INTRODUCTION
Chapter-I

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"What is this life, if full of care,
We have no time to stand and stare."

What every single muscle in our body is meant to do, and we can feel where it is and how it's doing. It is thoroughly specific art, and unless we work at it rather seriously and often, it doesn't work for us. To use an old cliché, it becomes a way of life.

"Movement should be approached like life-
With enthusiasm, joy and gratitude- For movement is life, and life is movement- And we get out of it what we put into it."

Every body is beautiful. Every body is divinely inspired, superbly designed, awesome in the complex way it's put together and wonderful in the simple, economical way it works. Every body can be improved inside and outside, because the body potential is hardly ever realized.¹

Modern technology has lessened the physical demand of everyday activities like cleaning the house, washing clothes and

¹Ron Fletcher & Alan Ebert, "Movement Experience and Aging", Every Body is Beautiful. 61, Leesville, South Carolina, (1978)
dishes, mowing the lawn and travelling to work. What would have once required an hour of physical work now can be accomplished in just a few seconds by pushing a button or setting a dial. As a result more time is available to pursue leisure activities. The unfortunate fact is, however, that many individuals pursue sedentary activities. Although the human body is designed for movement and strenuous physical activity, exercise is not a part of average lifestyle. One cannot expect the human body to function optimally and to remain healthy for extended period if the body is abused or not used as intended. Thus physical inactivity has led to a rise in hypokinetic diseases (lack of movement) such as coronary artery disease (CAD), hypertension, hypercholesterolemia, cancer, obesity and musculo-skeletal disorders.  

More than two-thirds of older adults don't engage in regular physical activity. Many people 90 and older who have become physically frail from inactivity can more than double their strength through simple exercises in a fairly short time. In one study, some people 80 and older were able to progress from using walkers to using canes after doing simple muscle-building exercises for just 10 weeks.  

"Exercise is like a savings account. The more we put in, the more we're going to get out of it."³

The notion that exercise is good for health is something everyone just always seems to have known. Somehow, though, older adults have been left out of the picture - until recently. A clear new picture is emerging from research: Older people of all ages and physical conditions have very much to gain from exercise and from staying physically active. They also have very much to lose if they become physically inactive - some degree of health and ability, for example.

Exercise isn't just for older adults in the younger age ranges, who lives independently and are able to go on brisk jogs. Researchers studied the question of whether exercise and physical activity also can improve the health of people who are 90 or older, who are frail, or who have the diseases that seem to accompany aging. We now know from reliable scientific studies that it can help. Staying physically active and exercising regularly can help prevent or delay some diseases and disabilities, as people grow older.⁴

⁳ Ron Ekovich, "National Institute on Aging: Is it safe for me to exercise" 2000
⁴ http://www.wellwebcom/aging.htm
Today old age period has become synonymous with suffering, ill health, poor fitness, chronic and acute depression. Health associated problems has become so endemic among old age that 95% of mortality causes are accorded to old age related health problems.

Progressive and gradual degeneration in structural and functional ability is age related natural phenomena. Loss of muscle strength and bone density is also associated with aging. These degenerations makes old adult prone to weak joint, lower mobility, poor posture, chronic back pain, arthritis and risk of fall. Rising systolic and diastolic blood pressure is also aging phenomena.

Compounding to all above degeneration problems, what makes life more difficult for old adult is growing occurrence of health related problems. The health hazards are bane of modern life. Every form of stresses of life finds manifestation ultimately in some or other form of health complication in old age.

Modern human lifestyle has become highly mechanised competitive and complex. Adding to this complex system of social set-up, political establishment etc., has made human survival a difficult task. Life for human has become challenging, physically and mentally demanding and stressful everyday. Further environmental
pollution, side effect of medication, junk food dependence, habit of smoking and alcohol, has increased risk of health hazard manifolds. Again, unfortunately technological advancement has facilitated more sedentary and inactive lifestyle compared to the past when a fair amount of physical activity was common. Travelling in car and busses has replaced walking and cycling, microwave ovens and mixers have replaced manual cooking and grinding. People are addicted to television for recreation rather than games and sports. Physical comfort has become priority at the expanse of physically active lifestyle and health. Though in one’s prime time during 25-50 years of age, the effect of all above may not be quite visible, it shows up ultimately during old age with various forms of health and pathological complications. Hence it is ultimately the old age, which bears the brunt of modern lifestyle.

