RESEARCH PAPER

Prevalence, risk factors and consequences of cerebral small vessel diseases: data from three Asian countries

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ABSTRACT

Background Cerebral small vessel disease (SVD) has been suggested to be more common in Asians compared with Caucasians. However, data from population-based studies in Asia are lacking. We report on the prevalence, risk factors and consequences of SVD from contemporary studies in three Asian countries using 3-Tesla MRI for the evaluation of SVD.

Methods Clinical, cognitive and 3-Tesla brain MRI assessments were performed among participants of three studies from Singapore, Hong Kong and Korea. SVD markers include white matter hyperintensities (WMHs) using the modified Fazekas scale, lacunes and microbleeds. Cognition was assessed using the Mini Mental Status Examination (MMSE) and Montreal Cognitive Assessment (MoCA). Adjustments were made for age, sex and cardiovascular risk factors.

Results A total of 1797 subjects were available for analysis (mean age: 70.1±6.3 years and 57% women). The prevalence of confluent WMH was 36.6%, lacunes, 24.6% and microbleeds, 26.9%. Presence of all three SVD markers was associated with worse performance on MMSE and MoCA.

Conclusion Elderly Asians have a high burden of SVD which was associated with cognitive dysfunction. This suggests that SVD markers should be a potential target for treatment in clinical trials so as to delay progression of cerebrovascular disease and potentially cognitive decline.

INTRODUCTION

Vascular risk factors such as hypertension, hypercholesterolaemia and diabetes are highly prevalent in the elderly population and are increasingly implicated as a cause and contributor to cognitive impairment and dementia.1,2 These systemic vascular risk factors are not only of interest in dementia and its preclinical stages (mild cognitive impairment) but also in cognitively normal elderly due to their association with cerebral small vessel diseases (SVDs). Moreover, these vascular risk factors are modifiable and hence are potential therapeutic targets.3

Advances in structural neuroimaging such as MRI have provided the means to assess cerebrovascular disease burden accumulated throughout life. The standard markers of SVD include lacunes, cerebral microbleeds and white matter hyperintensities (WMHs). These SVD markers are commonly observed on the brain imaging of normal elderly subjects with prevalence ranging from 8% to 28% for lacunes, 5%–23% for cerebral microbleeds and 50–98% for WMH.4 Although often subclinical, these lesions are frequently associated with stroke, cognitive impairment, cognitive decline, dementia and mortality.

Ethnic differences in the prevalence of cerebral SVD have been attributed to differences in vascular risk factors, genetic and environmental susceptibility. While it has been suggested that the prevalence of lacunar infarcts may be higher in Asians (45%) compared with Caucasians (41%), this observation has been limited to a hospital-based setting and was performed in a non-Asian country.5 So far, only one study has shown that the prevalence of WMH is significantly higher in Chinese (38.5%) than in whites (28.4%).4 Despite this high prevalence of SVD in Asia, most of the studies on risk factors have so far been performed in Caucasians. Currently, there is a paucity of data on the burden of SVD in the general elderly population in Asia specifically from the Asia Pacific region. Given the clinical relevance of SVD, understanding the burden of SVD among Asian countries will provide important information regarding healthcare planning and resource allocation for healthcare service and research. Hence, in this study, we aimed to report on the prevalence and risk factors of MRI markers of SVD and its consequences in Asian elderly from Singapore, Hong Kong and Korea.

METHODS

The study sample consisted of participants from three population-based studies in countries from the Asia Pacific Region: Singapore, Hong Kong and Korea. The descriptions of each study are as follows.

The Epidemiology of Dementia In Singapore (EDIS) study drew participants from the Singapore Epidemiology of Eye Disease (SEED) study, a multi-ethnic population-based study in persons aged 40–85 years among Chinese (Singapore Chinese Eye Study (SCES)), Malay (Singapore Malay Eye Study (SiMES-2)) and Indians (Singapore Indian Eye Study (SINDI-2)). In the first phase of the EDIS study, participants aged ≥60 years underwent cognitive screening using the Abbreviated Mental Test (AMT) and a self-report of progressive forgetfulness (PFQ). Screen positives were defined.