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Modest alcohol consumption and carotid plaques or carotid artery stenosis in men with non-alcoholic fatty liver disease

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ABSTRACT

Background: Favorable association between modest alcohol consumption and cardiovascular disease had been reported in general population, however, whether observed benefit extend to men with established fatty liver disease remains unknown.
Methods: Cross-sectional study of 10,581 consecutive male participants aged 30 years or older undergoing abdominal ultrasonography and carotid artery ultrasonography were screened. Non-alcoholic fatty liver disease (NAFLD) was diagnosed with ultrasonography and exclusion of secondary causes for fat accumulation or other causes of chronic liver disease. Modest alcohol use was defined as consumption of less than 20 g of alcohol per day.
Results: There were total 2280 men diagnosed with fatty liver, and the mean age was 51.8 years old. Among them, 1797 were modest alcohol drinkers. The prevalence of carotid plaques (55.3% vs. 43.4%, $p < 0.001$) and carotid artery stenosis (11.0% vs. 5.5%, $p < 0.001$) was higher in non-drinkers than modest drinkers. Modest alcohol consumption had the independent inverse association with carotid plaques [odd ratio (OR): 0.74, 95% confidence interval (CI): 0.60–0.92] and carotid artery stenosis (OR: 0.62, 95% CI: 0.43–0.90), adjusted for age, smoking and metabolic syndrome.
Conclusions: Modest alcohol consumption had a favorable association with carotid plaque or CAS in men with NAFLD.

1. Introduction

Nonalcoholic fatty liver disease (NAFLD) is a rapidly increasing chronic liver disease worldwide [1–3]. Its prevalence has been continuously rising over the past decade in many parts of the world [2]. Although NAFLD is usually benign in most patients, the clinical course of NAFLD widely varies and can result in cirrhosis, liver failure, or hepatocellular carcinoma [1]. Furthermore, NAFLD is not only limited to causing hepatic problems; NAFLD has been proposed as the hepatic manifestation of metabolic derangement of the body, with insulin resistance as the common pathophysiological mechanism [4]. Thus, patients with NAFLD are at increased risk of complications related to metabolic diseases. In particular, cardiovascular disease is the most common cause of death in patients with NAFLD [5–7].

The definition of NAFLD requires that a person not consume significant amount of alcohol, although what constitutes significant alcohol consumption remains unclear. Once diagnosed with NAFLD, avoidance of heavy alcohol consumption is recommended [1]. However, as the American Association for the Study of the Liver Disease practice guideline states, 'no recommendation can be made with regards to non-heavy consumption of alcohol by individuals with NAFLD' [1], because there are few data that reported the

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effects of ongoing alcohol consumption on disease severity or natural history of NAFLD, cancer risks and the cardiovascular system. As cardiovascular disease is a major cause of death in NAFLD [5], it is very important to understand the effects of ongoing non-heavy, modest alcohol consumption on cardiovascular disease in people with NAFLD.

When used in modest amount, alcohol shows favorable pleiotropic effects on lipids, adhesion molecules, platelet activation and oxidative stress explain the beneficial effects of modest drinking [8]. With the general population, cardiovascular and metabolic benefits of modest alcohol consumption have been well described. People who consumed one alcoholic drink daily had a decrease of 30–40% in cardiovascular mortality compared with non-drinkers [9]. Despite the epidemiologic evidence of a potential benefit of 'modest' alcohol consumption in the general population, to our knowledge, there has been no report that assessed the association between alcohol consumption and cardiovascular diseases in NAFLD. In addition, another concern exists as to whether alcohol consumption, even if only a modest amount, would be safe for the liver in NAFLD patients who already have established steatosis within hepatocytes. Considering the popularity of alcohol beverages, the increasing prevalence of NAFLD, and the high cardiovascular mortality among NAFLD patients, these issues need to be critically evaluated.

