CARDIO VASCULAR RISK REDUCTION

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ABSTRACT:

An account is given of recent literature regarding the major cardiovascular risk factors. It considers high blood pressure, high blood cholesterol smoking, as well as insulin resistance and, its metabolic consequences. The focus is on the current available evidence in terms of causal associations of these rich factors with the occurrence of cardiovascular disease, and the evidence of the benefits of risk factor lowering. The multiplicative effect of risk factors and their multifactorial role in the genesis of cardiovascular disease is now firmly established and, will affect the mode of approach preventive measures, The main preventive options currently available are twofold, a population-wide approach and a high risk, approach. The suitability of primary health care as one of the main providers of preventive care is today widely acknowledged. The need for cardiovascular risk assessment be multifactorial and made in terms of overall actual risk is of paramount importance. The implications of this overall issue for countries like those of the Middle East, here the prevalence of cardiovascular disease is on the rise, are of great concern.

KEYWORDS:

Hypertension, coronary heart disease, stroke mind-body therapies, cardiovascular risk.

INTRODUCTION:

For the past 100 years, the trajectory of cardiovascular disease (CVD) has followed the path taken by epidemiological transition and in line with global economic development. By the mid-20th century, CVD had become the leading cause of mortality and morbidity in Western developed countries. Toward the end of the 20th century, CVD has transitioned to be the leading cause of premature mortality and morbidity worldwide, with 80% of CVD mortality originating from lower-income countries.2-4 Individuals growing up in a developing country nearly 50 years ago will recall that myocardial infarction and cardiac surgery at that time were uncommon and occurred only in a few government ministers, political leaders, and other well-to-do individuals who presumably had adopted a more "western" lifestyle. The rapid transition of CVD from a disease of developed countries to occurring globally, with increasing prevalence in lower-income countries is

complex and reflects the extraordinary pace that society has taken. Instead of a discussion covering all perspectives of global CVD, this review. reflects a perspective from populations of developing countries in the midst of economic development, evolution of CVD, and the contribution of risk factors to disease development.

CARDIOVASCULAR RISK FACTORS:

High Blood pressure:

High blood pressure is preventable and treatable. Because hypertension is a major risk factor for cardiovascular disease, many deaths can be prevented if hypertension is prevented from developing or is detected early and managed properly.

Primary prevention:

This refers to actions that can be taken prior to the onset of hypertension through lifestyle modification.

- Maintain normal body weight.
- Avoid high salt diet.
- Engage in regular aerobic activity.
- Limit alcohol consumption.
- Consume diet rich in fresh fruits and vegetables.
- Replace saturated fat acids with polyunsaturated fats.
- Stop smoking.

Secondary prevention:

This refers to actions which halt the progress of hypertension at its initially stage and prevents complications through early detection and proper management.

Actions:

- Regular blood pressure screening.
- Lifestyle modification.
- Early initiation of treatment and assurance of compliance.

Tertiary prevention:

- This refers to measures used during the late stage of the disease to limit disease progression and clinical disease complication. after overt clinical hypertension manifest.

Actions:

- Lifestyle modifications.
- Treatment of hypertension and any target organ damage with consideration of compliance, adherence, and concordance.
- Concomitant treatment of diseases developed secondary to hypertension[1].

High Blood Pressure

BP Thresholds and Recommendations for Treatment

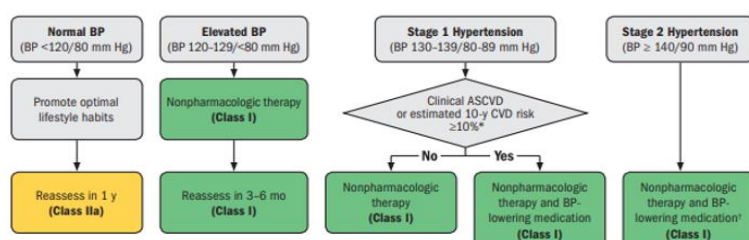| Normal BP (BP <120/80 mm Hg)	Elevated BP (BP 120-129/<80 mm Hg)	Stage 1 Hypertension (BP 130-139/80-89 mm Hg)		Stage 2 Hypertension (BP ≥ 140/90 mm Hg)
Promote optimal lifestyle habits	Nonpharmacologic therapy (Class I)	Clinical ASCVD or estimated 10-y CVD risk ≥10%*		
		No	Yes	
Reassess in 1 y (Class IIa)	Reassess in 3–6 mo (Class I)	Nonpharmacologic therapy (Class I)	Nonpharmacologic therapy and BP-lowering medication (Class I)	Nonpharmacologic therapy and BP-lowering medication (Class I)

Fig:1.Thresholds and Recommendations for treatment.