The following health hazards are most profound and endemic among old age:

a) Heart related complications, b) diabetes mellitus, c) hypertension, d) Alzheimer disease, e) obesity, f) depression, g) arthritis etc.

Among all above health hazards heart associated complication is attributed as morbidity factor in 90% cases among old age.
Heart is a very strong muscle that pumps blood through miles and miles of blood vessels to every part of the body. Blood vessels are normally soft, elastic tubes that stretch or expand to make room for the blood to flow through them. The blood vessels form a continuous network of tubes that act together to conduct blood to the body’s tissues and to return that blood to the heart. The arteries carry nutrient-rich blood away from the heart to all parts of the body. They branch into smaller and smaller arteries that lead into the capillaries. These very small, one-cell-thick vessels allow oxygen and other nutrients carried by the blood to move out of the bloodstream and into the nearby cells. At the same time, waste products including carbon dioxide enter the capillaries. From the capillaries, blood flows into the veins, which merge into larger and larger veins as they return the blood to the heart. This blood is partially deoxygenated — that is, much of its original supply of oxygen has moved into the body’s cells. This blood enters the right side of the heart and is then pumped to the lungs where it is reoxygenated, or resupplied with oxygen. After returning to the left side of the heart, the blood is again pumped out to the body. The heart, together with the arteries, capillaries and veins, make up the cardiovascular system.  

http://www.justmove.org/fitnessnews/hfbodyframe.cfm?Target=abthartexer.html
Like any muscle, the heart needs a constant supply of oxygen and nutrients that are carried to it by the blood in the coronary arteries. When the coronary arteries become narrowed or clogged (atherosclerosis) and cannot supply enough blood to the heart, the result is Coronary Artery Disease (CAD). If not enough oxygen-carrying blood reaches the heart, the heart may respond with pain called angina. The pain is usually felt in the chest or sometimes in the left arm and shoulder. (However, the same inadequate blood supply may cause no symptoms, a condition called silent angina (which is common in Diabetic patients). When the blood supply is cut off completely, the result is a heart attack. The part of the heart that does not receive oxygen begins to die, and some of the heart muscle may be permanently damaged (known as Myocardial Infarction).  

Coronary Artery Disease (CAD) occurs when the smooth inner lining of the coronary arteries becomes damaged and roughened, and fatty matter (sometimes called plaque) accumulates. As plaque continues to build-up the arteries become increasingly narrowed and hard, which restricts blood flow to the heart muscle. As atherosclerosis progresses, platelets (cells in the blood that aid

http://www.healthseva.com/content/cardiology/coronary_heart_1.php
clotting) can easily stick to the roughened vessel wall. This can cause small clots to form which will also block blood flow to the heart muscle.\(^7\)

The blockage can affect the artery in different ways:

- If the blockage occurs in a coronary artery it causes chest pain (Angina).
- If the blockage is complete it can cause a heart attack (Myocardial Infarction or MI).
- If the blockage occurs in one of the arteries near the brain, a stroke can occur.
- If a blockage occurs in a leg artery it causes Peripheral Vascular Disease (PVD) and can cause pain with walking called intermittent claudication.\(^8\)

The atherosclerosis process begins early in life, as early as childhood and progresses slowly over the years. The presence of mild or even moderate narrowing of the coronary arteries is not usually associated with any symptoms. Symptoms do not occur until 70% of the artery is blocked. The risk of developing atherosclerosis is

\(^7\) [http://www.mplsheartfoundation.org/typescv.cfm](http://www.mplsheartfoundation.org/typescv.cfm)  
\(^8\) [http://www.healthykhana.com/hphdatherosclerosis.htm](http://www.healthykhana.com/hphdatherosclerosis.htm)
increased in individuals with modifiable and non-modifiable risk factors. CAD risk can be reduced by improving the modifiable risk factors.\(^9\)

