



Gender differences in stroke

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Key words: Stroke, Stroke risk factors,
Gender and stroke, Stroke in men, Stroke in
women.

Abstract

Everyone is aware of many differences between men and women in everyday life. But, how different are we in coping with diseases? Nowadays, results of stroke studies more often point out gender differences. It has been shown that men and women have a different profile of vascular risk factors, different response to medical treatment, therapeutic interventions, as well as post-stroke disability and care. Data have shown women to be significantly older than men when stroke occurs, more likely to suffer cardioembolic stroke and have atrial fibrillation as a risk factor. Also, stroke onset differs among men and women. Acute stroke in women commonly presents with a coma, paralysis, aphasia, swallowing difficulties and urinary incontinence. Women also show greater disability and handicap after stroke, than men. There has been a noted difference as to where patients are discharged after hospital stay. While women are more often discharged to a chronic facility, men more often return home. These differences may imply some social differences, but also point out the need for careful future management and healthcare planning.

Everyone is aware of many differences between men and women in everyday life. We differ in the way we look, the way we talk, solve problems, and many other things. But, how different are we in coping with diseases? Many studies investigated this subject and tried to find a satisfying answer. In the text that follows, we will focus on gender differences in stroke, primarily on differences concerning stroke risk factors and some outcome measures.

Stroke is the second cause of mortality and morbidity in Croatia (1). For some time now we are aware that genetic differences and genetic predisposing factors greatly influence our stroke risk. Recent studies showed that heritability of ischemic stroke is higher in women, and that women have a profile of higher baseline risk factors (2). It seems that men and women are not susceptible to same risk factors. While women will more often have hypertension and intracranial stenosis, men will more likely have hyperlipidemia, peripheral vascular disease, abdominal aneurysm, severe carotid stenosis or aortic atherosclerosis. Among middle aged individuals (men and women between ages 45 and 65) differences were observed between sexes. Among stroke patients, women more often had hypertension and hypercholesterolemia, while men more often had history of previous heart disease, smoking and higher alcohol consumption. Data for diabetes is controversial. Also, women suffered cardioembolic strokes more often than atherothrombotic, which showed reverse in men. A Croatian population study showed a ten year difference in stroke occurrence between men and women. Men suffered stroke on average ten years earlier (55–74) than

women (65–84). Both sexes share small-vessel disease as the leading cause of stroke, but the second and third cause switch places in men and women. Cardioembolism is the second cause of death, and large-vessel disease is the third cause of stroke in women. These causes are reverse in men. On the other hand, a United States study showed no sex difference in location or stroke subtype among sexes (3, 4).

Increased body mass index (BMI) is considered a risk factor for stroke. Studies have shown that index of arterial stiffness is in correlation to BMI. Men have a higher stiffness index which is explained by a protective effect of female hormones. Studies have linked increased BMI ($>30\text{kg/m}^2$) in women with a higher risk of ischemic than hemorrhagic stroke, compared to women whose BMI did not exceed 25kg/m^2 . This risk can be controlled by adequate risk factor management (5).

Women with atrial fibrillation are exposed to a greater risk of ischemic stroke than are their male counterparts. This adds another point which needs to be considered when deciding on anticoagulation. Also, women showed to be more susceptible to hypercoagulable states following injury. Data points toward evidence that gender differences in coagulation mechanisms exist. Some studies even point towards higher incidence of stroke in urban areas with higher rate of air pollution (6).

For many years now opinions on hormone replacement therapy have been changing. Hormone replacement therapy increases the relative risk of ischemic stroke, coronary heart disease, and thromboembolism, but decreases the risk of fatal stroke. Studies have proven that caution is needed when considering estrogen administration in postmenopausal women who suffered stroke because women who received estrogen therapy had a higher risk of fatal stroke and their non fatal strokes were associated with somewhat worse neurologic deficits (7).

Migraine is a diagnosis which is far more prevalent in women than it is in men. Studies have shown that there is a positive correlation between migraine with aura and stroke. A population based study revealed that the risk of stroke in men who had headaches during the year preceding stroke was 4 times higher than in men without headaches, and 2 times higher than in men who had headaches in the past 5 years (8).

What happens once stroke occurs? Are stroke outcomes the same in men and women? Are there any differences in diagnosis or therapy? We would like to believe that we are all treated in the same way, according to newest guidelines. But, even if that is true, there are still some stunning differences. There is a noticeable difference in discharge destinations among sexes. While women were more likely to be discharged to a chronic facility, men more often return home. Is this purely due to worse stroke outcome in women? Or, are there still such strong social differences? Also, women seem to reach a medical facility much later than men after symptom onset (9, 10).

But, we do present differently at stroke onset. Acute stroke in women is more likely to present with a coma,

paralysis, aphasia, swallowing difficulties and urinary incontinence. Also, after a 3-month follow up, women showed greater disability and handicap than men. Despite this greater disability studies have shown that brain and vessel imaging was less frequently performed in women than it is in men (11, 12).

Data dealing with risks of carotid endarterectomy (CEA) is contradictory. First results of NASCET (North American Symptomatic Carotid Endarterectomy Trial) and ECST (European Carotid Surgery Trial) trials suggested asymptomatic men had a greater benefit of CEA, but newer studies point out that these differences are not clear to suggest not treating women surgically. Asymptomatic women showed to be at greater risk for postoperative TIA (transitory ischemic attack) or stroke, and stroke or mortality. These differences were not detected for symptomatic patients (13, 14).

All data point towards certain differences in stroke among sexes. But, how significant are they really? Are these differences significant enough for us to consider a different diagnostic or therapeutic approach? For these answers we will have to wait for some future investigations.

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