Carotid ultrasound is one of measures to assess the risk of cardiovascular disease [10]. Carotid plaques, which are identified by carotid ultrasound, represent a good clinical model of early atherosclerosis [11]. The presence of carotid plaques is indicative of increased cardiovascular risk [12]. In addition, carotid artery stenosis (CAS) on carotid ultrasound predispose people to transient ischemic attacks and strokes [13], as well as correlates well with coronary artery disease [10]. Thus, both carotid plaques and CAS are good surrogate markers for assessing the risk of cardiovascular disease. Carotid ultrasound is simple and non-invasive, with no risk of radiation exposure. Thus, this tool is often used for screening the risk of cardiovascular disease for asymptomatic individuals. In this study, we aimed to evaluate association between modest alcohol consumption and the risk of cardiovascular diseases in patients with NAFLD by means of the presence of carotid plaques and CAS on carotid ultrasound.

2. Methods

2.1. Study population

The study population comprised 10,581 consecutive men aged 30 or older who underwent a routine health check-up examination including an abdominal ultrasonography, and a carotid artery duplex ultrasound at the Center for Health Promotion of the Samsung Medical Center in Seoul, Korea, from January 2009 to December 2009. These men underwent these examinations as a part of their routine health check-up. Among the10,581men, we excluded participants for one or more of the following reasons (Fig. 1): no data on carotid plaques or CAS ($n = 13$), incomplete data on medical history, anthropometry ($n = 120$), daily alcohol intake $\geq$ 20 g or ex-drinkers ($n = 3112$), positive serologic finding for hepatitis B or C viruses ($n = 653$), history of malignancy, stroke, cardiovascular diseases or hepatectomy ($n = 293$), history of chronic aspirin use ($n = 528$), abnormal findings on the abdominal ultrasound (intrahepatic bile duct dilatation, intrahepatic stone, liver nodule or mass) ($n = 24$), and no evidence of fatty liver on abdominal ultrasonography ($n = 3558$). This exclusion was to select men with NAFLD by selecting men who has evidence of fatty liver by ultrasonography, but has no evidence of other chronic liver disease or secondary causes for hepatic steatosis. The final study population included 2280 men. The study protocol was approved by the institutional review board of the Samsung Medical Center, Seoul, Korea. The requirement for the informed consent was exempted by the Institutional Review Board because the study was

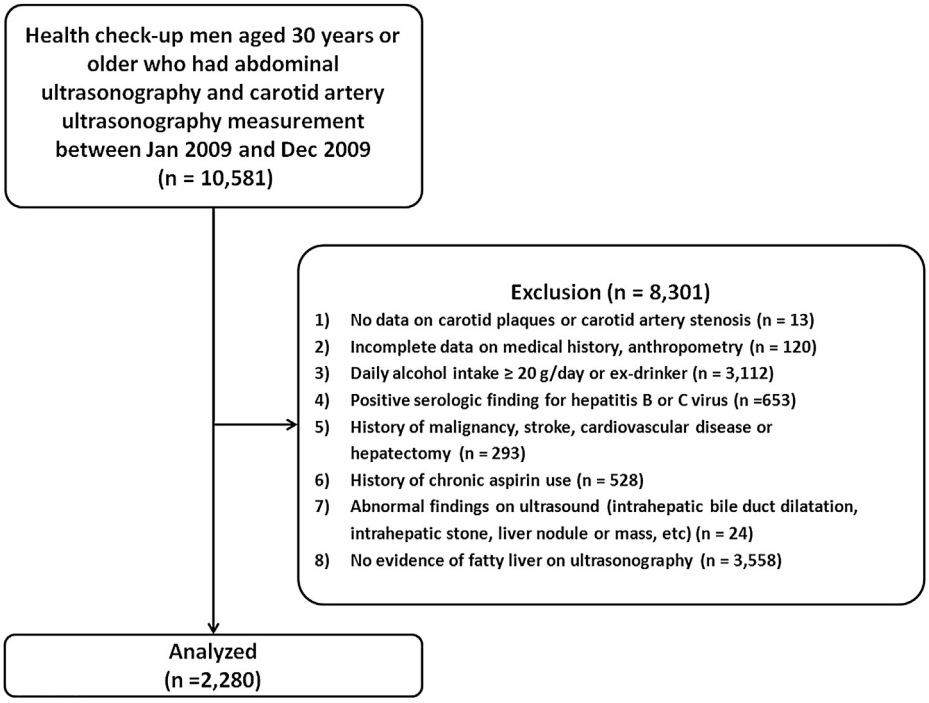

Fig. 1. Flow chart of the study subjects. Among 10,581 consecutive men, 8301 men were excluded and 2280 men were analyzed.