HIGH CHOLESTROL:

In order to estimate whether lowering of blood cholesterol could actually reproduce the results of their earlier overview, Law et al pooled the results of l0 large prospective (cohort) studies, three international prospective (epidemiological) studies and 28 randomised controlled (interventive) studies. The l0 cohort studies included 494,804 men and recorded 18,811 CVD events, whereas the 28 randomised clinical trials included 46,254 men and recorded 4241 events. The analysis of the l0 cohort studies concluded that a l0% (0.6 mmol) reduction in total cholesterol translates into a 50% reduction in the risk of CHD at the age of 40, successively diminishing in benefit as age increases, to 40% at 50 years and 30% at 60 years of age.

High density lipoproteins the HDL is also known as good cholesterol because it picks up cholesterol and takes it back to the liver for disposal.

In general, high level of HDL helps to reduce the risk of heart disease.

LDL low density lipoproteins cholesterol, sometimes called" bad" cholesterol.

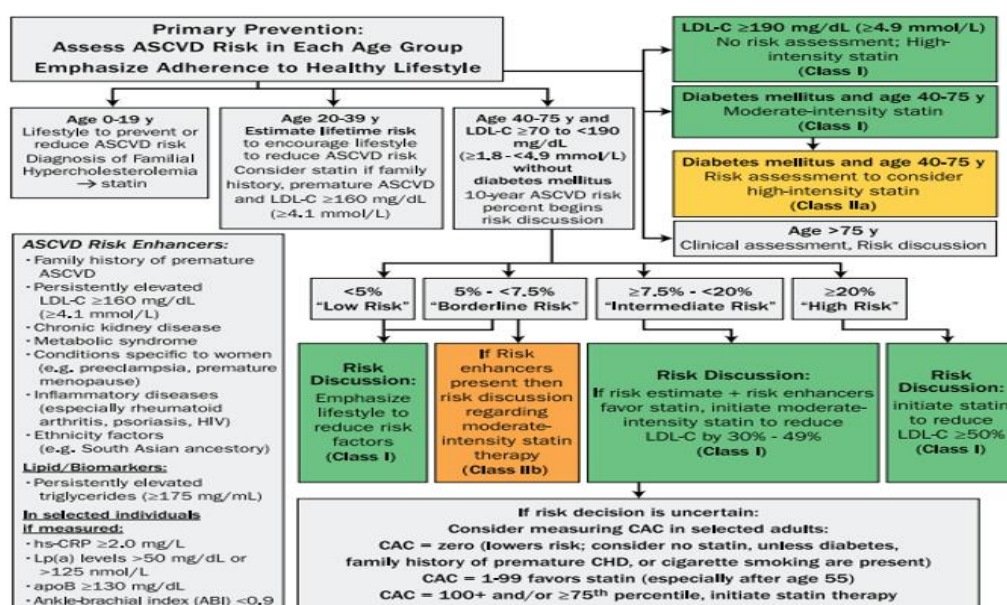LDL carries cholesterol to the parts of your body that need it.[2].

Fig:2 Primary prevention of high blood cholesterol.

DIABETES:

Insulin resistance:

In general, insulin resistance can be due to a preceptor, receptor, or post receptor abnormality . One signalling pathway for insulin and IGF-I is the phosphatidylinositide 3-kinase (PI3 -kinase) system. Upon binding to their receptors, there is autophosphorylation of the b-subunit, which mediates noncovalent but stable interactions between the receptor and cellular proteins (1). Several proteins are then rapidly phosphorylated on tyrosine residues by ligand bound insulin receptors, including insulin receptor substrate-1 (IRS-1) . IRS docking proteins bind strongly to the enzyme PI3 -kinase , a heterodimer consisting of a p85 regulatory subunit and a p110 catalytic subunit, via SH-2 domain interaction with the p85 subunit . Insulin and IGF-I stimulation increase the amount of PI3 -kinase associated with IRS, and the binding process is associated with increased activity of the enzyme. Activation of the enzyme is crucial for transducing the actions of these peptides in cardiovascular (CV) tissue as well as conventional insulin-sensitive tissues . The interruption of this pathway creates a resistance to the actions of insulin/IGF-I in stimulating vascular nitric oxide (NO) production, CV cation transport mechanisms, as well as glucose transport in classically sensitive

