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Review Article

A REVIEW ON THE ROLE OF TRIGLYCERIDE IN METABOLIC SYNDROME

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ABSTRACT

Increased serum triglyceride levels are commonly observed in subjects with metabolic syndrome (MS). Many studies show that hypertriglyceridemia is forcefully collaborated with all components of MS. The aim of this study was to review the role of triglyceride in MS. Based on prior epidemiological studies, this review indicates association of high triglyceride levels with cardiovascular disease (CVD). On the other hand, it is clearly shown that CVD is one of the main causes of death worldwide. Thus, it is important to investigate about MS and its components to decrease the prevalence of MS among different.

Keywords: Triglycerides, Risk factors, Metabolic syndrome, Cardiovascular disease.

INTRODUCTION

There is an elevated attention on metabolic syndrome (MS) in the past few years. MS was defined by Reaven as a conglomerate of coronary risk factors, in 1998 [1]. Many other researchers have shown modified definitions [2-4]. In 2007, Grundy [5] explained the reasons for MS analysis, which were more useful than the clinical perspective. Detection of MS is important. MS can be identified with the risk of atherosclerosis, Type 2 diabetes mellitus (T2DM), morbidities and mortality [6-13]. The prevalence of MS differs according to different factors, i.e. country, gender, and age. The prevalence of MS depends on age progression. In fact, some studies have shown different rates of MS prevalence in the world [14]. Age-depended studies on people of some European countries (Switzerland, Spain, the Netherlands, Italy, France, the UK, and Denmark) showed that the prevalence of MS changed from 14% to 41% in non-diabetic individuals under 40 years old [14]. Buckland *et al*. [15] showed that the frequency of MS in people of Catalonia (Spain), aged 18-74 years elevated from 2.5% to 51.1%. Ford *et al*. [16] also revealed that the prevalence of MS in people of USA altered from 6.7% (20-29 years old) to 43.5% (60-69 years old). Different cross-sectional studies have shown that the prevalence of MS in some developing countries is high. Studies on adult Indian and Iranian people indicated that the prevalence of MS changed from 33.7% to 41% [17-19]. It is noteworthy to mention that Marjani *et al*. showed that the most age distributions of this disease were between ages of 35 and 40 years and the frequency of MS reached its peak in ages of 35-40 years. The same study also represented the increased frequency of MS within Fars women aged 25-29 [20]. However, some studies in Turkey and Norway demonstrated that the prevalence of the MS increased with age [21,22]. Cardiovascular diseases (CVDs) are one of the main causes of death among females in the world [23]. Many studies have shown that females aged over 55 pose a higher risk of developing CVD than younger females [24-26]. Dyslipidemia is described as high triglyceride and low high-density lipoprotein (HDL) cholesterol levels in MS. Elevated free fatty acids cause hypertriglyceridemia in people with insulin resistance and hyperinsulinemia. Hypertriglyceridemia is collaborated with modification in HDL and LDL structure and metabolism [27]. Increased serum triglyceride levels are frequently observed in subjects with MS. Many studies showed that hypertriglyceridemia is forcefully collaborated with all components of MS. Patients with MS and high triglyceride in many cases show increased atherogenic level of triglyceride-rich lipoproteins [27]. There are still different controversial questions that whether high triglyceride is the reason of coronary artery disease or not. Many studies have shown that hypertriglyceridemia collaborated with elevated coronary disease risk in both genders [28]. It has been reported that the prevalence of hypertriacylglycerolemia was more prevalent in males than in females 12.9% and 16.7% respectively [29,30] whiles study of Velásquez-Meléndez *et al*. [31] indicated that this trend was partly higher in females (23.9%) than males (20.5%). There were significant differences between the mean values of triglyceride among women with and without MS in age groups 20-24, 25-29, 30-34, and 35-40 years old [32]. Some studies have reported that the prevalence of high triglyceride levels was considered in women with MS in different ethnic groups [20,33-35]. People in India, Pakistan, Sri Lanka, Bangladesh, and Nepal have shown an increased prevalence of MS and T2DM when compared with Europeans [36]. Several factors such as increased fat compared with muscle tissue and central body fat distribution, have been suggested to explain the tendency of South Asians to develop these metabolic risk factors for CVD [37]. Studies in American Indians on triglyceride levels regarding the influence of MS and T2DM have shown that a moderate elevation in triglyceride levels and a significant increase in prevalence of T2DM have contributed to incident CVD [38,39]. It has been indicated that non-fasting triglyceride levels were associated with incident of CVD, elevated risk of myocardial infarction, ischemic heart disease and death [40,41]. The aim of the present study was to review on triglyceride in MS.

TRIGLYCERIDES AND DISEASE RISK

The differences in the prevalence of MS, with respect to the components of MS have been shown. These differences might be described by genetic, environmental, and socio-demographic factors in different countries and populations [42].

The slope of morbidity and mortality because of MS has changed in recent decades due to exchanges in food intake, lifestyle habits, and reduction in physical activity among the different population in the world. Many epidemiological researches have shown the connection between triglycerides and coronary heart disease (CHD) risk, but the association had not been determined clearly [43]. Another study [44] clearly demonstrated the relation of fasting triglycerides and alterations in fasting triglycerides with the incidence of CHD in Israeli soldiers aged 26-45 years. Most population studies showed an association between fasting plasma triglycerides and CVD risk in addition that triglyceride was no longer an independent predictor [45-47], while other studies showed that triglyceride maintained its independent predictive power [48]. Study of Austin [49] indicated that underrating of triglyceride association with CHD is due to the fact of the biological

differences in its measurement and an inverse correlation between triglycerides and HDL-cholesterol, making multivariable estimation of its effect difficult to explain.

The study on healthy American women showed that fasting and non-fasting triglycerides were associated with future CVD after adjustments for age, blood pressure, smoking, and hormone-replacement therapy [40]. Studies on Japanese men and women has been shown that non-fasting triglyceride has revealed associated with increased CVD risk and also another study reported that non-fasting triglyceride was a stronger predictor of CVD than fasting triglycerides [50].

The prevalence of triglyceride levels higher than 150 mg/dL is almost twice higher in subjects with MS compared to those without MS [51,52]. High triglyceride level was the second most common (74%) among components of MS [53]. Observation of high prevalence of triglyceride levels have shown in patients with MS and CVD [54]. Studies showed that there are associations between patients with chronic kidney disease (CKD) and dyslipidemia. It takes place in patients with nephrotic syndrome, in patients undergoing dialysis, and after renal transplantation [55]. A triglyceride level higher than 200 mg/dL has been shown in almost 50% of patients with CKD. Several risk factors such as T2DM, obesity, and infrared change lipoprotein metabolism. MS, often are seen in CKD patients [56].

CONCLUSION

This review is about the possible correlation of high triglyceride levels with CVD and indicates their close association based on prior epidemiological studies. Therefore, it is highly recommended to further investigate their association to decrease the prevalence of morbidity and mortality caused by CVDs.

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