INTRODUCTION
I. INTRODUCTION

In the present era, Non Communicable Diseases (NCDs) throw a great challenge to health care systems, experts and governments and poses to be the underlying cause for poverty as well as a threat to human resources and their physical, social and economic development. Non Communicable Diseases are more common in developing countries and they are considered to be the byproducts of economic development (World Heart Federation, 2012).

Non Communicable Diseases include the “big four” – cardiovascular diseases (CVD), cancer, diabetes and chronic respiratory diseases. They are responsible for 63 per cent of deaths globally in 2008 with more than 80 per cent occurring in developing countries, attributed to poor dietary practices, insufficient physical activity and harmful use of tobacco and alcohol (WHO, 2010).

CVD ranks first among NCDs and contribute to 48 per cent of deaths throughout the world. The factors that increase people’s risk of developing these diseases are increased levels of blood pressure, cholesterol, BMI and blood sugar (WHO, 2011).

The heart is an amazing non-stop blood pumping organ. During the life time of an individual the average human heart beats more than two and half billion times without any rest. The term “Heart Disease” can be used to denote any disorder of the cardiovascular system that affects heart’s ability to function normally. They constitute Coronary Artery Disease (CAD), Rheumatic Heart Disease (RHD) Coronary Heart Failure (CHF), cardiomyopathy, congenital heart abnormalities and cardiac arrhythmias (Mahadik, 2010).

Cardiovascular disease in its various forms is the leading cause of death worldwide, ranking first in both developing and developed nations. CVD not only causes death but can also result in severe disability, particularly among who survive a myocardial infarction or stroke.

Every year 17.1 million lives are claimed by the global burden of heart disease. Of the 17.1 million deaths attributable to CVD every year, 7.2 million are
due to ischemic heart disease resulting in myocardial infarction (heart attack), 5.7 million are due to cerebrovascular disease (stroke) and a 2.2 million are due to hypertensive disease and/or congestive heart failure. The remaining deaths are due to rheumatic heart disease and inflammatory conditions (WHO, 2011 and World Heart Federation, 2012).

Based upon the estimates by (NCMH, 2005) cases of cardiovascular disease may increase from 2.9 crore in 2000 to as many as 6.4 crore in 2015. Deaths from CVD will also be more than double the rate. Most of this disease will occur on account of coronary heart disease, acute myocardial infarction, angina pectoris, ischemic heart failure and inflammatory heart disease.

CVD often strikes middle – aged adults and as a result, families spiral into a cycle of poverty as they lose their primary bread winners to death or severe disability. And the age of bread winners’ dying of CVD falls every year in Asia and the Pacific, posing an economic issue (WHO, 2011).

The prevalence of coronary heart disease is known to be high in people of South Asian countries (subjects originally form Indian Sub Continent). Some metabolic abnormalities are more prevalent among them including high triglyceride concentration, increased total cholesterol and high density lipoprotein (HDL) ratio, type II diabetes mellitus and central or visceral obesity (Ghosh et al, 2010). According to World Heart Federation (2009) Indians are succumbed to heart disease and stroke in the most productive years of their lives, about a decade earlier then their western counterparts.

A study by Shetty (2002), stated that societies like India, which are rapidly urbanizing, demonstrate increases in energy intake, dramatic increases in fat intake along with increased levels of sedentarianism resulting in higher prevalence of non communicable diseases among them. A recent finding revealed that heart diseases are steadily increasing in India and the epidemic has reached its advanced stage even in rural India. CVDs are already at the top among the top 10 causes of adult deaths (25-69 years) in urban and rural India contributing to 32.8 and 23 per cent deaths respectively (Thakur et al, 2011). The main reasons for this epidemic is
lifestyle changes like sedentary jobs, improvement in socioeconomic status leading to unhealthy diets rich in fats, high-stress jobs and the addictions like alcoholism, smoking and tobacco chewing (Durairaj, 2010).

Studies carried out by Gupta et al. (1997) proved that in India, the prevalence of coronary heart disease in rural community is higher than reported in earlier studies due to urbanization and lifestyle changes. According to Durairaj (2010) the prevalence of coronary artery disease in rural India is estimated to be more than seven per cent as compared to the urban areas where the incidence is up to 12 per cent.

