

Ischaemic Heart Disease: An Overview to Heart Disease

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Abstract

Ischaemic Heart Disease is a condition that affects the supply of blood to the heart. The blood vessels are blocked due to the deposition of cholesterol plaques on their walls. This reduces the supply of oxygen and nutrients to the heart musculature, which is essential for proper functioning of the heart. This may eventually result in a portion of the heart being suddenly deprived of its blood supply leading to the death of that area of heart tissue, resulting in heart attack.

In 1963 the Ministry of Railways carried out a survey with a view to ascertaining the number of deaths due to ischismic heart disease among railway populations in different parts of the country. The method employed was to obtain data from all the railway zones on a proforma based on W.H.O. classification 420, for arteriosclerotic, including coronary heart disease.

The epidemiology studies have provided several key points of information related to the risk of developing IHD. First, several specific risk factors for IHD have been identified. Second, evidence that these factors are closely related to environmental and life-style changes implies that risk factors are potentially alterable. Third, these studies have stimulated further consideration and investigation of the basic mechanism of atherosclerosis. Angiographic studies have indicated a direct relationship between the risk factors and the severity of coronary disease.

Key-Word:- Ischaemic Heart Disease, oxygen, nutrient, W.H.O. epidemiology.

Introduction

Ischaemic Heart Disease is a condition that affects the supply of blood to the heart. The blood vessels are blocked due to the deposition of cholesterol plaques on their walls. This reduces the supply of oxygen and nutrients to the heart musculature, which is essential for proper functioning of the heart. This may eventually result in a portion of the heart being suddenly deprived of its blood supply leading to the death of that area of heart tissue, resulting in heart attack.

As the heart is the pump that supplies oxygenated blood to the various vital organs, any defect in the heart immediately affects the supply of oxygen to the vital organs like the brain, kidneys etc. This leads to the death of tissue within these organs and their eventual failure or death. Ischaemic coronary artery disease is a condition in which fatty deposits accumulate in the cells lining the wall of the coronary arteries. These fatty deposits build up gradually and irregularly in the large branches of the two main coronary arteries which encircle the heart and are the main source of its blood supply. This process is called atherosclerosis which leads to narrowing or hardening of the blood vessels supplying blood to the heart muscle. This results in ischemia (inability to provide adequate oxygen).

Coronary artery disease is a leading cause of mortality and morbidity in most developed countries. Many studies have found gender-related differences in the presentations, prevalence, and clinical outcomes of CAD. CAD first presents itself in women approximately 10 years later than in men, most commonly after menopause. Compared to women, men present with ST-segment elevation myocardial infarction (MI) more often and have a higher prevalence of CAD adjusted for age. However, younger women experience more adverse outcomes after MI and coronary artery bypass grafting surgery than men. A greater proportion of women than men with MI die of sudden cardiac arrest before reaching hospital. Previous reports have shown a 20% reduction in total mortality among patients randomized to exercise-based cardiac rehabilitation compared with controls receiving usual care. The outcome was however similar between men and women, although only 20% of all participants were women in many reports.

1) *Epidemiology*

United States:

IHD is a major cause of death for men as young as 35 to 44 years of age, and the mortality rate of IHD rapidly increases with age. In fact, 35% of all deaths among men 55 to 64 years of age are due to IHD. The differences in IHD rates between men and women are striking; the most recent data indicate that in the 35- to 44-year-old age group, the male IHD mortality rate is 5.2 times higher than the female mortality rate. In the 65- to 74-year-old age group, however, the increased risk of IHD mortality is only 2.4 times higher for men than for women.

Western European countries:

Studies of migrants and people of similar ethnic backgrounds in different countries indicate that environmental factors are more influential on IHD incidence than genetic factors.^{3, 4} For example, the IHD mortality rate for native Japanese men is low in comparison with US men of similar age (95 vs 715 per 100,000, respectively).

Hawaii and California:

The most encouraging information derived from epidemiological studies to date has been the recent evidence that, between 1968 and 1978, the US-adjusted mortality from IHD decreased by 26.5%. Although researchers have no definitive proof, most of the accumulated evidence suggests strongly that this decline is due to changes in life styles and living habits.⁵⁻⁸ Unfortunately, in most other countries, IHD rates are continuing to increase or are showing significantly smaller declines. The long-term prospective epidemiological studies have been helpful in identifying the characteristics and personal life-style habits that relate to the probability of developing IHD.

