1. INTRODUCTION

As stated by Riccioni G,\textsuperscript{1} “the term cardiovascular diseases (CVD) include coronary heart disease (CHD) (myocardial infarction [MI], angina pectoris, coronary insufficiency, and coronary death), cerebrovascular diseases (stroke and transient ischemic attacks [TIA], peripheral vascular disease (PVD), congestive heart failure (CHF), hypertension, valvular and congenital heart disease.” As per Verghese M,\textsuperscript{2} “cardiovascular disease is the collective term for all diseases of the heart and blood vessels. Despite changes in lifestyles and the use of new pharmacologic approaches to lower cholesterol levels, CVD continues to be the principal cause of death.” Chhetri S\textsuperscript{3} has argued that “CVD are the major contributor to the global burden of disease. CVD is the number one cause of death worldwide and is projected to remain the leading cause of death. Hence, this disease greatly contributes to the rising costs of health care in the world. It is a major public-health challenge, especially in low and middle income countries, where 80 % of these deaths occur.” According to Zimmet P\textsuperscript{4} “because of increasing obesity and alterations in the dietary habits in both western as well as the developing countries, prevalence of CVD occurring due to atherosclerosis and diabetes is increasing at an exponential rate.”

As stated by Riccioni G\textsuperscript{1} “numerous epidemiological investigations have characterized the risk pattern for CHD. In particular age, male sex, elevated low density lipoprotein cholesterol (LDL-C) levels, low high density lipoprotein cholesterol (HDL-C) levels, diabetes mellitus, and cigarette smoking are key risk factors for CHD.”

As per Min-Yu H\textsuperscript{5} “atherosclerosis is one of the most widespread conditions that threaten human health and survival. The basic pathogenesis of atherosclerosis involves an insult to the endothelial and smooth muscle cells of the arterial wall by various harmful factors such as viral infection, mechanical damage, and dyslipidaemia, especially abnormal oxidized low-density lipoprotein (ox-LDL), leading to an excessive chronic inflammatory/fibroproliferative response. The pathologic process results in a progressive accumulation of lipids and fibrous elements in the large arteries.”

As stated by Abdelhalim MAK\textsuperscript{6} “hyperlipidaemia or a high level of serum triacylglycerol and cholesterol is a risk factor for premature atherosclerosis. Free oxygen radicals have been implicated in the pathogenesis of hypercholesterolemic
atherosclerosis and antioxidants suppress the development of hypercholesterolemic atherosclerosis. Hypercholesterolemia can increase the cholesterol content of platelets, polymorphonuclear leukocytes and endothelial cells so that endothelial and smooth muscle cells, neutrophils and platelets may be sources of free oxygen radicals.”

According to Iannelli P\(^7\) “nutrition is one of the most relevant environmental factors in the development or prevention of chronic degenerative diseases.” Gan Y\(^8\) discussed in a meta-analysis that “higher fruit and vegetable consumption is inversely associated with CHD.”

Stahl W\(^9\) stated that “carotenoids comprise a class of natural fat-soluble pigments which are found in numerous fruits and vegetables. The consumption of a diet rich in carotenoids has been epidemiologically correlated with a lower risk for several diseases. The antioxidant activity of carotenoids and biochemical properties influencing signalling pathways have been discussed as basic mechanisms of prevention. However, there is convincing evidence that carotenoids are important components of the antioxidant network. Data from epidemiological studies consistently show an inverse correlation between the intake of fruits and vegetables and the incidence of several diseases such as cardiovascular, ophthalmological, gastrointestinal or neurodegenerative disorders and some types of cancer. It has been postulated that among the different dietary components of fruits and vegetables, the so-called secondary plant constituents play a major role in disease prevention. Some of these phytochemicals are responsible for the bright colours of plants. Among the various natural pigments, carotenoids comprise an important group of more than 600 structurally different compounds”

Gerster H\(^10\) argued that “a high intake of tomatoes rich in lycopene could just be an indicator of a generally healthy life style.”

As per Rao AV\(^11\) “lycopene is a naturally present carotenoid in tomatoes and other fruits and vegetables. Unlike β carotene, it does not have provitamin A activity. It is one of the most potent antioxidants among the dietary carotenoids. It is readily absorbed from different food sources, distributes to different tissues and maintains its antioxidant properties in the body. It is suggested to have anti-cell-proliferative, anticarcinogenic and antiatherogenic activities. Epidemiological and a small number of animal and
experimental studies have provided evidence in support for its protective role in heart
disease and cancer.”

Rao AV\textsuperscript{11} also stated that “although the antioxidant properties of lycopene are thought to
be primarily responsible for its beneficial properties, evidence is accumulating to suggest
other mechanisms such as modulation of intercellular gap junction communication,
hormonal and immune system and metabolic pathways may also be involved.”

Lycopene, as an antioxidant, may be having considerable therapeutic potential, but it is
not used as a lipid lowering agent in the management of coronary heart disease. Although there have been extensive studies on the antioxidant and hypolipidaemic
properties of tomatoes and processed tomato products for the prevention of CVD, the
beneficial effects of pure lycopene supplement as an antioxidant and hypolipidaemic are
not yet out of the preview of debate. As stated by Mulkalwar S\textsuperscript{12} “despite the spotlight on
lycopene, it may not be protective on its own. It may only be functioning as a marker for
other active substances present in the tomatoes, or it may be working along with other
phytonutrients to confer health benefits.” Hence, our aim in this study was evaluation of
hypolipidaemic, antioxidant and hypoglycaemic effect of pure lycopene in the powder
form in hyperlipidaemic rabbits.

Nitric oxide has been shown to play an important role in regulating the vascular tone.
However, there is paucity of references vis-à-vis effect of lycopene on serum nitric oxide
levels. Therefore, it is interesting to evaluate the effect of lycopene on serum nitric oxide
levels in addition to its hypolipidaemic, hypoglycaemic and antioxidant activity.