Ischemic Heart Diseases

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- It’s impairment of the heart function due to impairment of its blood flow compared to its needs, the main pathology involved here is atherosclerosis.
- **Morbidity & Mortality:**
- These have great differences among different populations, in USA IHDs represent the most common serious life-threatening illness among males & females, 0.5 million die and 2.5 million are hospitalized annually. There has been a decline in the trend of the disease mortality in USA & Canada (involving both sexes & all age groups); but not in UK & Sweden.

- **Sex Differences:**
- In general males are affected more often than females, there is excess risk of coronary heart disease in white men, while in non whites sex differences are less.
- Protection against IHDs among women due to:

1) Cardio protective effect of estrogen.
2) More cholesterol is carried as HDL which is protective against atherosclerotic changes.

Females have greater risk to develop angina pectoris with poorer survival post infarction. Also in developed countries females aging is higher than males aging due to IHDs.

- **Risk Factors:**
- The major risk factors are those of atherosclerosis:

1) High serum cholesterol.
2) High LDL.
3) Low HDL.
4) Smoking.
5) Hypertension.
6) Post menopausal state.
7) Male sex.
8) DM.
9) Family history.

Concerning these risk factors, keep in mind that:

- They are positively correlated with disease rates.
- They are strongly related with future risk of IHD.
- Differences in youth tend to stay in adulthood.
- The factors are related to the environment.
- Lowering these risk factors has direct effect on subsequent disease rate.
- They have an additive effect i.e. the more the risk factors, the higher the effect or chance of the disease.

- The major risk factors and other minor ones will be discussed below:
- **1. Diet:**

a. Fat: saturated fat and dietary cholesterol will contribute to IHDs. When we study countries with increased fat & calorie consumption and decreased physical activity we find increased mortality from IHDs.

b. Sugar: table sugar increases serum lipids.

c. Fibers: lack of fiber in diet increases serum lipids. The more the fiber in diet (e.g. cellulose) the higher the decrease in serum lipids.

d. Protein: the more the animal protein containing diet (meat & cheese), the higher the deaths from CHDs, this not due to their protein content but due to saturated fats.

- **2. Blood lipoproteins:**

Lipoproteins carry the proteins in the blood, HDL protects against atherosclerosis while LDL & VLDL give risk to atherosclerosis.

Increased serum cholesterol is necessary for the occurrence of severe IHD, but normal total serum cholesterol should not be taken as a reassurance if HDL is less than 40 mg/dL as there is strong relation between HDL and IHDs & there is increased risk of IHDs with high LDL & VLDL.

- **3. Alcohol:**
- The relationship between alcohol consumption and IHDs is somewhat strange. The effect of alcohol will contribute to: calorie excess, smoking, overeating, underactivity and hypertension. Alcohol is no more recommended now as a preventive measure.

- **4. Tobacco smoking:**

The association between smoking & IHDs is strong, causal and independent of other risk factors. Smoking will lead to increased heart rate, increased myocardial O_2 demand and decrease the carrying capacity of blood to oxygen leading to CHDs.

There is a fall of smoking among educated adults, but this is counterbalanced by the following facts:

a) Increased smoking trend in young ages.
b) Minimal changes among low socioeconomic states.
c) Heavy smokers of more than 25 cigarettes/day.
d) Increased failure rate among females in the antismoking campaign in USA.

- **5. Hypertension:**
- Both systolic & diastolic blood pressures are related to CHDs.
- **6. Diabetes mellitus:**
- There is no sex difference of CHDs among diabetics, but the risk of CHDs among diabetics is affected by physical activity, body weight, diet and lipids.

- **7. Body weight:**
- Weight reduction by increasing the physical activity will lead to increased HDL, decreased LDL & VLDL, decrease in insulin excretion and finally increase in cardiovascular efficiency “fitness”. The person is said to be obese whenever the fat content in the body is 25% in males and 30% in females.
- **8. Physical inactivity:**
- Automated occupations, motorized transport and sedentary life style predispose to IHDs. The relationship between physical inactivity and IHDs is dose related i.e. the more you increase the physical activity the more the protection against IHDs.

- **9. Stress:**
- Stressful life events and big emotional changes are associated with CHDs.
- **10. Oral contraceptives:**
- Oral contraceptive pills will give excess risk of infarction due to increased blood pressure, increased serum lipids and decreased glucose level.
- **11. Hereditary effect:**
- As in diabetes, hypertension, lipid profile, obesity and premature CHDs.

- **Ischemic Heart Diseases:**

The rates of occurrence of IHDs differ from one country to other, and even in the same country it differs from one community to other i.e. the rates in urban areas are higher than the rates in rural areas. The middle and older age groups have more incidence than youngs, in males more than females.

- **Causal & Risk Factors:**

1) Hypertension.
2) Increased serum cholesterol especially LDL.
3) Smoking.
4) Oral contraceptives (female, > 35 years, smoker).
5) Family history.
6) Obesity.
7) Diabetes mellitus.
8) Sedentary life style and decreased physical activity.
9) Psychological stress or response to stress.
10) Atherosclerosis.

- **Socioeconomic Importance of Cardiovascular Diseases:**

1) Cause premature loss of capacity because the patients become unfit for work.
2) This leads to socioeconomic problems in the community.
3) Loss of skilled personnel.
4) Prevention is difficult.

