

# ATHEROSCLEROSIS RISK FACTORS FREQUENCY AMONG NORTH AMERICANS AND IRANIAN STROKE CASES

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## Abstract

**INTRODUCTION:** Atherosclerosis of cerebral arteries is the most common etiology of ischemic stroke around the world. This pilot double-center study evaluated risk factors of atherosclerosis in stroke patients in two different racial subtypes.

**METHOD AND MATERIALS:** This prospective clinical study was conducted on 100 consecutive stroke patients in Mackenzie hospital, Canada and 100 consecutive stroke patients in Ghaem hospital, Iran in 2007. The patients were age and sex matched. All of the Canadian patients were from white North American race and all of the Iranian patients were white Persian race. Diagnosis of ischemic stroke was made by stroke neurologists. The frequency rates of hypertension, diabetes, hypercholesterolemia and smoking were detected in the two studied groups. Chi-Square and Fisher tests served for statistical analysis and  $P < 0.05$  was declared as significant.

**RESULTS:** 92 males and 108 females with ischemic stroke were investigated. Hypertension was the most common risk factor of atherosclerosis in all patients followed by hypercholesterolemia, diabetes and smoking. The influence of race on the frequency rate of atherosclerosis risk factors was not significant,  $P > 0.05$ . Hypertension was significantly more frequent in Iranian than Canadian males:  $df = 1$ ,  $P = 0.023$ . However, racial difference in the frequency rate of the hypertension was insignificant in the females:  $df = 1$ ,  $P = 0.841$ . The effects of race on frequency rate of other atherosclerosis risk factors was insignificant in each gender separately,  $P > 0.05$ .

**CONCLUSION:** There is no significant difference in frequency rate of atherosclerosis risk factors between North American and Persian stroke patients.

**Keywords:** Atherosclerosis, Risk Factors, Stroke, Race.

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## Introduction

A number of large epidemiological studies in North America and Europe have identified numerous risk factors for the development and progression of atherosclerosis.<sup>1</sup> The prevalence of stroke and atherosclerosis risk factors vary by race-ethnicity.<sup>1</sup> It has been shown that modification of several major risk factors for stroke can reduce stroke incidence. These differences are crucial to the etiology of stroke and to the design of stroke prevention programs.<sup>1</sup> Relative risk of stroke among definite hypertensive cases compared to normotensive cases is 3.1 in men and 2.9 in women.<sup>1</sup> Even borderline levels of hypertension carry a 50% increased stroke risk.<sup>1</sup> There is no

clear or consistent relationship between ischemic stroke and blood lipid levels. A meta-analysis of 45 prospective epidemiologic studies found no significant association between total serum cholesterol and stroke incidence.<sup>2</sup> Diabetics have an increased susceptibility to atherosclerosis and an increased prevalence of other atherogenic risk factors.<sup>2</sup> The Honolulu Heart Program monitoring Japanese men living in Hawaii found that increasing degrees of glucose intolerance is associated with an increased risk of thromboembolic stroke, which was independent of other risk factors.<sup>3</sup> Case-control studies of stroke patients and prospective epidemiologic studies have confirmed an independent effect of diabetes with a relative risk of ischemic stroke in diabetics from 1.8 to 3 times compared

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to nondiabetics.<sup>4</sup> Cigarette smoking has been clearly linked to brain infarction in the Honolulu and Framingham epidemiologic studies.<sup>3,4</sup> In a meta-analysis of 32 studies, cigarette smoking was a significant contributor of stroke incidence in both men and women.<sup>4</sup> This pilot double-center study was designed to evaluate atherosclerosis risk factors in patients with ischemic stroke.

### Materials and Methods

100 consecutive ischemic stroke patients admitted in Walter Mackenzie hospital, Canada and 100 consecutive ischemic stroke patients admitted in Ghaem hospital, Iran in 2007 enrolled in this prospective study. The Canadian patients consisted of white North American race and the Iranian patients were white Persian race. Ischemic stroke patients were age and sex matched in the two groups. Diagnosis of ischemic stroke was made by stroke neurologists. Stroke was defined as an ischemic focal neurological deficit that persisted at least 24 hours.<sup>5</sup> All of the ischemic stroke patients had one or more control brain Computerized Tomography (CT) 48-hour post stroke.<sup>6</sup> Hypertension was defined as using antihypertensive medication or patients with two blood pressure values (at least 1 week apart) higher than 140/90 mm/Hg.<sup>6</sup> Administration of antidiabetic medication or a fasting blood glucose > 6.4 mmol/l or > 126 mg/dl were defined as diabetes mellitus. Hypercholesterolemia assumed as using lipid lowering medication or fasting cholesterol > 5.2 mmol/l or > 200 mg/dl.<sup>5</sup> Patients who smoked more than 5 cigarettes per day in recent year were defined as smoker.<sup>7</sup> The effects of race and gender on frequency rate of atherosclerosis risk factors analyzed by Chi-Square and Fisher tests and  $P < 0.05$  was declared as significant. The protocol was approved by our institutional ethics committees

and the informed consent was obtained from the subjects and/or their guardians.