Major risk factors for Atherosclerosis are - diabetes, mental tension, emotional stress, hypertension, high cholesterol, smoking, heredity, obesity, lack of exercises, high uric acid level, alcohol consumption and eating too much fat like ghee, butter, meat, etc. This can lead to angina, heart attack, stroke and sudden death. Atherosclerosis is often referred to in common language as ‘hardening of the arteries’ and although this is an entirely inaccurate way of describing what happens, ‘Narrowing of the arteries’ would be a better catch-phrase though this term also is less than accurate.\(^10\)

Coronary arteries have muscle fibers within its wall. By contracting the muscle the artery can reduce blood flow, while relaxing the muscle increases flow. In this way, the coronary arteries can regulate blood flow to different portions of the heart.\(^11\)

There is a wide range of symptoms that may be experienced by a person affected by coronary artery disease. Approximately 50% of

\(^9\) [http://www.mplsheartfoundation.org/typescv.cfm](http://www.mplsheartfoundation.org/typescv.cfm)
\(^10\) [http://www.healthlibrary.com/reading/nacure/cha5.htm](http://www.healthlibrary.com/reading/nacure/cha5.htm)
\(^11\) [http://www.healthseva.com/content/cardiology/coronary_heart_1.php3](http://www.healthseva.com/content/cardiology/coronary_heart_1.php3)
men and 63% of women who die suddenly from CAD show no previous symptoms of the disease. The degree to which patients experience symptoms of CAD varies, if they experience any symptoms at all. While some people may experience mild chest discomfort or shortness of breath, others with coronary artery disease have steady, uncontrolled chest pain that interferes with their daily activities.

The classic symptom associated with coronary artery disease is called **angina**. Angina is usually described as a chest discomfort that can be experienced as:

- A "pressure", "squeezing", "burning", or "heaviness" sensation in the center of the chest area, underneath the rib cage. The discomfort can sometimes spread to the neck, jaw or arm regions
- Sweating
- Lightheadedness
- Nausea
- Shortness of breath
- Palpitations

Symptoms of angina are most often experienced:
- During exertion - for example, while running for a bus, playing a game such a tennis or football, climbing stairs or walking uphill
- Due to undue strain
- In cold weather
- After a heavy meal
- When a person feel stressed

These symptoms disappear once the act is stopped or after medication. At times angina is the first indication of CAD.\(^{12}\)

Angina pectoris is the medical term for chest pain due to coronary artery disease. It occurs when the heart muscle does not get enough blood and oxygen to meet its needs. The most common cause of this is the narrowing of one or more of the coronary arteries, which supply blood and oxygen to the heart muscle. Angina can often be brought on by exertion or emotion, especially anger, and is usually relieved by rest. The classic symptom of angina is a heaviness or tightness in the chest. Patients often describe the pain they experience as like a fist clenched over their chest. Other symptoms may include an aching or a burning sensation in the middle of the chest, nausea, jaw pain, sweating, indigestion, pressure,

\(^{12}\)http://www.healthykhana.com/bphdcoronary.htm
breathlessness and numbness or tingling in the arms or fingers. Most patients experience a feeling of anxiety. In some rare cases there may be no symptoms at all, even though the heart muscle may be deprived of oxygen.\textsuperscript{13}

It is important for all adults to have regular examinations by a physician. These include not only a physical exam but also a medical screening (blood pressure and weight measurements, electrocardiogram, specific blood tests and lifestyle evaluation) to evaluate overall risk factors for heart disease. The diagnosis of coronary artery disease is made based on family and patient history, physical examination, symptoms, and the results of diagnostic testing.\textsuperscript{14}

Exercise Stress Test (Treadmill): This is a test in which the patient walks on a treadmill. Changes in heart rate, blood pressure and respiration are recorded. An electrocardiogram (ECG) is continuously monitored. This test is a very helpful tool in the diagnosis of angina and evaluation of chest pain.\textsuperscript{15}
A heart attack occurs when a coronary artery is blocked, causing a lack of blood and then death to the heart muscle served by that artery. When the muscle dies it releases certain chemicals into the blood that were present in those muscle cells. These can be measured and if present are evidence of a heart attack. Each chemical becomes measurable and persists in the blood for different times. These chemicals are CPK, CPK-MB, Troponin and Myoglobin.16