tissues such as muscle and adipose tissue. PI3-kinase mediates the increases in NO, Na1 pump, K1 channel, and calcium (Ca21) myofilament sensitivity by increasing the trafficking and translocation of NO synthase and cation pump units glucose transporters. Therefore, resistance to the actions of insulin and IGF-I in these tissues occurs whenever there is reduced PI3 -kinase activation.[3]

OBESITY:

The growing prevalence of obesity and type 2 diabetes in the United States has attracted the attention and concern of the medical profession, the media, policymakers, and the American public. Recent statistics from the Centres for Disease Control and Prevention indicate that nearly two thirds of American adults are overweight (body-mass index [the weight in kilograms divided by the square of the height in meters], greater than 25) and more than 30 percent are frankly obese (body-mass index, greater than 30), that nearly 8 percent are diabetic, and that 24 percent have the metabolic syndrome. The metabolic syndrome is an ominous combination of visceral obesity, atherogenic dyslipidaemia (low levels of high-density lipoprotein [HDL] cholesterol and elevated levels of triglycerides), hypertension, and glucose intolerance that contributes to insulin resistance and a heightened risk of diabetes and cardiovascular disease.[4]

SMOKING:

Smoking increases mortality from all causes and has a crucial role in atherosclerotic cardiovascular disease (ASCVD). Active smoking and second-hand smoke exposure determine more than 30% of coronary heart disease (CHD) mortality. The exact mechanisms of cardiovascular damages are not well known, but the detrimental effect of smoking on endothelial function has long been recognized. Smoking elicits oxidative processes, negatively affects platelet function, fibrinolysis, inflammation and vasomotor function; all these proatherogenic effects double the 10-year risk of fatal events in smokers compared to nonsmokers. An intriguing issue about smoking is the vulnerability of female gender. The mortality from cardiovascular diseases (CVDs) is higher in female than male smokers and female smokers show a 25% higher risk of developing CHD than men with the same exposure to tobacco smoke.[5]

SEDENTARY LIFESTYLE:

Reducing sedentary behaviour is an essential component of cardiovascular risk reduction leading a secondary lifestyle means engaging in little to no physical activity and spending extended periods sitting or lying down. This lack of activity can contribute to various cardiovascular risk factors and increase the likelihood of developing heart related disease and condition.

DIET AND NUTRITION:

Whole grains:

Whole grains represent unprocessed grains that contain the endosperm; the bran (the outer layer of the whole grain) and the germ are in the same relative proportions as they exist in the intact grain. In contrast, refined grains retain only the endosperm. Common whole grains include: whole wheat, whole rice, barley, corn, rice, oats, millet, sorghum, teff, triticale, canary seed, Job's tears, fanion, and wild rice. Dietary fibre consists of the remnants of edible plant cell polysaccharides, lignin, and associated substances resistant to hydrolytic digestion by the human alimentary enzymes.

They can be divided into: insoluble fibres, which includes cellulose and lignin, and is found in vegetables, some fruits, and whole grains (including the wheat germ); and soluble fibre, which includes fruits, pectin, guar gum, and mucilage. Soluble fibres are found in legumes and in oat brand. In a Cochrane review, 10 studies of 4–8 weeks duration that included 56–85 g of fibre in individuals with CHD or CHD risk factors were reviewed. Eating whole grains decreases total cholesterol levels by 7.7 mg/dL (95% CI 3.9–12) and LDL-C levels by 6.9 mg/dL (95% CI ,3.5–10.8).