### Results

Two hundred ischemic stroke patients (92 males, 108 females) were evaluated. Mean age of the North American and Iranian stroke patients were 71.88, SD = 10.99 and 68.7, SD = 5.3 respectively. In the Iranian group, hypertension was found in 55% of the cases followed by hypercholesterolemia (46%), diabetes (37%) and smoking (16%). In North American group, Hypertension was detected in 64% of the cases followed by hypercholesterolemia (47%), diabetes (32%) and smoking (15%). The effect of race on the frequency rate of hypertension, hypercholesterolemia, diabetes and smoking in all of the stroke patients was not significant ( $df = 1$ ,  $P = 0.194$ ), ( $df = 1$ ,  $P = 0.887$ ), ( $df = 1$ ,  $P = 0.458$ ) and ( $df = 1$ ,  $P = 0.841$ ) respectively. Table 1 demonstrates the effect of race on the frequency rate of atherosclerosis risk factors in each gender separately.

### Discussion

Comparing the occurrence of stroke in different races is often confounded by factors other than racial differences. These include socioeconomic, lifestyle and nutritional factors as well as a variation in risk factor abnormalities in different racial groups.<sup>1</sup> In recent years, attempts have been made to determine risk factor differences in different racial groups living in a single geographic location.<sup>8-10</sup> These researches determine the contribution of these risk factors to frequency of stroke.<sup>8-10</sup> Our research is designed to compare these differences in two Caucasian white races living in two continents. In our study groups, the effect of race subtypes and geographic difference in the frequency rate of atherosclerosis risk factors was

**Table 1:** Effect of race on the frequency rate of atherosclerosis risk factors in each gender separately.

Atherosclerosis Risk Factor	NA females	Iranian females	NA males	Iranian males	Race difference in females	Race difference in males
Hypertension	70.4%	68.5%	58.7%	80.4%	Df = 1, P = 0.841	Df = 1, P = 0.023
Diabetes	29.6%	46.3%	34.8%	26.1%	Df = 1, P = 0.074	Df = 1, P = 0.365
Hypercholesterolemia	44.4%	57.4%	50%	32.6%	Df = 1, P = 0.177	Df = 1, P = 0.09
Smoking	11.1%	1.8%	16.6%	27.7%	Df = 1, P = 0.056	Df = 1, P = 0.154

NA: North American

insignificant in all of the stroke patients and in each gender separately. However hypertension was significantly more frequent in Iranian than North American males. The reason for this difference is unknown. An European epidemiological study revealed that history of hypertension was significantly more frequent in female stroke patients.<sup>11</sup> Evaluation of racial and ethnic disparities in American stroke patients confirmed that American blacks were 1.6 times more likely than whites and Hispanics were 0.73 times less likely than whites to report hypertension.<sup>9</sup> Both American Hispanics and blacks were less likely than whites to have diabetes,  $P < 0.05$ .<sup>9</sup> Smoking was less common among Hispanics and blacks than whites in the America,  $P < 0.05$ .<sup>10</sup> The frequency rate of the atherosclerosis risk factors in our two studied groups is similar to the other reported studies around the world.<sup>1,4</sup> Evaluation of atherosclerosis risk factors in India showed that Indian stroke patients had a higher prevalence of smoking, hypertension, diabetes and lower high density lipoprotein cholesterol compared to the community controls.<sup>12</sup> Evaluation of traditional cardiovascular risk factors in Nigerians with stroke demonstrated that all of the stroke patients had at least one risk factor.<sup>13</sup> Hypertension was the most common risk factor in all of the Nigerian age groups, while dyslipidemia was the most common in patients aged 15 to 45 years.<sup>13</sup> In Thai population, diabetes was the most frequent atherosclerosis risk factor of stroke.<sup>14</sup> There was no difference in the presence of diabetes, hypertension, hypercholesterolemia and smoking in the white Caucasian and black stroke patients in the United States.<sup>8</sup> In Japan, substantial changes have occurred in the diet since World War II. These include an increase in animal fat and animal protein and a reduction in the amount of sodium chloride in the diet.<sup>1</sup> Industrialization and diet changes in recent decades in Iran could be the main reason of similarities in the frequency rate of the atherosclerosis risk factors between North American and Iranian patients. Our results confirms that Persian white race and North American white race have no difference in preponderance to the atherosclerosis risk factors although these races live in two distant continents. However both of these races are subtypes of white Caucasians.

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