

**EGYPTIAN GUIDELINES ON  
PREVENTION OF ATHEROSCLEROTIC  
CARDIOVASCULAR DISEASE**

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**THE EGYPTIAN HYPERTENSION SOCIETY WORKING GROUP ON  
CARDIOVASCULAR PREVENTION GUIDELINES  
DELTA-C PROJECT**

EXECUTIVE SUMMARY

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This Document has been approved by members from the Egyptian Hypertension Society, Egyptian Society of Cardiology, Egyptian Society of Nephrology, Egyptian Society of Diabetes and Egyptian Society of Obesity

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## ABSTRACT

- In Egypt and third world countries, there are no guidelines for prevention of atherosclerotic cardiovascular disease. Clinical guidelines developed in wealthy countries are inappropriate for most of the world population.
- Guidelines address both lifestyle modification and drug therapy for established risk factors. Because of limited resources, thresholds of pharmacologic interventions for treatment of hypertension and hypercholesterolemia and target levels were higher than in western guidelines.
- Two complimentary prevention strategies are needed. The first is directed to the whole population aiming at decreasing the risk profile of the whole community. The second is an individual approach targeting principally high risk individuals.
- Individuals at increased risk of developing future cardiovascular events should be the first target of the prevention programs. High risk individuals include patients with established atherosclerotic cardiovascular disease (e.g. angina, MI, stroke), diabetic patients with additional risk factors, elderly individuals with risk factors, very high level of a single risk factor and multiple (> 3) risk factors.
- Complete smoking cessation is mandatory through both community and individual approaches.
- Both public and food industry should be aware of the hazards of unhealthy dietary style. A heart healthy diet should be made popular. This diet is low in animal fat and refined sugar and rich in fibers and unsaturated fat. Increased consumption of fruits, vegetables, whole grain, legumes and fish should be encouraged. Food labeling, government legislations and media campaigns are important tools.
- All individuals should be encouraged to establish and maintain at least 30 minutes of moderate intensity physical activity as 5 or more days/ week.
- A normal body weight (BMI 20-25 Kg/m<sup>2</sup>) and a waist circumference < 94 cm in men and < 80 cm in women are recommended. Control of obesity requires indefinite dietary and behavior therapy and regular physical activity. Combination of pharmacotherapy and lifestyle modification is more effective in weight loss than either approach alone.
- Blood pressure goal < 140/90 mmHg is recommended in all individuals, lower levels may be required in high risk individuals. Accurate blood pressure measurements should be encouraged in all routine office visits.
- Start of drug therapy for high BP, unless there is an emergency, should follow a period of monitoring and repeated measurements over a period varying from days to months depending upon BP level and global risk profile.
- In patients with dyslipidemia an elevated serum LDL-C should be confirmed on at least two separate measurements. Initiation of statin therapy is recommended only after failure of dietary intervention for a period of 3-6 months and should take into consideration the level of LDL-C and the patient's global risk profile. The use of statins for primary prevention is not recommended unless LDL-C is > 210 mg/dl, or if LDL-C >160 mg/dl in presence of multiple risk factors.
- Diagnosis of diabetes depends on accurate and repeated estimation of plasma glucose (PG). An optimal (normal) fasting PG is less than 100 mg/dl. If diet and exercise fail to normalize blood glucose within 3 months, oral therapy is initiated. Screening for hyperglycemia is indicated for individuals most likely to have impaired glucose tolerance, those with established atherosclerotic cardiovascular disease, hypertension and dyslipidemia.

