ELSEVIER

Clinical Research

Vascular Disease Prevalence and Risk Factors in a Screened Korean Male Population

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Background: Vascular diseases, such as carotid artery stenosis (CAS), abdominal aortic aneurysm (AAA), and peripheral arterial occlusive disease (PAD) of the lower limb, are common in elderly men. These diseases have not been thoroughly reported in Eastern countries as well as in Western countries. We compare the prevalence rates in Korea with previous reports, and evaluate correlations between known risk factors and these conditions in this population.
Materials and Methods: From November 2008 to December 2012, elderly men (≥65 years) were randomly referred from the Incheon Federation of the Korean Senior Citizens' Association, which is one of the major organizations representing retired individuals in Korea. CAS was defined as ≥50% of internal CAS, AAA was defined as ≥3 cm aortic diameter, and PAD of the lower limb was defined as an ankle brachial index ≤0.9.
Results: The average age was 72.14 ± 5.15 years. CAS was detected in 116 subjects (7.2%), AAA was detected in 52 subjects (3.2%), and PAD was detected in 79 subjects (4.9%). On multivariate analysis, octogenarian status and coronary artery disease were significantly associated with CAS and current smoking was significantly associated with PAD ($P < 0.001$).
Conclusions: The Korean prevalence rates of CAS and PAD in this study are similar to previous reports. The prevalence of AAA in Korea is lower compared with western reports, but higher than previous Asian reports. It is presently necessary to conduct major clinical studies throughout Asian countries to prepare for a rapid increase in the prevalence of major vascular diseases in Asia.

INTRODUCTION

Peripheral vascular diseases, such as carotid artery stenosis (CAS), abdominal aortic aneurysm (AAA), and peripheral arterial occlusive disease (PAD) of the lower limb, are common in elderly men, and their prevalence rates and characteristics have been thoroughly reported in Western countries.[1–3]

CAS is well known as a leading cause of stroke and is strongly associated with mortality.[4] The sequelae of stroke decrease the quality of life in physical, emotional, psychological, and social ways. A ruptured AAA is a very serious condition with a high mortality rate of up to 50–90%.[5] PAD may easily progress to critical limb ischemia and consequent limb amputation.[6] Therefore, in Western countries, there have been many attempts to screen elderly individuals for peripheral vascular

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diseases in a timely fashion to prevent the subsequent complications of these conditions.[5–7]

According to the World Health Organization classification, Korea became an aging society in 2007 and is expected to become an aged society and then a post-aged society in 2017 and 2025, respectively.[8] Recently, many other Asian countries have also experienced rapid industrialization, leading to westernization and increases in the elderly population. Consequently, the prevalence rates of peripheral vascular diseases are predicted to increase rapidly in Korea and in Asia in general. However, screening studies for peripheral vascular diseases in the general population have been sparse in Korea and Asia. Some prevalence studies have been conducted in Korea, but these studies have been based on hospitalized populations, not the general population.

The purpose of this study was to define the prevalence of CAS, AAA, and PAD in elderly men (≥65 years) in Korea and to evaluate correlations between known risk factors and these conditions in the population.

MATERIALS AND METHODS

Study Population and Design

The study subjects were elderly men >65 years of age who were living in Incheon city, which is the third largest city in Korea and a western neighbor of Seoul. The study population was not selected from hospital patient data, but instead was randomly selected from the Incheon Federation of the Korean Senior Citizens' Association (KSCA). The KSCA is a nationwide corporate aggregate established in 1969 and has approximately 2,500,000 members. It is one of the representative groups for retired individuals in Korea.[9] The authors and the KSCA made an announcement regarding a vascular screening program to KSCA members, who participated in this program voluntarily. Elderly men are known to be at high risk for peripheral vascular disease; thus, this population was the focus in this study because of budgetary limitations. We also excluded patient data obtained from individuals who were previously diagnosed and treated for peripheral vascular disease before.

After approval by Inha University Hospital's Institutional Review Board, the study was conducted between November 1, 2008 and December 31, 2012 at the Inha University Hospital. Written consent was obtained from participants, who were then asked to complete a questionnaire-based survey of their medical history. Data were collected regarding the following risk factors: age, hypertension, smoking, obesity (body mass index [BMI] >25), diabetes mellitus, dyslipidemia, and history of coronary artery disease.

Measurement and Diagnostic Criteria

A carotid Doppler ultrasound was used to determine CAS, transabdominal ultrasonography was used to determine the presence of AAA, and an ankle brachial index (ABI) was used to determine the presence of PAD of the lower limb. One vascular surgeon and 2 radiologists performed all imaging examinations, including carotid Doppler and transabdominal ultrasonography. Two professional engineers who were working at the vascular laboratory performed every ABI. Accuvix V10 (Medison, Seoul, Republic of Korea) and P5 (GE Healthcare, London, UK) were used for the ultrasound, and ABI was measured using the VP1000 (Omron, Tokyo, Japan). Two trained radiology technicians performed the examinations, while 2 vascular surgery specialists and 2 radiology specialists confirmed the readings.

For the carotid Doppler ultrasound, two-dimensional (2D) and color modes were used to examine both the proximal and distal regions of the right common carotid artery (CCA) and internal carotid artery (ICA), followed by measurement of the peak systolic velocity (PSV). The North American Symptomatic Carotid Endarterectomy Trial criteria were used to determine the presence of stenosis. The PSV ratio, that is, the ratio of the ICA PSV to the CCA PSV (ICA PSV/CCA PSV), was calculated. If the PSV in the ICA was ≥125 cm/sec or the PSV ratio was >2, then more than 50% stenosis was considered to be present.[10] The protocol was repeated for the left carotid artery. If at least one side exhibited ≥50% stenosis, then the patient was confirmed to have CAS.

For the transabdominal duplex ultrasonography, the abdominal aorta was first identified using the 2D and color modes. Then, the artery was scanned from the renal artery area to the takeoff point of the iliac artery to identify the presence of aneurysms. If the aortic diameter was ≥3 cm in the minor axis, the patient was considered to have AAA.

ABI was determined using the oscillometric method. Blood pressure was measured in both arms and ankles. The higher arm systolic reading was used for the assessment. Each ankle's blood pressure and the higher arm blood pressure value were used to calculate the ABI for each leg. An ABI of ≤0.9 indicated the presence of PAD. The subjects' characteristics were noted and the prevalence of each peripheral vascular disease of interest was investigated, based on the criteria of ≥50% CAS,