In India, CVD is the largest cause of mortality in all regions of the country. There are large regional variations in CVD mortality in India, with high CVD mortality in Goa, Tamil Nadu, Andhra Pradesh and Punjab and low mortality in the central Indian states of Uttar Pradesh, Madhya Pradesh and Rajasthan (Gupta et al, 2012).

Over all, men have a higher risk of heart attack than women. But the difference narrows after women reaches menopause. After the age of 65, the risk of heart disease is about the same for both the sexes when the other risk factors are similar. Recent findings by World Heart Federation (2013), also revealed that heart disease is actually number one killer of women, causing one in three female deaths, shockingly that’s about one death per minute.

Health care of women has been traditionally neglected by society, particularly in countries like India and China. It remains a fact that women with many diseases, including heart disease, continue to receive less attention and inferior quality of care by their family members in the vast majority of Indian families even today. At times, the symptoms of heart disease have even been wrongly attributed to psychological depression in women and they are not taken seriously and medical interventions are provided (Gupta, 2000).

There are many misconceptions about CVDs in women. In reality, CVD affects as many men as women. However, women loose less years of life due to CVDs as the disease develops about 7-10 years later in women compared to men.
Every year 3.3 million women die of heart attack and 3.2 million die of stroke globally (Mendis et al, 2011).

Currently, a large proportion of people with high cardiovascular risk remain undiagnosed and often even diagnosed have insufficient access to treatment. When diagnosis is made, it is frequently at a late stage of the disease, when people become symptomatic and are admitted to hospitals with acute myocardial infarction or stroke and when costly high – technology interventions are required for treatment. Thus early detection is key to improve outcomes of CVDs. Since CVDs are asymptomatic in early stage (Mendis et al, 2011).

Heart attack and atherosclerosis are conditions often caused by cholesterol that has accumulated and thickened in the walls of arteries. The composition of every blood vessel is unique to itself. The inside of the blood vessel would appear like a wall and no toxic substances can gain entry. The cholesterol normally present in blood starts getting deposited to the lower most level of the inner wall of the blood vessel for people having high blood glucose and cholesterol levels such accumulation leads to the formation of a heap of cholesterol. Even a small breakage or disruption of the wall causes the toxic substances to escape in to the blood, attracting the attention of thousands of platelets. These platelets cover the entire area of “toxic presence” there by blocking the passage/flow of that particular blood vessel. The particular block of the flow of blood is termed as heart attack (Stanner, 2005).

Total cholesterol is the sum total of cholesterol carried by three kinds of lipoproteins; very low density lipoprotein (VLDL), low density lipoprotein (LDL) and high density lipoprotein (HDL). The production, clearance and metabolism of cholesterol are quite a complex process. Thousands of receptors are involved in this process. Dysfunction of cholesterol receptor sites on the cells and enzymes may cause abnormally high levels of cholesterol and triglycerides and in turn cause the risk of heart disease. The common epidemic reason for hyperlipidemia is an excessive or improper lipid intake (Gupta, 2000).
Hyperlipidemia refers to elevated levels of lipids and cholesterol in the blood, and is also identified as dyslipidemia, to describe the manifestations of different disorders of lipoprotein metabolism. Although elevated low density lipoprotein cholesterol is thought to best indicator of atherosclerosis risk, elevated total cholesterol or triglycerides or low levels of high density lipoprotein cholesterol are also a major risk factor for atherosclerosis (Adams, 2000). According to WHO report (2002), elevated serum cholesterol is a modifiable risk factor and is associated with an estimated 4.4 million deaths each year and forms a major cause for ischemic strokes and heart diseases worldwide.

Diet has been known for years, to play a key role, for chronic heart disease. In the present era, a great deal of interest has been focused on the role of dietary factors in the pathogenesis of non communicable diseases, such as coronary heart disease, hypertension and diabetes (Varghese and Adhikari, 2007). Improper dietary practices can also trigger underlying genetic tendencies towards atherosclerosis and thrombosis. The higher inclusion of fats and oil also play an important role in determining the incidence of cardiovascular disease along with other risk factors (Murugesan and Ramdas, 2008). According to Mozaffarian et al (2008) inclusion of trans fatty acids (TFAs) contributes to a sizable proportion of coronary heart disease (CHD).