## INTRODUCTION

- The development of atherosclerotic (ASO) cardiovascular disease (CVD), namely coronary artery disease (CAD) and stroke is closely linked to the presence of a number of risk factors (RFs). These RFs when present will increase the chance of an individual for developing a CV event e.g. myocardial infarction, angina, stroke or coronary death.
- Many of the RFs are related to lifestyle and therefore can be modified while others are genetically determined and unmodifiable. Both genetic and environmental factors may co-exist.
- The chance of developing a future CV event are increased when more than one RF is present. A single RF unless of a very high level (e.g. very high BP or very high plasma cholesterol) is generally not enough to produce a CV event. However, there is a tendency of CV RFs to cluster i.e. more than one RF is usually present in the same individual.
- Eighty percent of coronary events are due to major modifiable RFs such as cigarette smoking, diabetes, hypertension, dyslipidemia (increase in plasma LDL-cholesterol and/or decrease in plasma HDL-cholesterol), obesity, sedentary lifestyle and psychosocial stress. Unmodifiable RFs include advancing age, male gender and a strongly positive family history of premature ASO CV disease.
- Prevention of ASO CV disease and delaying the development of CV events is possible through control and treatment of modifiable CV RFs.
- Although the outcome of prevention is not immediate like the results of treating acute conditions, yet on the long run it is more cost effective. Controlling hypertension and dyslipidemia, tobacco elimination and healthy diet improves disability, delays or prevents development of coronary events, stroke and death. Consequently the need of dialysis, and revascularization will decrease.
- Prevention is better than cure, and when possible we should help people avoid developing heart disease in the first place.

## RATIONALE FOR EGYPTIAN GUIDELINES

- A number of guidelines on prevention of atherosclerotic cardiovascular disease are developed by western and international societies.
- In third world countries and in economically disadvantaged communities there are no cardiovascular prevention guidelines.
- National and regional guidelines are affected differently by considerations of cost, priorities in health care and prevalence rates of different cardiovascular risk factors.
- Clinical guidelines for the prevention of cardiovascular diseases developed in wealthy countries are inappropriate for most of the world's populations.
- In rich countries, where there is a viable health insurance system and various payment organizations, guidelines particularly for initiation of prevention drug therapy are largely "science based" and cost considerations are given less attention.
- In developing countries, resources for clinical prevention are severely limited. In these countries, cardiovascular disease prevention, if necessary, must give way to other health priorities.
- Guidelines for developing countries should, therefore, make a compromise between the optimal science based approach and the minimal affordable policy.
- Furthermore, there are difference in racial susceptibility, national life style and prevalence of cardiovascular risk factors among different countries.

### NEED FOR EGYPTIAN GUIDELINES

1. In Egypt, resources for primary prevention are severely limited.
2. Cost considerations are given priority since largely science-based guidelines (USA and Europe) are unaffordable. Risk factors treatment thresholds, goals and use of drug therapy should, therefore, be modified. Egyptian national health care system will not pay for expensive drugs used in primary prevention, even in high-risk individuals. Therefore, recommendations for long term prevention based on guidelines from USA or Europe can not be accepted because of cost consideration.
3. Available cardiovascular risk predictive equations and scoring systems (e.g. Framingham, SCORE) are tedious and may not be applicable equally to Egyptian population.

## WHAT IS SPECIAL ABOUT EGYPTIAN GUIDELINES

- Three factors were considered in the development of the Egyptian guidelines. These influenced the scope, dimensions, and many of the statements in the document:
  - A. Population characteristics.
  - B. Egyptian government and health system policies.
  - C. Egyptian environment.

### A. Population Characteristics

1. Low income and high rates of poverty (average income per capita in Egypt is low).
2. High illiteracy rates particularly among rural women.
3. High prevalence rates of some cardiovascular risk factors (CV RFs) e.g. cigarette smoking, obesity, hypertension and diabetes (Egyptian NHP 1991-1994).
4. Misinformation about health and diet:
  - a. Obesity is a sign of good health, prosperity and sexual attraction among some Egyptian women.
  - b. Red meat is essential for energy, resistance to disease and sexual vigour.
5. Increased psychosocial stress due to overcrowding, unemployment and poor housing will create negative emotions of depression, anger and hostility. When these are complicated by illiteracy, there will be difficulty in health education, lifestyle modification and behaviour changes.
6. Cultural and social traits make involvement of women in exercising or physical activity sometimes unacceptable.

