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Tobacco Smoking And The Risk Of Stroke: A Literature Review

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Abstract: This article analyzes the negative impact of smoking on human health, particularly on the brain and its vascular system. Special attention is given to the correlation between smoking and stroke (cerebrovascular disorders), based on scientific sources. Smoking contributes to the narrowing of blood vessels, increased blood pressure, and higher blood clotting, all of which can lead to stroke. The article also provides recommendations for stroke prevention through the adoption of a healthy lifestyle and smoking cessation. Studies conducted on this topic confirm that reducing or completely quitting smoking significantly decreases the risk of serious complications.

Keywords: ischemic stroke, hemorrhagic stroke, tobacco, atherosclerosis, vascular endothelium, brain, risk factors.

Stroke is one of the most significant global health challenges, exerting a profound impact on both quality of life and economic systems. Mortality and morbidity related to stroke are increasing sharply, particularly in developing countries [5,9,21,22]. Tobacco smoking has been identified as a major contributing factor. This article discusses the available evidence on the association between smoking and different types of stroke, its pathophysiological mechanisms, and the impact on public health.

Due to the lack of consensus among studies on the relationship between smoking and stroke, a meta-analysis was conducted. All published data were reviewed, and whenever possible, the relative risk for each study was determined. The overall relative risk was then calculated, taking into account the precision of each individual study. In total, 32 independent studies were analyzed. The pooled relative risk of stroke associated with smoking was found to be 1.5 (95% CI, 1.4–1.6). Subtype-specific risks

showed significant variation: ischemic stroke, 1.9; intracerebral hemorrhage, 0.7; and subarachnoid hemorrhage, 2.9. The effect of age on relative risk was also noted, with values of 2.9 in individuals under 55 years, 1.8 in those aged 55–74, and 1.1 in those over 75 years. A dose–response relationship between the number of cigarettes smoked and stroke risk was observed, and the risk appeared slightly higher in women compared to men. Former smokers under the age of 75 remained at significantly elevated risk (RR 1.5), while across all ages, the relative risk in former smokers was 1.2. The meta-analysis provides strong evidence that smoking is associated with an increased risk of stroke. Therefore, stroke should be included in the list of smoking-related diseases [8, 13,23,24,31].

The adverse cardiovascular effects of tobacco smoking are well established, as it increases the risk of both ischemic and hemorrhagic stroke [6,11,32,38]. Smoking has been shown to raise the risk of thrombotic and hemorrhagic stroke among men. To examine whether a similar association exists among women, a prospective cohort study was initiated in 1976, including 118,539 women aged 30–55 years, all free of cardiovascular disease, stroke, and cancer at baseline. Over an eight-year follow-up period (representing 908,447 person-years), 274 cases of stroke were documented, including 71 subarachnoid hemorrhages, 26 intracerebral hemorrhages, 122 thromboembolic strokes, and 55 unclassified cases due to insufficient information.

A clear dose–response relationship was identified between the number of cigarettes smoked per day and stroke risk. Compared to non-smokers, women who smoked 1–14 cigarettes daily had an age-adjusted relative risk of 2.2 (95% CI, 1.5–3.3), while those smoking 25 or more cigarettes per day had a relative risk of 3.7 (95% CI, 2.7–5.1). Among the latter group, the relative risk of subarachnoid hemorrhage was strikingly elevated at 9.8 (95% CI, 5.3–17.9) compared to non-smokers [39,40,51].

After adjusting for confounding factors such as body mass index, hypertension, diabetes, hypercholesterolemia, oral contraceptive use, postmenopausal estrogen therapy, and alcohol consumption, the association between smoking and stroke remained significant.

These prospective findings provide strong evidence of a robust positive association between smoking and stroke among young and middle-aged women [4, 10,27,28,37].

Effects of Smoking on Stroke Subtypes

Ischemic stroke results from impaired cerebral blood flow. Numerous studies have reported that tobacco smoking increases the risk of ischemic stroke. According to meta-analyses, daily smoking increases the risk of ischemic stroke by 50–60% [13,35,37]. Passive smoking has also been identified as an important factor contributing to an increased risk of ischemic stroke [2,32,34].

The association between smoking and hemorrhagic stroke remains controversial. Some studies suggest that smoking increases the risk of hemorrhagic stroke [12,29,36], while others have found the relationship to be non-significant [5,30,33,50]. These discrepancies may be related to the effects of smoking on blood pressure, coagulation systems, and vascular wall integrity. Because subarachnoid hemorrhage can be clinically distinguished from other types of stroke, we reviewed data on all stroke cases excluding those diagnosed as subarachnoid hemorrhage. Based on 35 independent risk estimates, the pooled relative risk of stroke, excluding subarachnoid hemorrhage, was 1.43 (95% CI, 1.33–1.55) [13,47].

Pathophysiological Effects of Smoking

Tobacco smoking significantly increases the risk of arterial hypertension, one of the major risk factors for stroke [15,17,25,27]. Nicotine activates the sympathetic nervous system, which in turn raises blood pressure and increases cardiac workload [16].

Smoking enhances platelet activation, promotes coagulation, and increases the likelihood of thrombus formation [7,45,46,53]. This process markedly elevates the risk of ischemic stroke.

Smoking accelerates the development of atherosclerosis, leading to arterial narrowing and further increasing the risk of ischemic stroke [1,18,49]. In addition,

toxic substances in tobacco smoke damage endothelial cells, reducing vascular elasticity.

Passive smoking also significantly increases the risk of stroke. Several studies have reported that passive smokers have a 25–30% higher risk of ischemic stroke [2,52].

Measures to reduce tobacco use can substantially lower stroke risk. Policies such as raising tobacco taxes, banning smoking in public places, and public education campaigns play an important role in reducing stroke incidence [3,41,43].

Limitations of Studies

Research on the relationship between smoking and stroke carries certain limitations. Failure to account for factors such as the total duration of smoking, quantity consumed, and individual variables (e.g., diet, physical activity) may influence outcomes. In addition, reliance on self-reported history may reduce data reliability [6, 19].

Smoking Cessation and Stroke Risk

Smoking cessation provides significant and rapid benefits in reducing stroke risk, particularly among light smokers (<20 cigarettes/day). In heavy smokers, complete elimination of excess risk is rarely observed. Switching to pipe or cigar smoking offers virtually no benefit, emphasizing the necessity of complete cessation. The absolute benefit of smoking cessation in lowering stroke risk is greatest among individuals with hypertension [14,26,42].

According to the World Health Organization (WHO), quitting smoking helps rapidly reduce stroke risk. Within five years, the risk of stroke among former smokers approaches that of never-smokers [3,20,44,48]. Therefore, supporting smoking cessation and expanding public health programs are of critical importance.

Conclusion

Tobacco smoking is a major risk factor for stroke, particularly ischemic stroke. Its adverse effects on blood pressure, coagulation systems, and vascular health contribute to the increased risk of cerebrovascular events. Public health initiatives,

preventive strategies, and legislative measures aimed at reducing tobacco consumption can play a key role in significantly lowering stroke incidence.

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