Introduction

Tobacco product use and smoking are the leading causes of preventable deaths throughout the world. Of those deaths, one-third are attributed to cardiovascular disease (CVD). The cardiovascular (CV) effects of tobacco exposure can include atherogenesis, vascular injury, thrombosis, arrhythmias and inflammation and may be attributable to the many different harmful and potentially harmful constituents (HPHCs) present in tobacco products***(Maritz and rayise ,2014).***

The (HPHCs) found in tobacco products include volatile organic compounds (VOCs) of which reactive aldehydes, such as acrolein and crotonaldehyde, are likely the most significant contributors to CV toxicity. High levels of aldehydes are present in cigarette smoke as well as smokeless tobacco. Risk assessments, using the prevalence of each individual chemical weighed by its potency, suggest that the non-cancer risk of smoking is dominated by acrolein, which contributes 40–100 times more to risk than any other chemicals present in cigarette smoke ***(Keith et al .,2018).***

Nicotine is one of the most pharmacological active and toxic component of the tobacco smoke, that readily crosses the placenta and concentrated in the fetus tissue 15 times higher than maternal level ***(Hisu et al .,2014)***

Maternal smoking during pregnancy increasing the risk of congenital heart defect in offspring ***(Shan et al ., 2009).***

Nicotine increase oxidative stress, which may be associated with apoptosis , it is termed programmed cell death, that plays a critical role in

the pathogenesis of a variety of cardiovascular diseases ***(Brown et al .,2012).***

It has been shown that apoptosis occurs in myocardial tissue samples from patients suffering myocardial infarction, dilated cardiomyopathy and end-stage heart failure . Based on the above facts, we hypothesized that nicotine can induce cardiomyocyte apoptosis, which may be involved in the pathogenesis of nicotine-induced cardiovascular diseases**.** ***(Colombo et al .,2013).***

Transforming growth factor (TGF-B) is induced during cardiac development and present in endothelial cells , vascular smooth muscle cells and macrophages ***(Das et al .,2012)***

A number of invitro and invivo studies have demonstrated that , nicotine induces TGF-B production in aortic smooth muscle cells ,and increases collagen and fibroblast activation in the heart tissue ***(Baychuk and* Hayward*, 2011).***

Although the clinical complication of atherosclerosis occur in adult life, the process of atherogenesis begin in childhood ***(Lee and Lupo,2013).***

Vascular endothelium plays an important role in the maintenance of (CV) health. Endothelial dysfunction is a key feature of early atherosclerotic lesions and predictive of CV prognosis in both human and animal models. Endothelial cells are major targets of inflammatory cytokines released from various immune cells and vascular cells ***(Liu et al .,2017).***

It has been shown that inflammatory cytokines, such as tumor necrosis factor (TNF) , interact with endothelial cells or vascular smooth muscle cells to induce endothelial nitric oxide dysfunction, reactive oxygen species (ROS) production and vascular smooth muscle cell proliferation, resulting in endothelial dysfunction and promotion of (CVD) ***(Rabkin ,2016).***

Active macrophages are the main source of inflammatory cytokines. Macrophages *via* their scavenger receptors take up oxidized low density lipoprotein (oxLDL) and other lipids, undergo activation, and produce various cytokines. The macrophages also produce an oxidative state that promotes the oxidation of LDL, activation of endothelial cells and monocyte migration into the vascular wall, initiation of vascular inflammation and progression of atherosclerosis **(Wang et al .,2017).**

Recently, we have shown that nicotine can synergize with oxLDL to increase macrophage expression of scavenger receptor . Nicotine in the presence of oxLDL promoted macrophage activation and production/release of multiple pro-inflammatory cytokines in vitro including interleukin 6 (IL6) , monocyte chemoattractant protein , and accelerated atherosclerosis in vivo ***(Liu et al .,2017).***

Increased aortic tunica media thickness (aTMT) has been shown to be one of the earliest sign of atheroma formation ***(Minicucci et al .,2009).***

Ascorbic acid is an essential component of the human diet .Most of the animal species can synthesize it from glucose ,except for guinea pigs and humans ***(Taylor et al .,2018).***

Recent studies showed that , ascorbic acid may play a role in adverse bad effect of nicotine on cardiac muscle and aortic wall in rat offspring ***(Maritz and rayise ,2014).***

Ascorbic acid decrease the amount of p-benzoquinone (p-BQ),that is (ROS) causing oxidative damage with subsequent cardiomyocytes damaged (**Kelly , 2003)** .