### B. Egyptian Government and Health System Policies

1. Resources for primary prevention are limited.
2. Priority in spending is given to care of acute conditions.
3. Concept of RFs and CV prevention is not well understood among health professionals. Medical school training provides limited information in these areas. RFs scoring charts and tables are not known by the majority.
4. Health care system can not afford to pay for expensive drugs such as statins and ACE-Is used in either primary or secondary prevention.
5. Legislations against smoking and harmful palm oil use do not exist or are difficult to implement.
6. Majority of Egyptians purchase medications out of pocket.

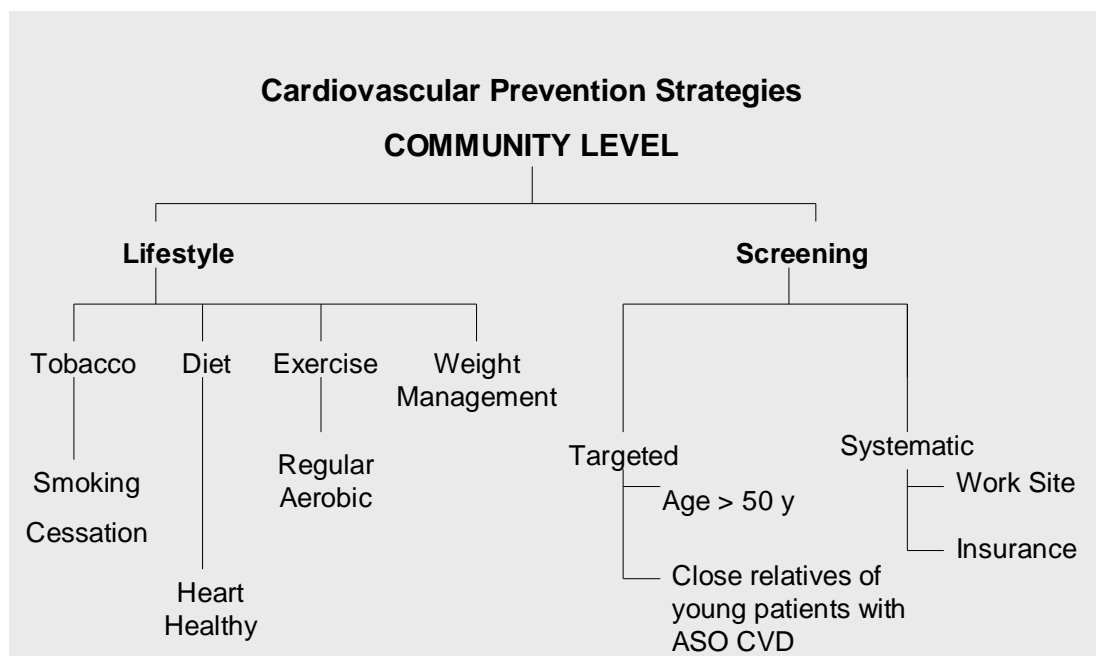
### C. Egyptian Environment

1. Healthy foods such as fruits, vegetables, legumes (lentils and beans) and whole grain bread are available at reasonable prices (see appendix).
2. Mild weather conditions will encourage out-door sports and physical activity.
3. Religion has a very strong influence and can shape the behaviour of the public in right direction if it has the correct information.