Epidemiological studies in India:

In 1963 the Ministry of Railways carried out a survey with a view to ascertaining the number of deaths due to ischemic heart disease among railway populations in different parts of the country. The method employed was to obtain data from all the railway zones on a proforma based on W.H.O. classification 420, for arteriosclerotic, including coronary heart disease. This ascertainment of deaths was done by the different units, by a search of individual hospital records and electrocardiograms, and matching these with mortality returns of the units concerned. An independent means of checking the degree of ascertainment was the death certificate books in which disease as named in W.H.O. international statistical classification is mentioned.

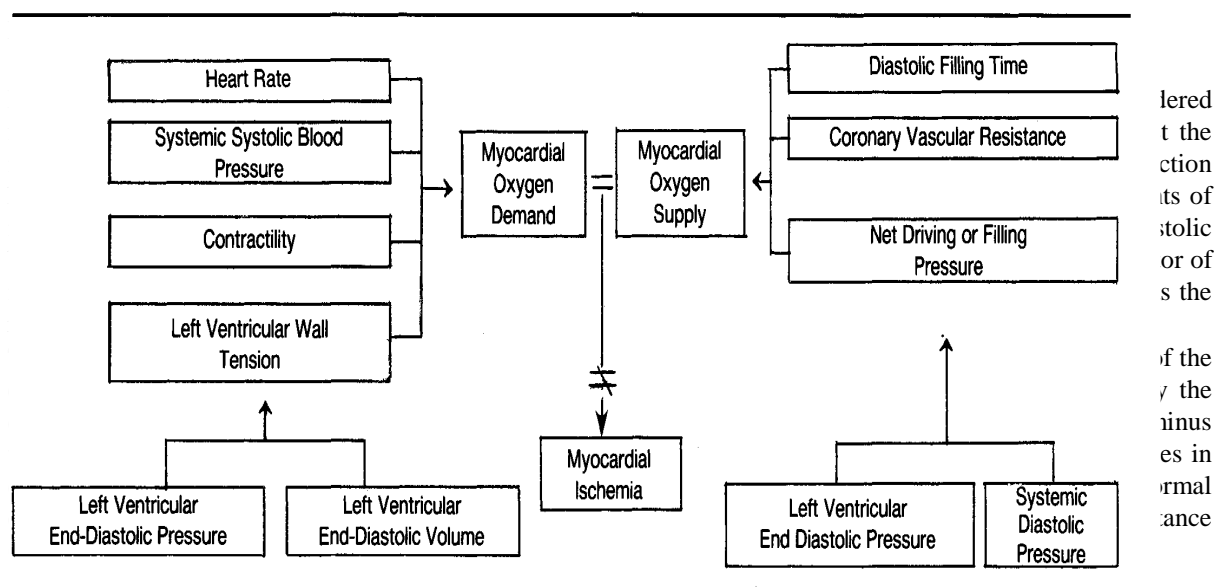
A final proof is provided by the data from two independent sources, namely the Employees' State Insurance Health Corporation (1957, 1958, and 1962) reported in part by Padmavati (1962), which pertains to non-railway industrial workers (Table 1), and in an indirect way by the data of Singh and Prakash (1964), from a teaching hospital in the Punjab, north India, both of which showed similar geographical trends. These extra sources of information make it improbable that the geographical differences noted by us could be due to bias in our data.

1.1) Etiology

Causes:

Numerous factors are responsible for the development of Ischaemic Heart Disease. The major risk factors are smoking, diabetes mellitus and cholesterol levels.

- Those with Hypercholesterolaemia (elevated blood levels of cholesterol) have a much higher tendency to develop the disease.
- There is also the theory that Hypertension is a risk factor in the development of Ischaemic Heart Disease, Genetic and hereditary factors may also be responsible for the disease.
- Males are more prone to Ischaemic Heart Disease. However, in post-menopausal women, the risk is almost similar to that of men. Stress is also thought to be a risk factor, though there has been a great deal of debate on this factor of late.
- The disease process occurs when an atheromatous plaque forms in the coronary vessels, leading to narrowing of the vessel walls and obstructing blood flow to the musculature of the heart.
- Complete blockage results in deficient oxygenation and nutrient supply to the heart tissues, leading to damage, death and necrosis of the tissue, which is known as Myocardial Infarction (heart attack).



2) CLINICAL MANIFESTATIONS

2.1) Chest Pain or Chest Discomfort :

Few symptoms are more alarming than chest pain. In the minds of many people, chest pain equals heart pain. And while many other conditions can cause chest pain, cardiac disease is so common - and so dangerous that the symptom of chest pain should never be dismissed out of hand as being insignificant.