Risk factors are those behaviors or conditions which contribute to the likelihood of developing disease. Risk factors over which individuals do not have control are referred to as non-modifiable. They include age, race, family history, and personal history.17

The evidence-based modifiable risk factors associated with CAD are:

Physical inactivity, inadequate nutrition, tobacco use, stress, elevated cholesterol, high blood pressure, diabetes, and obesity.18

Physical inactivity has been established as a major risk factor for the development of coronary artery disease. It also contributes to

16 http://www.healthykhana.com/hphddiagnosis.htm
17 http://healthlink.mcw.edu/article/9312233444.html
earheart.com/risk/inactivity.htm
other risk factors including obesity, high blood pressure and a low level of HDL cholesterol. Even modest levels of physical activity are beneficial. The more risk factors one has, the greater is the risk for heart disease and heart attack. Smoking is the single most preventable cause of death in the world. Smoking greatly increases one’s risk for heart disease, and more than doubles the risk of having a heart attack. Inhaled tobacco smoke reduces the amount of oxygen available to the heart, as well as the rest of the body. The reduction of oxygen available to the heart can result in angina (chest pain) during exertion. Smoking causes arteries to narrow and causes the build up of fatty deposits on the inner walls of the arteries, a condition called atherosclerosis. This build-up or hardening of the arteries reduces the blood flow throughout the body and can lead to a heart attack or stroke. 19

Heavy smokers are two to four times more likely to have a heart attack than nonsmokers. The heart attack death rate among all smokers is 70 percent greater than among nonsmokers. People who

19 http://www.mplsheartfoundation.org/smoking.cfm
are active regularly are more likely to cut down or stop cigarette smoking.\textsuperscript{20}

Smokers who have a heart attack also, are more likely to die and that too die suddenly (within an hour). Constant exposure to other people's smoke (passive smoking) increases the risk of heart disease even for nonsmokers. In addition to coronary artery disease, other diseases like diabetes and high blood pressure are linked with smoking.\textsuperscript{21}

In posing health risks on the body's cardiovascular system, smoking:

- causes immediate and long term increases in blood pressure.
- causes immediate and long term increases in heart rate.
- reduces cardiac output and coronary blood flow.
- reduces the amount of oxygen that reaches the body's tissues.
- changes the properties of blood vessels and blood cells - allowing cholesterol and other fatty substances to build up.
- contributes to higher blood pressure and clot formation.

\textsuperscript{20} http://healthlink.mcw.edu/article/931233444.html
\textsuperscript{21} http://www.healthykhana.com/hpcholesterol.htm
• damages blood vessels.
• doubles the risk of ischemic stroke.

American Heart Association estimates indicate that approximately 37,000 to 40,000 people die from heart and blood vessel disease caused by other's people smoke (passive smoking) each year. Both direct and indirect smoking exposure poses significant health hazards to pregnant women, infants, and young children. Children and infants exposed to tobacco smoke are more likely to experience ear infections, and asthma, and are at a higher risk for sudden infant death syndrome (SIDS) than children and infants without the same exposure. In addition, smoking has been associated with depression and psychological distress.

According to the American Heart Association, eliminating smoking not only reduces the risk of coronary heart disease, but also reduces the risk of repeat heart attacks and death by heart disease by 50 percent. Research also indicates that smoking cessation is crucial in the management of many contributors to heart attack, including
atherosclerosis, thrombosis, coronary artery disease, and cardiac arrhythmias.\textsuperscript{22}

Hypertension (HBP) has become one of the commonest diseases, and is a great danger to life. According to one survey, 20 percent of the adult population has the hypertension. The blood vessels thicken, lose their elasticity and the heart has to pump harder to maintain the blood circulation. Thus, it gets over-strained. If the person is obese, the heart works under greater pressure. High blood cholesterol and triglycerides are other sources of strain on the heart. Consequently, with the arteries becoming narrower, the blood supply to the heart gets reduced and results in heart attack or cardiac arrest.