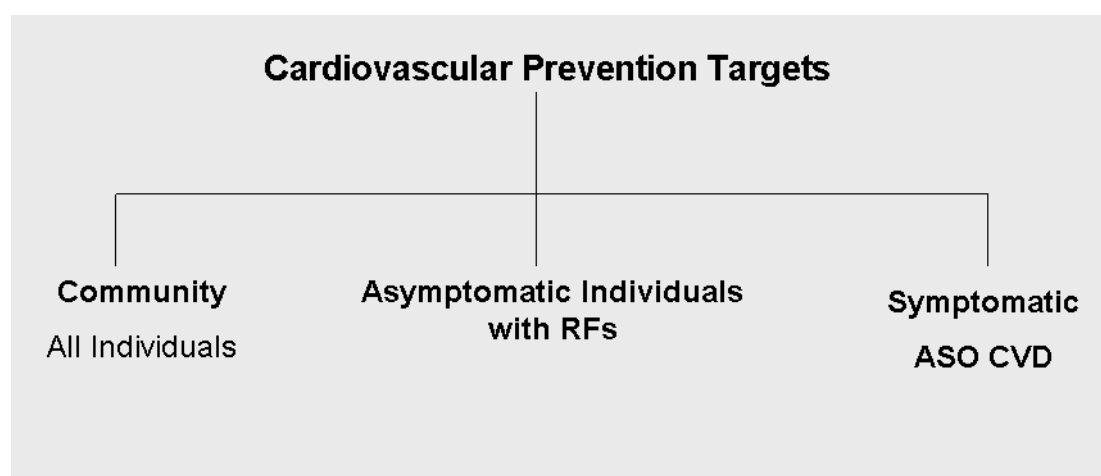
### Scope of Guidelines and Main Features

1. Lifestyle change, public awareness and education received high priority.
2. Dietary approaches were stressed and given more space because of the affordable healthy foods in Egyptian environment (see appendix).
3. Community and public health prevention strategies were reinforced and outlined whenever possible while addressing lifestyle and major risk factors modifications.
4. Thresholds for initiation of pharmacologic therapy and targets of risk factors levels were higher than those reported in Americans or European guidelines. We realize that this may not be a scientific approach, yet there is no point in designing guidelines that are not applicable and not affordable to the majority of the population. There is strong evidence that some lowering in BP is better than no change, similarly even small reduction in plasma LDL-C can be beneficial. At both the individual level and health care system, the long-term prescription of expensive drugs is doomed to fail. Discontinuation of drug therapy and lack of compliance are very common and a main reason is the cost.
5. Risk assessment was based on the number of risk factors and presence of established ASCVD. Charts, tables and risk scoring systems were not tested in the Egyptian population and the majority of physicians are not familiar or aware of them.
6. High prevalence rates of hypertension, obesity, cigarette smoking and diabetes among Egyptians dictated a more detailed discussion of these risk factors in the guidelines.

## CARDIOVASCULAR PREVENTION STRATEGIES



- There are two types of CV prevention strategies, one is addressing the whole population where the aim is to lower the incidence of CV RFs in the whole community (public health or population strategy) and the second is directed to individuals at high risk (individual or high risk strategy).
- *The population strategy* depends on public education of healthy lifestyle, government legislations to develop a healthy smoke-free environment and promotion of healthy food through co-operation with food industry.
- *The high risk individual strategy* depends upon the evaluation of individuals seen in clinical practice, identification of persons at increased CV risk and treating the modifiable RFs.  
The aim of primary prevention is to identify early those individuals who are at risk of developing ASO CVD.