In a meta-analysis of 67 controlled intervention trials, daily consumption of 2–10 g/day soluble fibres (mainly beta-glucan, psyllium, and pectin) lowered LDL-C by 2.2 mg/dL with no significant changes in HDL-C or triglycerides (TG). The American Heart Association (AHA), The American Dietetic Association and the National Cholesterol Education Program (ATP III) guidelines include a recommendation to increase dietary

soluble fibres intake. The question of whether added fibres used as a food supplement can similarly protect against CVD is still controversial. Despite this, the Food and Drug Administration.[6]

VEGETABLES AND FRUITS:

Although the botanic term "fruit" refers to the seeds and surrounding tissues of a plant, the foods that are commonly referred to as "fruits" for culinary purposes are pulpy seeded tissues that have a sweet (oranges, apples, pears, and blueberries) or tart (lemons, limes, and cranberries) taste. By culinary definition, "vegetables" are edible plant parts including stems and stalks (celery), roots (carrots), tubers (potatoes), bulbs (onions), leaves (spinach, and lettuce), flowers (artichokes), some fruits (cucumbers, pumpkin, and tomatoes), and seeds (beans, and peas). Vegetables are in general less sweet or tart than fruits.

The evidence that vegetables and fruits are associated with reduced CHD risk is based only on epidemiological data. In a meta-analysis of nine cohort studies (including 91,379 men, 129,701 women, and 5007 CHD events), CHD risk was lower by 7% for each additional fruit serving a day (RR 0.93, 95% CI 0.89–0.96; $p < 0.001$). The association between vegetable intake and CHD risk was heterogeneous and more marked for CV mortality (0.74, 95% CI 0.75–0.84; $p < 0.0001$) than for fatal and nonfatal myocardial infarction (0.95, 95% CI 0.92–0.99; $p < 0.006$). There are no interventional studies that specifically evaluated the influence of vegetables and fruits on CHD risk.[7]

Nuts:

Nuts (tree nuts and peanuts) are nutrient-dense foods with complex matrices rich in unsaturated fatty acids and other bioactive compounds: high-quality vegetable protein, fibre, minerals, tocopherols, phytosterols, and phenolic compound. By definition, tree nuts are dry fruits with one seed in which the ovary wall becomes hard at maturity.

This group includes almonds, hazelnuts, walnuts, pistachios, pine nuts, cashews, pecans, macadamias, and Brazil nuts. The consumer definition also includes peanuts, which botanically are groundnuts or legumes but are widely identified as part of the nut's food group.

In addition, peanuts have a nutrient profile similar to that of tree nuts. Although chestnuts are tree nuts as well, they are different from all other common nuts because of being starchier and having a different nutrient profile.[8]

Omega-3 and fish oil:

Polyunsaturated fatty acids are characterized according to the position of the first double bond. In omega-3 (also called ω-3 or n-3) fatty acids the first double bond is situated after the third carbon atom from the methyl end of the carbon chain.

Humans cannot synthesize short-chain fatty acids and therefore need to consume them in their diet. They include the plant-derived alpha-linolenic acid, and the fish-oil-derived eicosapentaenoic acid and docosahexaenoic acid.[9]

Omega-3 supplements

Various sources of omega-3 fatty acids are used as supplements for commercial use, including fish oil, flaxseed oil, and walnut oil. Although the FDA has concluded that omega-3 dietary supplements from fish are "generally recognized as safe", some have questioned the safety of fish oil supplements because some species of fish can contain high levels of mercury, pesticides, or polychlorinated biphenyls (PCBs).

Most fish oil supplements undergo purification processes and do not appear to contain these substances in appreciable quantities. Many clinical trials have used an ethyl-ester form of omega-3 fatty acids, which may affect the product's bioavailability and metabolism. Commonly used doses of omega-3 supplements (up to 1 g daily) do not appear to have significant side effects. However, larger doses may cause minor gastrointestinal upsets, worsening of glycemia control, and a rise in LDL-C levelss.[10]
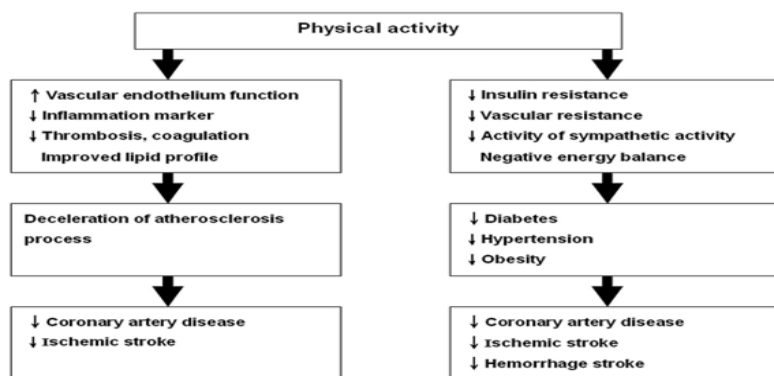
PHYSICALACTIVITY:

Fig:3 Physical activity

There is strong scientific evidence that regular physical activity reduces the risk of CVD and other chronic illnesses in older adults. The current recommendations from the American Heart Association and the American College of Sports Medicine for older adults is as follows: physical activity should be primarily aerobic, supplemented by strengthening activity, flexibility, and balance exercise.

The intensity of physical activity should be moderate or vigorous intensity. The so-called moderate-intensity aerobic physical activity involved a moderate level of an effort relative to an individual's aerobic fitness. On a 10-point scale, where sitting is 0 points and all-out effort is 10 points, moderate-intensity activity is 5 points or 6 points and produces noticeable increases in heart rate and breathing. On the same scale, vigorous-intensity activity is 7 points or 8 points and produces large increases in both heart rate and breathing. The duration of physical activity should consist of a minimum 30 minutes on most, preferably on all days of the week36. Frail elders and those restricted because of disease activity can also gain health benefits when moving from an "inactive" status to performing "some activities." Physical activity should be tailored to meet an individual's needs and ability, which is especially for frail and older adults. Training programs must emphasize safety, and a priority strategy should be implemented to increase daily activities and to develop a more active lifestyle. Such an activity should integrate daily walking or other activities as they become tolerated. Thus, except where such advice is contraindicated, older adults should be encouraged to be physically active.[11]

SMOKING CESSATION:

Tobacco smoking:

Smoking is 1 of the 2 most important risk factors for CVD, but data on tobacco are largely from developed Western countries. The INTERHEART and other studies have extended these findings to developing countries and showed that various forms of tobacco use (cigarettes, pipes, bodies, and chewing) were harmful, and accounted for a PAR of 44.0% in men and 16.0% in women (36% overall). Global consumption of cigarettes has steadily risen in the 20th century. Currently, consumption is levelling off and even decreasing in some high-income countries, but increasing in low-income and middle-income countries.

The harmful effects of tobacco use on CVD, cancers, and total mortality were mainly observed from cigarette smoking in Western countries. Other major studies have reported on the prevalence of tobacco use in India, China, the Asia-Pacific region, Mexico, Cuba, and Russia. Tobacco provides no physiological or pharmacological benefit to users.[12]

STRESS MANAGEMENT:

Cardiovascular disease (CVD) is the leading cause of death in the United States and the world. Blacks suffer from disproportionately high rates of CVD morbidity and mortality. Substantial evidence indicates that psychosocial stress contributes to the onset and progression of CVD. The attributable risk associated with psychosocial stress factors across diverse populations is similar to traditional CVD risk factors. Psychological distress factors, including depression, anger, hostility, and anxiety, predict CVD clinical events.

The disparity in CVD in blacks may be related to disproportionate levels of psychosocial and environmental stress. Randomized, controlled trials of stress reduction using the Transcendental Meditation (TM) program

have reported decreases in CVD risk factors, surrogate end points, and mortality in blacks and the general population.

Stress reduction plays a significant role in cardiovascular risk reduction:

Exercise Regularly:

Physical activity is a powerful stress reducer. Regular exercise helps release endorphins, the "feel-good" hormones, which can improve mood and reduce stress levels. Aim for at least 150 minutes of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity exercise per week, along with muscle-strengthening activities on two or more days a week.

1. **Mindfulness and Meditation**:
   Mindfulness practices, such as meditation and deep breathing exercises, can calm the mind and reduce stress. These techniques help individuals focus on the present moment and become more aware of their thoughts and feelings, leading to a reduction in stress-related cardiovascular risk.

2. **Engage in Relaxation Techniques**:
   Relaxation techniques, such as progressive muscle relaxation, guided imagery, and yoga can lower blood pressure and promote a sense of calm, which is beneficial for heart health.