Blood pressure varies according to age, sex, muscular development, attitude etc., though 120/80 mm/Hg is generally taken as normal, in some cases 140/90 mm/Hg is also considered normal. Some of the causes are - heredity, smoking, worry, anxiety, obesity, mental or emotional stress, tension, alcohol and taking too much salt and sugar and some unknown causes. Hypertension occurs when arterioles,

\textsuperscript{22} http://www.stjosephs-marshfield.org/heart/smoke.htm
small blood vessels that branch off from the arteries, become constricted making it difficult for blood to pass through them.\textsuperscript{23}

Cholesterol is an essential body fat. It is present in animal foods and is also made by the liver. At any given time, some cholesterol is always present in the bloodstream. However, an abnormally high amount of cholesterol increases the risk of having heart attacks. Cholesterol forms the fatty streaks, which get embedded in the blood-vessel walls and then progress to form a plaque. This plaque then causes the blood vessels to narrow, and compromise the circulation to the heart.\textsuperscript{24}

Cholesterol, and other fats, are transported in the blood stream in the form of spherical particles called lipoproteins. The two most commonly known lipoproteins are LDL, low-density lipoproteins and HDL, high-density lipoproteins.\textsuperscript{25}

The lack of physical activity increases the risk for developing heart disease. Even persons who have had a heart attack can increase their chances of survival if they change their habits to include regular

\textsuperscript{23} \url{http://www.jhbumc.jhu.edu/cardiology/rehab/hypertension.html}  
\textsuperscript{24} \url{http://www.healthykhana.com/lpcholesterol.htm}  
\textsuperscript{25} \url{http://www.stjosephs-marshfield.org/heart/fatsbld.htm}
physical activity. It can help control blood lipids, diabetes and obesity as well as help to lower blood pressure.\(^{26}\)

Lack of physical exercise may increase LDL and lower HDL cholesterol. Regular physical activity may lower LDL ("bad") cholesterol and raise HDL ("good") cholesterol levels.\(^{27}\)

Obesity is perhaps the most prevalent form of malnutrition in developed countries. It has been estimated to affect 20 to 40% of adults & 10-20% of children and adolescents in developed countries. Obesity is a positive risk factor in the development of hypertension, diabetes, gall bladder disease & heart disease. Other associated diseases are varicose veins, abdominal, hernia, arthritis, flat feet, and psychological stresses particularly during adolescence. Obesity may lead to lower fertility.\(^{28}\)

Excess weight may increase the risk of developing high blood pressure, high blood cholesterol and diabetes. Regular physical activity can help maintain desirable body weight. People at their

\(^{26}\) [http://healthlink.mcw.edu/article/931233444.html](http://healthlink.mcw.edu/article/931233444.html)
\(^{28}\) [http://www.medivationindia.com/nutrition/obesity.phtml](http://www.medivationindia.com/nutrition/obesity.phtml)
desirable weight are less likely to develop diabetes. And, exercise may also decrease a diabetic person's need for insulin.\textsuperscript{29}

People who carry excess body fat - especially around the waist are more likely to develop heart disease and stroke even if they have no other risk factors.

Excess weight:

- Increases the strain on the heart
- Raises blood pressure
- Raises blood cholesterol and triglyceride levels
- Lowers HDL ("good") cholesterol levels
- Increases the risk for developing diabetes\textsuperscript{30}

Obesity, itself a disease, also predicts more serious diseases. Current rates of overweight and obesity most of all in children, young adults and women, project rapidly increasing disability and premature death from nutrition-related chronic diseases for most developing countries. Phenomenal social and economic changes, on a scale and at

\textsuperscript{29} http://healthlink.mcw.edu/article/9312334444.html
\textsuperscript{30} http://www.healthykhana.com/hpcholesterol.htm
a speed unprecedented in history, have resulted in an epidemic of nutrition-related chronic diseases that must be contained.\textsuperscript{31}

It is well known that people who drink heavily on a regular basis have higher rates of heart disease than both moderate and nondrinkers. Alcohol appears to constrict the coronary arteries and some studies suggest that it can injure the heart muscle.\textsuperscript{32}

Excessive alcohol contributes towards high caloric intake, high triglycerides, heart failure, high blood pressure, stroke, obesity and certain cancers.\textsuperscript{33}