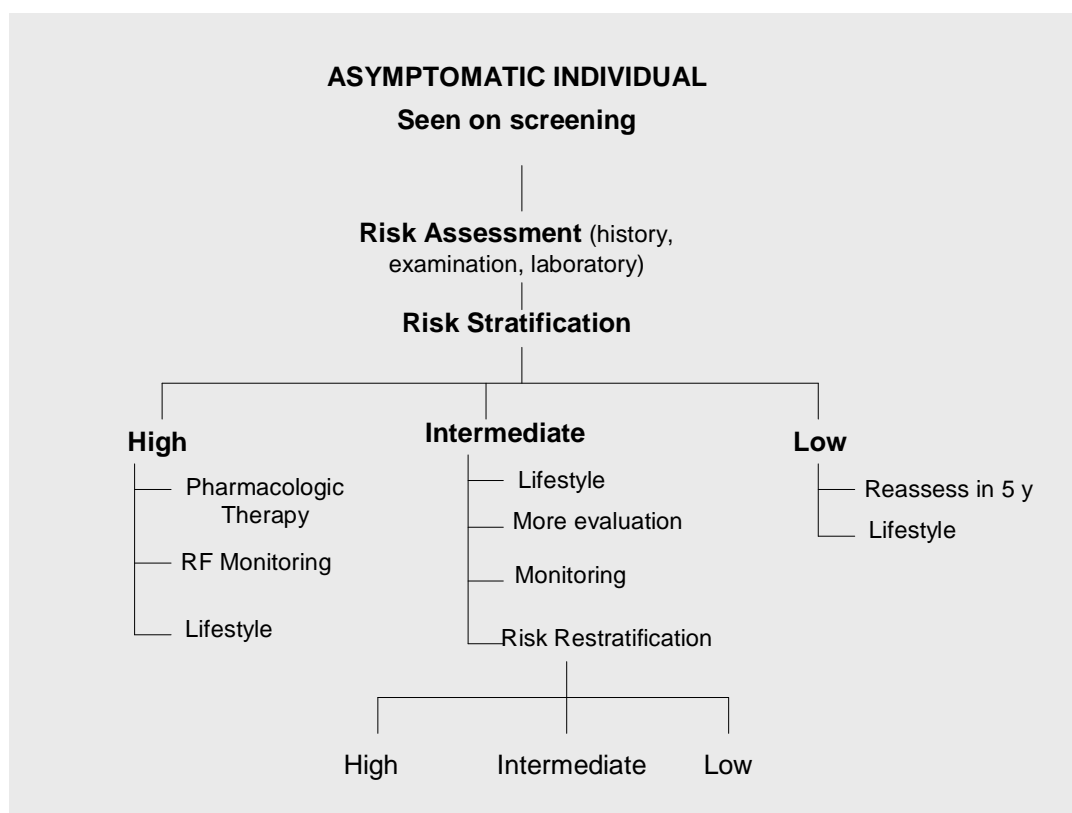
## ASSESSMENT OF CARDIOVASCULAR RISK

- Individuals at increased risk of developing future CV events should be the first target in any CV prevention program.
- Risk assessment depends on taking a detailed history of current or previous CV events (angina, infarction, claudication, transient ischemic attacks), family history of premature atherosclerotic CVD in first degree relatives, history of smoking, diabetes, HTN and physical activity. Presence of obesity (particularly the abdominal type characterized by increased waist circumference), presence of manifestations of ASO disease (e.g. peripheral artery disease, abdominal aortic aneurysm, carotid bruits) and signs of left ventricular hypertrophy (LVH) should be carefully searched for (table 1). When laboratory facilities are available an electrocardiogram (ECG), urine examinations for proteinuria and blood tests for sugar, lipid profile (plasma cholesterol, HDL-C) and creatinine are performed (table 2).

Table (1): Atherosclerotic Cardiovascular Risk Factors

Risk Factor	Criteria
§ Age	> 50 years in males and > 60 years in females
§ Hypertension	No treatment SBP $\geq$ 160 mmHg and/or DBP $\geq$ 95 mmHg on 3 measurements. Treatment SBP $\geq$ 140 mmHg and/or DBP $\geq$ 90 mmHg
§ Cigarette Smoking	Current or during the past 5 years
§ Hyperlipidemia	TC $\geq$ 240 mg, LDL-C $\geq$ 160 mg/dl on 2 measurements
§ Low HDL-C	< 40 mg/dl on two measurements
§ Diabetes Mellitus	FPG $\geq$ 126 mg/dl or PPG $\geq$ 200 mg on 2 measurements
§ Obesity	BMI $\geq$ 30 kg/m <sup>2</sup>
§ Family History (first degree) of premature ASO CVD	Female relatives < 60 years, male relatives < 50 years
§ Raised Serum Creatinine	> 1.6 mg/dl
§ Left Ventricular Hypertrophy	ECG criteria

- The role of the rapidly growing list of evolving or non-traditional risk factors in primarily prevention is not established. These include lipid abnormalities (lipoprotein(a), small LDL-C and HDL-C particles), coagulation abnormalities (platelets function, plasma fibrinogen and other coagulation factors), metabolic defects (hyperhomocysteinemia), inflammatory markers (hsCRP and interleukin-6) and air pollution.