3. **Social Support and Connection**:
   Maintaining strong social connections and seeking support from friends, family, or support groups can help individuals cope with stress more efficiently. Talking to loved ones about worries and concerns can provide emotional relief and reduce cardiovascular risk.

4. **Time Management and Prioritization**:
   Effective time management helps individuals avoid overwhelming stress by organization their tasks, setting realistic goals and avoiding overcommitment.

5. **Get Adequate Sleep**:
   prioritize getting enough sleep and maintain a regular sleep schedule sufficient rest is crucial for managing stress and promoting overall cardiovascular health.

6. **Counselling and Therapy**:
   For individuals experiencing high levels of stress or facing emotional challenges, seeking professionals counselling or therapy can be beneficial. Therapist can provide coping strategies and emotional support, leading to reduced stress levels and improved heart health.

7. **Maintain Healthy Diet:**
   A balanced and nutritious diet can positively impact stress levels and cardiovascular health. Foods rich in omega -3fatty acids, fruits, vegetables, whole grains, and lean proteins can support the body's response to stress and contribute to a healthier heart.

8. **Limit Caffein and Alcohol**:
   Excessive caffeine and alcohol consumptions can contribute to stress and negatively affect heart health. Moderation is key when consuming these substances.

9. **Practice Gratitude:**

10. Cultivating an attitude of gratitude and focusing on positive aspects of life can help reduce stress and improve overall well-being.[13].

MEDICAL MANAGEMENT:

Drug Use in Secondary Prevention of CVD:

In the PURE study, at a median of 4.0-5.0 years before enrolment, 5650 individuals had a self- reported ischemic heart disease event and 2292 had strokes. Evidence-based cardiovascular drugs for secondary prevention were taken only in relatively low proportions by individuals who clearly had indications for treatment: antiplatelet drugs were taken by 25.3%, b-blockers by 17.4%, angiotensin-converting enzyme (ACE) inhibitors, or angiotensin receptor blockers by 19.5%, and statin drugs by 14.6% of participants.

High-income countries had the highest rate of use (antiplatelet drugs 62.0%, b-blockers 40.0%, ACE inhibitors 49.8%, and statin drugs 66.5%). Usage decreased with the decreasing economic status of the country, being lowest in low-income countries (antiplatelet drug use 8.8%, b-blockers 9.7%, ACE inhibitors 5.2%, and statins 3.3%). These generally low rates of use at 4-5 years after the events could be because of issues previously discussed.

SLEEP DURATION:

According to outcome-based recommendations issued recently by the National Sleep Foundation, the appropriate sleep duration for adults lies between 7 to 9 hours per night1. Notably, only 48% of the US adult population reports a habitual sleep time falling within that range2, while 26% average 6 to 7 hours of sleep/night, and 20% sleep less than 6 hours/ night.

Nevertheless, changes in sleep habits are not without consequences. Deviations from optimal sleep duration may pose a substantial threat to health, with the detrimental effects of abnormal sleep on physical and psychological well-being only beginning to be unrevealed.

Coronary heart disease:

Coronary heart disease (CHD), which comprises a spectrum of acute and chronic manifestations, remains the major cause of death worldwide20, with rising prevalence4. Abnormal sleep duration has been identified as a risk factor for CHD on the basis of epidemiologic studies, which show a cross-sectional relation consistent with a U-shaped curve21–24. Weighted prevalence of total CHD was higher in respondents of the behavioural Risk Factor Surveillance System (BRFSS) survey reporting either ≤6 hours/night (11.1%, 95% CI: 10.1–12.1) or ≥10 hours/night (14.8%, 12.0–17.6) than in the reference group sleeping 7 to 9 hours (7.9%, 7.3–8.5)22. When the clinical presentations of CHD are considered separately, a heterogeneous pattern of risk emerges. Both sleep lengths of 6 or less hours/night and 9 or more hours/night were associated with heightened odds for history of myocardial infarction in a Finnish population23 and in the NHIS cohort24, but only short sleepers has a significant adjusted prevalence of myocardial infarction.