- **Prevention:**

1) Screening for the risk group.
2) Cholesterol control: dietary prevention requires establishing and maintaining food habits that insure lower animal fat intake, a decrease in serum cholesterol is associated with 5% decreased risk of IHDs.
3) Control of food habits is best begun in early adult life, before aging and increased risk.
4) Discouraging smoking habits, attention must be directed to members of the younger age group that have not yet acquired the smoking habit, as well as the present smokers.
5) Appropriate physical activity.
6) Health education especially high risk groups, about diet, therapy and life habits risk factors.
7) Hypertension control is very important to decrease the mortality from IHDs, detection and treatment of the greatest possible number of previously unknown hypertensive patients, and to keep the greatest number of hypertensive patients under control.

- Hypertension

- It’s a worldwide problem, it’s defined as a sustained elevation of diastolic, and in most cases systolic pressure in the systemic circulation with the cause being known or unknown.
- Diastolic pressure of 95 mm Hg or greater is accepted as criterion for adults aged 30 or over, 90-94 mm Hg (borderline), lower values are appropriate for teenagers and young adults.
- Morbidity, disability and mortality in persons with high blood pressure are caused by pathologic involvement of the arterial circulation of the heart, brain, kidney, abdomen and lower extremities.

- **Classification:**

1. Primary or essential hypertension (unknown causes), most cases are of this type. Essential hypertension becomes accelerated or malignant with high pressures and severe vascular disease.
2. Secondary hypertension: (known cause e.g. renal, endocrine, pregnancy).

- **Prevalence:**

It’s an important disease in the developed countries, leading to disability and premature death in the adult population. About 33 million adults aged between 18-74 had hypertension in USA.

Sex: the incidence is more among men than women, but by the age of 60 the frequency was comparable.

Race: blacks more than whites at any age, by the age of 60 about 55% of blacks have hypertension (for both sexes), compared to 39% of white males and 36% of white females.

Age: prevalence increases with age, in elderly 40-60% are affected, in adults 20%. The disease affects all socio-economic groups.

- **Aetiology of Hypertension:**

1. Primary (Idiopathic-Essential) hypertension:

In 95% of cases, there is no identifiable cause, various factors are involved, these include:

a) Genetic factors:

Significant correlation have been demonstrated in blood pressure of family members and it's been seen running in families.

a) Race:

Hypertension affects all races, but it's more common in blacks than whites.

a) Environmental factors:

There are possible factors including:

- Obesity.
- High intake of Na and low intake of K.
- High intake of saturated fat.
- Alcohol and smoking.
- Stress and anxiety.
- Socioeconomic state, it has higher prevalence in low socioeconomic groups.

- **2. Secondary hypertension:**

Occurs in about 5 %, an underlying cause can be identified and is mostly due to:

a) Renal hypertension:

- Acute glomerulonephritis.
- Chronic glomerulonephritis.
- Ischemia of the kidney.
- Chronic pyelonephritis.
- Renal artery stenosis.
- Polycystic kidney.

b) Endocrine hypertension:

- Adrenal: aldosterone secreting tumor (Conn's syndrome).

Adrenal medullary tumor (excessive formation of catecholamines).

Hyperfunctioning adrenal cortex (Cushing's syndrome).

- Pituitary: acromegaly.
- Contraceptive pills: particularly after 30 years of age.

c) Pregnancy associated hypertension e.g. pre-eclampsia.

d) Coarctation of the aorta.

- **Complicated hypertension:**

Unmanaged hypertension is considered as a major cause of morbidity and disability, through its many severe and serious complications, and is consequently an important cause of mortality.

1- Cardiovascular complications:

- Hypertensive heart disease and heart failure.
- Coronary heart disease: hypertension is a risk factor that enhances the formation of an atheromatous lesion.
- Coronary thrombosis and its sequelae.

2- Cerebral complications:

- Cerebral hemorrhage (intracerebral or subarachnoid): it's influenced by extent of systolic pressure and age of the patient.
- Cerebral thrombosis and recurrent stroke.
- Hypertensive encephalopathy: it's a rare complication in severe cases.

3- Renal complications:

- Malignant hypertension due to involvement of the kidney arterioles is characterized by retinopathy and proteinuria.
- Renal failure.

4- Ophthalmic complications:

- Retinopathy.
- Retinal hemorrhage.

- **Prevention & Control:**

A- **Preventive measures:**

Hypertension is considered as a health problem, in addition to being a risk factor for cardiovascular diseases. Since the vast majority of the causes are idiopathic (essential) the primary prevention can't be done. However, general preventive measures are related to:

1. Healthy life style and diet.
2. Exercise and increased physical activity.
3. Avoid smoking.
4. Healthy living condition and sanitary environment.

- **Control measures:**

The following steps may be used to control the disease properly:

1. Detect and treat the greatest possible number of previously unknown hypertensive patients.
2. Keep the greatest number of hypertensive patients under control by proper follow up and treatment.
3. Put standard methods to be used by general practitioners in the diagnosis and treatment of hypertension.
4. Gather new information about the occurrence and treatment of hypertensive patients.
5. Register all hypertensive patients by record and properly manage them.

- **Important Points:**
- Prevalence increases with age.
- All socioeconomic groups are affected, although it's a disease of modernization.
- Generally the estimated prevalence all over the world among adults is 20%, in some countries it is 30-40 % which is an alarming figure.
- Hypertension is associated with premature death due to its complications (MI, heart failure, stroke, uremia or dysrhythmias).
- Medical personnel should pay more attention to systolic rather than diastolic hypertension because the systolic pressure reflects the degree of wall sclerosis of the arteries.

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