- Based upon the results of history, clinical and laboratory evaluation individuals can be categorized into 3 groups:
  1. *High risk* where the probability of developing a CV event in the coming 5 or 10 years is very high. The threshold for high-risk based on fatal cardiovascular events is defined as  $\geq 5\%$  in 10 years (European Society of Cardiology Guidelines).
  2. *Intermediate risk* where the chances of developing an event is less than the high risk group.
  3. *Low risk* includes individuals who have an optimal cardiovascular risk profile i.e. young age, ideal body weight, normal blood pressure (BP) ( $\leq 130/80$  mmHg), optimal plasma lipid profile (LDL-C  $< 130$  mg/dl and HDL  $> 50$  mg/dl) and no history of smoking or diabetes.
- *High risk* individuals should be identified and treated aggressively through lifestyle modification and pharmacologic therapy.
- The following individuals belong to the high risk category:
  1. Established ASO-CVD:
    - a. Coronary: MI, angina, revascularization procedures (CABG, PCI).
    - b. Cerebrovascular: stroke, TIA
    - c. Peripheral arterial disease.
    - d. Abdominal aortic aneurysm.
  2. Diabetes mellitus in patients above the age of 50 years when there is microalbuminuria or additional RFs.

3. Elderly individuals (> 65 y) with more than one major risk factor (e.g. hypertension, dyslipidemia, cigarette smoking, obesity, positive family history).
  4. Very high level of a single RF e.g. BP  $\geq$  180/110 mmHg, LDL-C  $\geq$  240 mg/dl, total cholesterol  $\geq$  320 mg/dl.
  5. Multiple RFs (more than 3 of atherosclerotic cardiovascular risk factors in table (1)).
- *Intermediate risk*
    1. Multiple RFs ( 2-3 of the previous RFs)
    2. Elderly individuals (> 65 y) with no or a single RF.
    3. Presence of the metabolic syndrome (abdominal obesity i.e. waist circumference > 94 cm in men and > 80 cm in women in addition to two or more of the following: fasting blood sugar > 110 gm/dl; BP > 130/80 mmHg, plasma triglycerides > 150 mg/dl and HDL-C < 40 mg/dl).

In the intermediate risk group, further evaluation is optional for risk re-stratification. Blood tests for inflammatory markers (hsCRP), urine for microalbuminuria, ECG-stress testing, echocardiography for LVH, imaging for coronary calcification and for carotid intimal-medial thickness and measuring the ankle-brachial pressure differences. Because of their cost, these tests are seldom performed.

- *Low risk:*  
Individuals in this low risk category had no RFs or just one RF of mild to moderate intensity.
- *Factors contributing to increased CV risk:*
  1. Sedentary lifestyle and lack of physical activity.
  2. Increased psychosocial stresses: poverty, unemployment, social isolation, poor family relations, stressful job conditions.
  3. Impaired glucose tolerance and raised triglyceride levels.

Table (2): Assessment of Cardiovascular Risk

History	Physical Examination	Laboratory
§ Angina	§ Obesity	§ ECG
§ MI	§ Waist Circumference	§ Blood Sugar
§ Stroke	§ BP	§ Lipid Profile
§ TIA	§ LVH	§ S. Creatinine
§ PCI, CABG	§ Abdominal Aorta	§ Microalbuminuria
§ Claudication	§ Peripheral Arteries	
§ Family history	§ Carotid Bruits	
§ Smoking		

Risk Scoring Systems

- Another approach for CV risk assessment based upon epidemiologic studies in USA (Framingham) and Europe (SCORE) using risk charts and assigning a number of points for each RF. This approach is not practical or familiar to Egyptian community, furthermore, it was not tested in the Egyptian population.

### Methods for Prevention of ASO CVD

1. Lifestyle modification: Sep 2006
2. Major risk factors interventions: Jan 2007