AVOIDING HARMFUL UBSTANCES:

1. **Tobacco and smoking:**
2. Smoking is one of the most significant risk factors for cardiovascular disease.it damage blood vessels, increasing blood pressure, reduce oxygen levels, and promotes the formation of atherosclerotic plaques avoiding smoking and exposure to second hand smoke is crucial for cardiovascular risk reduction.
3. **Excessivealcohol**: While moderate alcohol consumption may have some cardiovascular benefits, excessive drinking can lead to high blood pressure, heart muscle damage, and other heart-related issues. Its best to limit alcohol intake to moderate level, which means up to one drink per day for women and up to two drinks per day for men.
4. **Illicit drugs:** These use of illicit drugs, such as cocaine or methamphetamine, can significantly increases the risk of heart attacks, strokes, and other cardiovascular issues. Avoid use of these substances altogether.
5. **Caffeine:** While cholesterol in foods has less impact on blood cholesterol levels compared to saturated and trans fats, it's still advisable to limit the intake of cholesterol -rich foods like egg yolks and organ meats.
6. **Stress and Anxiety:** Chronic stress and anxiety can negatively impact cardiovascular health. Practice stress-reducing techniques like mediation, yoga, deep, breathing exercise, or engaging in hobbies you enjoy.

Gender And Age Considerations:

Cardiovascular disease has a significant correlation with age, but varies in gender. In men, the risk profile of cardiovascular disease increases linearly over time and the atherosclerotic process is constantly evolving. Conversely, because oestrogen has a beneficial effect on the cardiovascular system, women during the fertile age can be protected from atherosclerosis.

However, the incidence of stroke among menopausal women increases significantly and the prevalence of hypertension in women over 75 years is also higher than that of men. In summary, women and men show similar cardiovascular characteristics, but the age-specific risk is apparently lower in women before the menopause.
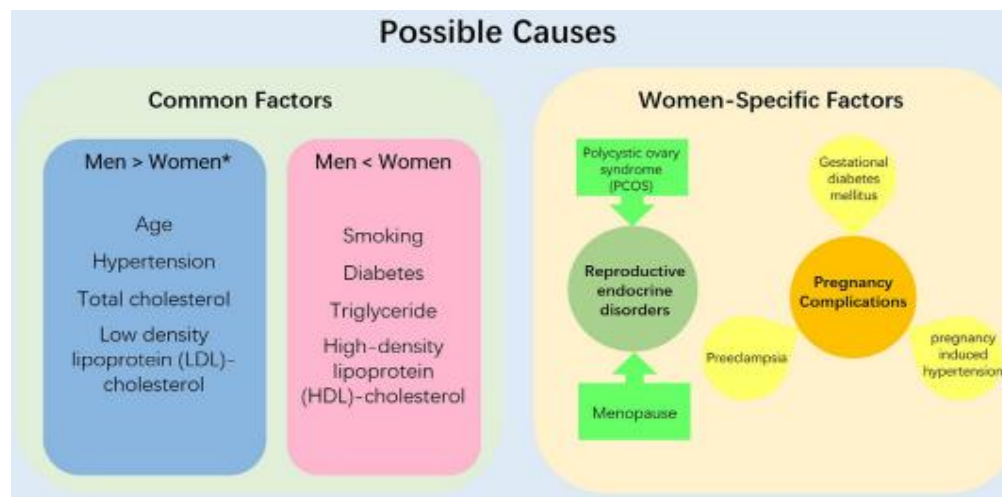

Fig:4 Gender and age considerations.

Body weight:

Many studies have proved the relationship between body weight and cardiovascular disease. Many large-scale analyses have shown that the association between body mass index (BMI) and CHD is broadly identical between men and women.

However, the risk for stroke associated with increments in BMI may be higher in men than in women. In the Prospective Studies Collaboration, each 5 kg/m2 increase in BMI was associated with an increased risk for CHD of 1.35 in women and 1.42 in men and with an increased risk for fatal stroke of 1.30 in women and 1.50 in men.[14]

CONCLUSION:

The trajectory of CVD worldwide has changed over the past 100 years, spreading mainly in developed countries in the initial stages to globally in recent years, with 80% originating from lower-income countries. Advances have been made in the understanding of CVD, identifying and avoidance of risk factors, treatment of the CVD, and changes in lifestyle modification Such advances do not occur evenly in all countries. Advances in therapy, identification of risk factors, and treatments occur unevenly and will need to be adapted to suit the particular populations to obtain the optimal outcomes. Recent evidence suggests that some of the existing dietary recommendations might be outdated and should be reviewed and if necessary, revised.

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