2.2) Heart Palpitations :

Palpitations, an unusual awareness of the heartbeat, are an extremely common symptom. Most people who complain of palpitations describe them either as "skips" in the heartbeat (that is, a pause, often followed by a particularly strong beat,) or as periods of rapid and/or irregular heart beats.

- *2.3) Lightheadedness or Dizziness :*

Episodes of lightheadedness or dizziness can have many causes, including anemia (low blood count) and other blood disorders, dehydration, viral illnesses, prolonged bed rest, diabetes, thyroid disease, gastrointestinal disturbances, liver disease, kidney disease, vascular disease, neurological disorders, dysautonomias, vasovagal episodes

- *2.4) Syncope (Fainting/Loss of Consciousness) :*

Syncope is a sudden and temporary loss of consciousness, or fainting. It is a common symptom - most people pass out at least once in their lives - and often does not indicate a serious medical problem.

- *2.5) Fatigue, Lethargy or Daytime Sleepiness :*

Fatigue, lethargy or somnolence (daytime sleepiness) is very common symptoms. Fatigue or lethargy can be thought of as an inability to continue functioning at one's normal levels.

Diagnosis

Diagnosis of angina is a clinical diagnosis based on a characteristic complaint of chest discomfort or chest pain brought on by exertion and relieved by rest. Confirmation may be obtained by observing reversible ischemic changes on ECG during an attack or by giving a test dose of sublingual nitroglycerin that characteristically relieves the pain in 1 to 3 minutes.

- Certain tests may help determine the severity of ischemia and the presence and extent of the coronary artery disease.
- Diagnostic tests may include electrocardiogram (measures electrical activity of the heart), echocardiogram (measures sound waves), exercise-tolerance test, thallium stress test, blood studies to measure total fat, cholesterol and lipoproteins, X-rays of the chest and coronary angiogram.
- Surgical therapy is indicated when medical treatment has failed to relieve symptoms or when the Angiogram shows significant disease in the blood vessels.
- Coronary Angioplasty - dilating the blocked vessel by inflating a balloon inside the vessel and Coronary Artery Bypass Grafting (CABG) - replacing the blocked area of the vessel using a graft from the patient, may be done to relieve the blockage.
- The indications for bypass surgery are increasingly becoming limited. This is due to the growing realization that except in selected cases, bypass surgery only helps to improve the quality of life and relieve symptoms.

Prevention

Risk factors like a fatty diet, smoking; sedentary lifestyle and stress should be avoided, as they are the main areas of focus in prevention. Avoiding foods rich in saturated fats is vital to reduce lipid levels in the blood and to prevent arteriosclerosis. Adequate regular exercise is also essential.

3) Primary Prevention

The most successful programmes are those that, in a consistent and continuous way, combine various different measures, such as education, campaigns aimed at individual citizens, the promotion of healthier environments (e.g. smoke-free public spaces, healthy schools), financial incentives (e.g. taxes), legislative measures (e.g. food labeling, restrictions on marketing to children of foods/drinks that are high in fats, salt and sugar and low in essential nutrients), and initiatives addressing groups such as the food.

3.2) Secondary prevention

For high cholesterol and hypertension (high blood pressure), secondary prevention implies the detection of cases, either in the general population or in high-risk groups. The latter refers to groups for which a number of other risk factors have already been identified.

Treatment :

- Beta-blockers like Propranolol are also highly effective in relieving pain by reducing myocardial oxygen demand, mainly by decreasing the heart rate.
 - Calcium channel antagonists produce vasodilatation and relieve the symptoms by reducing the excitability and conductivity of cardiac muscle and by reducing blood pressure.
 - For patients with hypercholesterolaemia, drugs may be used to lower cholesterol levels.
 - Surgery to bypass coronary arteries (severe cases). End-stage coronary artery disease, even when no simple procedures will help, can still be cured with a heart transplant in rare cases.
 - With proper treatment, most patients will be able to lead normal and healthy lives. Treatment also involves advice regarding regular exercise, avoiding Good control of diabetes and hypertension.
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- Drug therapy with Nitrates, which dilate the diseased coronary arteries, administered sub-lingually are very effective in relieving the pain in a few minutes.
 - Drugs such as Isosorbide Dinitrate and Isosorbide Mononitrate belong to the category of Nitrates. These drugs are also used as a prophylactic to prevent the pain from occurring.