Diabetes is a serious condition that occurs when a person's insulin level is unable to move blood sugar from the blood stream into the body's cells, where it can be used for energy. There appears to be an increased risk of cardiovascular disease in people with diabetes, although the reasons for this are still unclear. It is thought that if the blood glucose levels are higher than normal and not controlled, this may affect the lining of the body's arterial walls. This can increase susceptibility to the formation of atherosclerosis, or the furring up of

\textsuperscript{32} http://www.mplsheartfoundation.org/alcohol.cfm
\textsuperscript{33} http://www.healthykhana.com/hpcholesterol.htm
the arteries. People with high blood triglyceride levels as well as diabetes may be at a greater risk of atherosclerosis.34

Diabetes can lead to a range of diseases, including coronary artery disease. More likely it causes silent ischemia because diabetes can affect the nerves, which send pain messages to the brain.35

It is impossible to define and measure a person's stress level, but studies suggest that certain people respond to stress in ways that can create health problems. Several physiological changes take place in the body when a person is stressed, placing an extra burden on the heart. Under stress the heart beats faster, the body releases more fat into the blood stream, blood sugar concentration increases and the body secretes chemicals that accelerate the blood clotting mechanism. Many scientists have also found a relationship between a person's stress, their behaviour habits, and heart attacks. For example, a person may overeat, smoke continually, or may develop high blood pressure in response to too much stress.36
Cardiology is now at a critical crossroad globally. We are living in an age of unprecedented medical progress. The innovations in cardiology, at times bordering on the miraculous, are compelled by inexorable advances in scientific knowledge. The present trajectory, though heady, is not sustainable and furthermore threatens to denature the moral core of our professionalism.

Three developments have brought the issue into prominence. First is the emerging global pandemic of cardiovascular disease that will impact most decisively on poor developing countries. Second is the burgeoning cost of health care in rich countries that forces rationing of medical care along class lines. Third is the growing public discontent with, and alienation from, a technology-centered medical profession. These issues are interrelated and demand critical analysis. As is true of crises wrought by human agency, they challenge new thinking and offer opportunities for reaching a higher plateau of human service and development.

While unable to shake the disease of poverty, a mounting epidemic of Coronary Artery Diseases (CAD) is now sweeping the urban populations of the developing world. For the first time chronic degenerative ailments, generally associated with affluent societies,
constitute a major cause of death in impoverished countries of the South.\textsuperscript{37}

The Cardiological Society of India plays a vital role in prevention and treatment of cardiovascular diseases, and in determining the course of future action. Prevention of cardiovascular diseases calls for correction of modifiable risk factors. Thus, emphasis is placed on correcting lipid disorders, lowering blood pressure, stopping smoking, improving eating habits, and encouraging more physical exercise. A population-wide approach corrects the underlying cause of the epidemic and is safer, cheaper, and more cost-effective than the high-risk approach which is directed at the individual with risk-factors. Keeping this in mind, several public-awareness programs and free heart "check-up camps" are being organized countrywide under the auspices of the Cardiological Society of India. The Indian government has also started a serious antismoking campaign and the Supreme Court of India recently issued an order banning smoking in public places.\textsuperscript{38}

\textsuperscript{37} "Lown Cardiology at the Crossroads", \textit{Indian Heart Journal} 2001; 53:38-43 39 IHJ-IA-003, p65
\textsuperscript{38} Rose G. Ancel, "Prevention Of Cardiovascular Diseases", \textit{Asian Cardiovascular & Thoracic Annals} 22A 2002, VOL. 10, NO. 3
Developing countries like India are struggling to manage the impact of infectious diseases simultaneously with the growing burden on society and health systems caused by non-communicable diseases.\(^{39}\)

India is facing an epidemic of coronary artery disease. In 1998, coronary artery disease accounted for 30.2% of all causes of death in India, compared to 25.5% in 1990. The World Health Organization has predicted that by the year 2015, coronary artery disease mortality will have increased by 103% among Indian men and by 95% among Indian women. The rising incidence of coronary artery disease in India can be attributed to a significant increase in the prevalence of smoking, physical inactivity, diabetes, truncal obesity, and an increase in levels of cholesterol, LDL cholesterol, and triglycerides over the last decade, especially in the urban population. In a study from northern India (1992 to 2000), the incidence of smoking increased by 11%, diabetes by 5%, truncal obesity by 5%, the mean cholesterol level by 14%, LDL cholesterol by 16%, and triglycerides by 20% among Indian men, while physical activity decreased by 19%. The incidence of hypertension increased from 3.98% in 1963 to