According to Junshi and Wenhua (2012) and Bhuvaneswaran (2013), the adverse dietary changes namely shift in the structure of the diet towards energy dense with trans fat and sugar, reduced amount of complex carbohydrates and dietary fibre in terms of reduced inclusion of vegetables and fruits, coupled with reduced physical activity and increased leisure time both at home and at work places have led to the rapid increase in coronary heart disease. The relationship between food consumption and coronary heart disease has become a priority research focus and driven an emerging interest in plant/functional foods in the field of preventive cardiology.

Dietary approach is recommended as the primary strategy for the prevention and treatment of high blood cholesterol. The National Cholesterol Education
Programme (NCEP), the American Heart Association (AHA) and a host of other health and medical organizations have advocated a diet low in trans and saturated fat and cholesterol for reducing the risk of cardiovascular disease (Horn and Kavey, (1997) and NCEP (2001)).

Studies by Hu and Willet (2002) and Handysides (2012) proved that a plant based diet has its beneficial effect in reducing the risk of coronary heart disease with substantial evidences throw more light on the diets with non-hydrogenated unsaturated fats, foods high in Omega-3 fatty acids, whole grains and abundance of fruits and vegetable in reducing the risk of coronary heart disease.

A growing body of research established the fact that, several dietary phytonutrients (astaxanthin, lycopene, lutein and glabridin) decrease the risk for atherosclerosis by decreasing oxidative stress due to free radical production and endothelial inflammation. More over these phytonutrients retard atherogenesis and decrease the risk for atherogenic cardiovascular disease (Riccioni et al, 2012). Soluble fibres found in many cereals (oats, rice and barley) as well as fruits, vegetables and legumes will help to raise protective HDL cholesterol and reduce levels of destructive and harmful LDL cholesterol (Wright, 2012).

Davis et al (2004) states that there is an abundant amount of research evidence to prove that diets rich in fruits, vegetables, wholegrain breads, high fibre cereals, fish, low fat dairy products and diets low in saturated fats and sodium markedly reduce the risk of cardiovascular disease.


According to study by Tovar et al (2012) multifunctional diet rich in antioxidant foods, oily fish, viscous dietary fibres, soy bean and whole barley kernel products, almonds, stanols and a probiotic strain which was supplemented for a period of four weeks, showed a significant reduction in total cholesterol, LDL, LDL/HDL and systolic blood pressure and the risk for cardiovascular disease. It has been
established that reducing cholesterol level by one per cent, can reduce the risk of heart disease by two per cent.

Diet is only one aspect of a comprehensive lifestyle approach to good health, which should include regular exercise, tobacco avoidance, stress reduction, maintenance of healthy body weight and other positive health practices. Only when all of these issues are addressed, functional foods become part of an effective strategy to maximize health and reduce disease risk. Nutrition education based on dietary modifications, lifestyle alterations can be used as the basis of prevention and as the general strategy to overcome health problems (Meister, 2002).

In the modern era, medical interventions for cardiovascular problems are beyond the reach of a common man living in urban or rural areas. At the same time, timely screening, suitable dietary changes with cardio protective ingredients and life style changes may reduce the risk of cardiovascular problems. Towards this vein in the present research, to bridge the gap between diet and cardiovascular health efforts have been taken to formulate, standardize and evaluate heart friendly mix on the selected cardiovascular and hypercholesterolemic subjects. Heart friendly mix included cardio protective foods from all the food groups namely barley, soy flour, curry leaves, yellow pumpkin, onion, garlic, flax seeds, groundnuts and amla/grapes. The objectives of the present study are

- To formulate and standardize a heart friendly mix for cardiovascular and hypercholesterolemic subjects
- To study the socio economic profile, lifestyle pattern, dietary habits and medical history of the selected cardiovascular and hypercholesterolemic subjects
- To prepare an education module and create awareness about heart health and hypercholesterolemia and its relationship to diet for the selected cardiovascular and hypercholesterolemic subjects and
- To evaluate the efficacy of supplementation of heart friendly mix and focused education on the selected cardiovascular and hypercholesterolemic subjects.