Non-Pharmacological Treatment

1. Limit unhealthy fats and cholesterol :
2. Choose low-fat protein sources :
3. Eat more vegetables and fruits :
4. Yoga Treatment for Heart Diseases :

Pharmacological Treatment

Many cardiologists regard combined administration of conventional anti-anginal medications (including nitrates, Bblockers and calcium channel blockers) to be a more rational approach to the management of patients with angina than single-agent therapy. The rationale for this therapeutic strategy is based primarily on our knowledge of the pathophysiology of myocardial ischaemia and the mechanism of action of the various anti-ischaemic drugs.

4) Classification Of Drug

Some of the major types of commonly prescribed cardiovascular medications are summarized in this section.

4.1) ACE Inhibitors

4.2) Diuretics (Water Pills)

4.3) Vasodilators

4.4) Digitalis Preparations

4.5) Beta Blockers

4.6) Blood Thinners

4.7) Angiotensin II Receptor Blockers

4.8) Calcium Channel Blockers

Conclusion

The epidemiology studies have provided several key points of information related to the risk of developing IHD. First, several specific risk factors for IHD have been identified. Second, evidence that these factors are closely related to environmental and life-style changes implies that risk factors are potentially alterable. Third, these studies have stimulated further consideration and investigation of the basic mechanism of atherosclerosis. Angiographic studies have indicated a direct relationship between the risk factors and the severity of coronary disease. Large prospective primary prevention trials have demonstrated that risk-factor reduction, specifically reduction in blood pressure and serum cholesterol decreases the chances of developing a future coronary event. Secondary prevention studies indicate that risk-factor reduction decreases the likelihood of coronary artery disease progression as measured by angiography and the chances of a repeat coronary event, including coronary death. These findings have important implications for physical therapists involved with either primary or secondary prevention clients. To design exercise programs aimed at risk-factor reduction, the therapist needs to be aware of the factors that influence myocardial oxygen supply and demand and be able to recognize an imbalance between supply and demand as manifested by symptoms, ECG abnormalities, abnormal blood pressure, and other clinical indicators of ischemia.

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4.1) ACE Inhibitors

Generic name	Brand name(s)
Captopril	Capoten [®]
Enalapril	Vasotec [®]
Ramipril	Altace [®]

Side effects and special instructions :

Some people develop a persistent cough and kidney problems. It's also common for people to feel weak or dizzy when they first take these drugs, due to the lowering of blood pressure

4.2) Diuretics (Water Pills)

Generic name	Brand name(s)
Hydrochlorothiazide	HydroDIURIL [®]
Chlorothiazide	Diuril [®]

Side effects and special instructions :

Some types of diuretics also remove potassium from the body. Diuretics can cause low blood pressure, kidney complications & excessive loss of potassium and fluid.

4.3) Vasodilators

Generic name	Brand name(s)
isosorbide dinitrate	Isordil [®]
Nesiritide	Natrecor [®]
Hydralazine	Apresoline [®]
Minoxidil	Loniten [®]

4.4) Digitalis Preparations

Generic name	Brand name(s)
Digoxin	Lanoxin [®]
Digitoxin	-

Side effects and special instructions:

For digoxin to be effective, patients must take the right amount. This means they will probably be given regular blood tests to see if their digoxin level is correct.

4.5) Beta Blockers

Generic name	Brand name(s)
Carvedilol	Coreg [®]

4.6) Blood Thinners

Generic name	Brand name(s)
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Warfarin	Coumadin [®]
Heparin	-

Side effects and special instructions :

People taking blood thinners can have nosebleeds, bleeding in the gums and easy bruising. It's important to report bruises and bleeding to the doctor right away.

4.7) Angiotensin II Receptor Blockers

Generic name	Brand name(s)
Losartan	Cozaar [®]
Valsartan	Diovan [®]

Side effects and special instructions :

Like other blood pressure-lowering medicines, angiotensin II receptor blockers may cause nausea, dizziness, headaches and low blood pressure.

4.8) Calcium Channel Blockers

Generic name	Brand name(s)
Amlodipine	Norvasc [®]

Table 1 Employees State Insurance Data

State	No of new cases Per 1000 insured person for 1958-59*	No of new cases Per 1000 insured Person for 1961-62
Punjab(ps)	0-22	0-64
Dehli(ss)	0-13	0-07
Rajsthan(ss)	0-54	0-16
Uttar Pradesh(ss)	0-11	1-15
Maharashtra(ps)	0-41	0-52
Maharashtra(ss)	0-22	0-89
West Bengal(ps)	0-90	0-59
Bihar	0-13	1-32
Madras(ss)	1-66	1-52
Madras	0-71	1-25
West Bengal(ps)	0-90	0-59
Mysore(ss)	4-42	0-44
All India	0-63	0-62

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