26.78% in 2000 among men, and from 6.64% to 27.65% among women. Interestingly, the improved socioeconomic conditions that contributed to the rise in coronary artery disease did not wipe out the age-old scourge of rheumatic heart disease. The prevalence of rheumatic heart disease has increased from 2 per 1000 children in 1958 to 5.1 per 1,000 children in 1982.40

Physical activity in addition to healthy diet and a smoke free life style is an efficient, cost effective and sustainable way for promoting public health in low and middle-income countries. There are some wonderful things about physical activity:

- Physical activity can be done almost anywhere and requires no equipment. Walking, perhaps the most practiced and most highly recommended physical activity is absolutely free.
- At least thirty minutes of moderate physical activity every day are recommended to improve and maintain your health. Even if you are very busy-you can still work in thirty minutes of activity in your daily routine.

• Patterns of physical activity acquired during childhood and adolescence are more likely to be maintained throughout the life span, thus providing a basis for an active and healthy life.

• Physical activity can improve quality of life in many ways for people of all ages.

• Benefits of physical activity can be enjoyed even if regular practice starts late in life.41

Hence it is clearly evident that exercises as most effective means of prevention and rehabilitation measure for CAD patients have been prescribed since a long time. Use of exercises as therapeutic means for various ailments is ever increasing trend in the field of health management. From the point of health management, exercise adds to cost effective management for developing countries.

In the field of heart-related ailments and their rehabilitation through exercise, plenty of researches are being done. Though physicians, therapists, rehabilitationists often face the dilemma - how frequently and appropriate exercises to prescribe for patients considering their severity of ailment. The task became more challenging and difficult when the patient happens to be of age of 55-

41 http://www.healthinitiative.org/html/whd/
65 years. The biggest issue in this context is when one has to actually deal with specific level of heart complication and suppose to plan effective exercise program and suggest measures on modifiable behaviours to reduce risk factors. Since these needs to consider patient’s fitness level, health hazards etc., one need to decide exercise load, intensity, frequency and nature of exercise etc. It is in this context that there is negligible comprehensive guidelines and holistic approach available.

The research scholar genuinely felt, that there needs to be plenty of field experiment to conduct to find out solution for this problem. Research work needs to be conducted to suggest a comprehensive exercise program as specific requirement for particular degree of heart ailment.

The overriding goal of this study was to construct a comprehensive exercise diet, stress free & healthy lifestyle program which is preventive, safe, user friendly, practical and cost-effective, and to employ it in individuals with known cardiac diseases and angina and examine these responses in the context of disease reduction and functional capacity and improved quality of life.

Hence scholar was interested to elaborately examine and investigate effect of exercises as preventive, curative and
rehabilitative measure and to find out the possibilities to prepare comprehensive exercise program for heart patients.

Statement of the Problem

Construction of a Comprehensive Exercise Program for Cardiac Patients. The purpose of this study was:

1. To precisely find out beneficial effects of exercise program on Coronary Artery Disease (CAD) risk factors.

2. To design a comprehensive exercise program selecting and considering the effect of exercises, which are safe, useful and practical for manifest Coronary Artery Disease.

3. To assess and prepare the caloric requirement module for the same.

4. To identify and improve social-psychological aspect of their life and to find out whether exercise program will have any other beneficial bi products of the program like, effect on the functional capacity, efficiency level, social acceptance and self concept.

5. To compare and relate the effect of exercise program on both groups experiment and control respectively.
6. To check the effect of lifestyle modification on cardiac patients.

**Delimitations**

The study was confined to the following:

1. The study was delimited to Indian male citizens only.

2. Age ranging between 55-65 years.

3. The study was further delimited to CAD patients with Angina-I and Angina-II group based on the classification of New York Heart Association (NYHA).

