UNRWA)
Professor S. Alam (Lebanon)
Professor A. Berbari (Lebanon)
Dr E. Nasr (Lebanon)
Dr A. Jurjus (Lebanon)
Professor A. Faruqui (Pakistan)
Professor M. Al-Nozha (Saudi Arabia)
Professor A.R. Moosa (Sudan)
Professor J.C. Petrie (United Kingdom)
Professor K. Badr (USA)
Dr A. Alwan (WHO)

A quick reference guide for hypertension

Definition

Blood pressure sustained above 140/90 after repeated measurement

Classification

- hypertension with no risk factors and no organ damage
- hypertension with risk factors alone
- hypertension with organ damage
- hypertension with risk factors and organ damage

Measurement of blood pressure

Sitting or supine, repeated twice after 3 minutes if initially ≥140/90

Note. Observers require training.

High risk groups

- smokers
- diabetes mellitus
- elderly
- hyperlipidaemia
- previous myocardial infarction
- evidence of organ damage
- family history

Minimum data set for clinical assessment of hypertension

History

- presenting complaints and duration
- previous history of myocardial infarction, stroke, diabetes, renal disease and peripheral vascular disease
- family history of hypertension, myocardial infarction, stroke, diabetes and peripheral vascular disease
- drug history, e.g. use of non-steroidal anti-inflammatory drugs, oral contraceptives, corticosteroids
- previous therapies/previous adverse reactions to drugs
- risk behaviour, such as smoking

Physical examination

- to look for signs of secondary hypertension such as:
  - Cushing syndrome yes/no
  - polycystic kidney yes/no
  - renal artery stenosis yes/no
  - phaeochromocytoma yes/no
  - coarctation yes/no
- to look for signs of organ damage such as:
  - left ventricular hypertrophy and failure (displaced apical impulse, gallop, rales) yes/no
  - retinal changes yes/no, if yes specify
  - peripheral pulses reduced yes/no
  - peripheral pulses synchronous yes/no
  - cerebrovascular disease yes/no

Laboratory tests

- urine analysis
- blood glucose
- ECG (SV_1+RV_5 or RV_6)
- serum creatinine or blood urea nitrogen
- haematocrit
- serum potassium and sodium
- serum cholesterol

Target blood pressure

To achieve the maximum tolerated reduction in blood pressure ≤140/90

Management

Nonpharmacological

- reduce fat intake
- reduce salt (do not add)
- take regular dynamic exercise (e.g. walking)
- reduce weight (if obese)
- reduce alcohol
- avoid tobacco

Pharmacological

- diuretic or β-blockers as first line unless contraindicated
- ACE inhibitors especially in diabetes with incipient nephropathy
- calcium channel blockers, α–blockers
- others

Note. The choice of drug is influenced by associated disease, risk factors or organ damage.

Education

Public

- raising awareness
- change in attitudes and lifestyle

People with hypertension

- compliance with regimen

Note. Adequate time should be given to each patient during consultation

Doctors and nurses (including continuing education)

- blood pressure measurement
- levels of hypertension to treat

Indicators (audit)

- % ≥140/90 on treatment, ≥160/100, ≥180/110, ≥200/120
- % with complete data set
- % team trained in blood pressure measurement
- % lost to follow up
- % with complete medical records

Prevention and Management of Hypertension, World Health Organization, Regional Office for the Eastern Mediterranean, Alexandria, 1996

Prevention and management of hypertension

This publication addresses the increasing importance of high blood pressure as a challenge to public health and an important cause of morbidity and mortality in countries of the Eastern Mediterranean Region. Hypertension is associated with the development of serious and potentially fatal complications, such as cardiovascular and renal diseases, thus causing considerable human suffering and enormous health care costs. There is a pressing need for action to control this problem. While primary prevention is critically important, prevention of complications through good management of established cases is equally essential. The publication reviews strategies for the prevention of hypertension in the Eastern Mediterranean populations and provides clinical practice guidelines for the management of high blood pressure with special emphasis on the role of primary health care.

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