**Limitations**

1. Though the instruments used were of high quality, results of clinical tests like blood lipid profile and TMT were from different laboratories according to the convenience of the subjects.

2. The study was confined to the information available from the books and journals mainly published abroad as very little material has been published in India. The material from the libraries of L.N.I.P.E. Gwalior, N.M.L., Saaol and internet served as the reference centers for the research.
3. Variability of motivational techniques, awareness & fear of death, which may affect the result of the test and program was considered as another limitation of the study.

4. Response to questionnaire has its own limitations as individual subject on their own understanding respond with different degree of sincerity. This negligible factor needs to be considered while analysing the finding of the study.

Hypotheses

On the basis of available literature and the scholar’s own understanding of the problem, the following hypotheses were formulated:

1. The comprehensive exercise program shall have a significant influence on the heart patients of 55-65 years.

2. The comprehensive exercise program shall significantly influence the preventive, maintenance and rehabilitative aspect of CAD patients.

3. The comprehensive exercise program shall have a significant improvement in their functional capacity, efficiency level, load
tolerance, delayed fatigue, remain healthy, avoid diseases and prevent injuries, etc.

4. The comprehensive exercise program will significantly influence their psychological health-stress reduction, sense of independence and confidence and overall sense of well-being

Definition of Terms

Physical Activity

Physical activity is defined as the state of being active, or as energetic action or movement. 42

Obesity

This may be defined as an abnormal growth of the adipose tissue due to enlargement of the fat cell size or an increase in the fat cell number or a combination of both. Obesity is often expressed in terms of body mass index (BMI). A BMI of 30 or more in males & 28.6 or more in females indicates obesity [Body mass Index = weight (kg)/height 2 (m)] 43

42 http://health.yahoo.com/health/de/001941/0.html
43 http://www.medivisionindia.com/nutrition/obesity.phtml
Heart Disease

Heart disease is any condition that causes your heart to malfunction. When the words "heart disease" are used generically, what people are usually referring to is Coronary Heart Disease, which leads to Angina and Heart attacks, ultimately caused by Atherosclerosis.  

Angina

Angina is an uncomfortable feeling in the chest. It usually feels like a heaviness or tightness in the centre of the chest which may spread to the arms, neck, jaw, back or stomach. Symptoms usually fade within about 10 to 15 minutes.

Atherosclerosis:

Cardiovascular condition characterized by the loss of elasticity of the arterial walls and the general hardening and narrowing of the arteries due to plaque formation.

References:
44 http://www.healthykhana.com/hpheartdisease.htm
45 http://www.medivisionindia.com/nutrition/angina.html
46 http://www.medivisionindia.com/nutrition/obesity_.html
Coronary Arteries

The arteries that carry blood to the heart muscle.

Coronary Artery Disease

Coronary Artery Disease (CAD) is the narrowing of one or more arteries of the heart.

Risk Factors

Risk factors are those behaviours or conditions which contribute to the likelihood of developing disease.47

47 http://healthlink.mcw.edu/article/931233444.html
Significance of the Study

This study signifies a noble effort of scholar with an endeavour to contribute towards prevention and rehabilitation of CAD patients of old age group. In compliance of the purpose of the study, this research project will throw light on crucial issues compounding the problems of effective exercise planning, workout monitoring, load determining method, exercise selection, modifiable behaviour management for coronary artery disease patients. In addition to this the study will be highly significant in following ways also:

1. The study will implement evidence-based, affordable and sustainable intervention for prevention of recurrence of myocardial infarction & stroke (CAD).

2. Evaluate the impact of these interventions on CAD risk factors and outcomes.

3. Identify sustainable strategies for integrating secondary prevention interventions into existing health care infrastructure.

4. Build national capacity to meet the health care needs related to secondary prevention of CAD in low and middle-income countries.
Aim

1. Among key goal is to stimulate research in areas where there exists but a paucity of reliable epidemiological data about incidence and trends in CAD risk factors prevalence.

2. A further objective is to rouse awareness of the cardiovascular community in the industrialized world far too long blinded to the plight of the majority of humankind.

3. A key objective was to popularize preventive, safe and cost effective care of coronary artery disease (CAD) among health care providers, policy makers and general public.