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Advances in Stroke : Population Studies

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Advances in Stroke
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With ischemic heart disease (IHD) and stroke sharing many risk factors, one could presume a similar geographic pattern of stroke and IHD; however, Kim and Johnston described remarkable worldwide variations in disability-adjusted life-years (DALY) loss for both diseases.[1] For stroke, much of Asia, eastern Europe, and Africa had DALY loss of ≥120/100 000 in contrast to North America, western Europe, and Australia having DALY loss rates ≤60/100 000. Eastern Europe and northern Asia also had strikingly high DALY loss (≥240/100 000) from IHD. Overall, there were 62 of 192 countries with higher DALY loss from stroke than for IHD, particularly for China, but also in many countries in Africa and South America. There were only marginally more countries (74 of 192) with higher DALY loss from IHD, particularly the Middle East, but also North America, Australia, and western Europe. Countries with lower national income, lower prevalence of diabetes, higher average alcohol intake, and less obesity tended to have higher DALY loss from stroke than IHD.[1]

The contributors to the substantial variations in stroke incidence within countries have been examined by reports including that by Grimaud and colleagues, who showed stroke incidence was as much as one third higher in regions of France with lower levels of socioeconomic status and/or higher levels of income inequality.[2] A similar one third difference (32%) in stroke risk was observed between high socioeconomic status and low socioeconomic status neighborhoods in the United States.[3] Attenuation of these neighborhood differences was larger with adjustment for biological risk factors (mediated to a 16% excess) than for behavioral risk factors (mediated to a 30% excess), suggesting that biological risk factors are in the pathway to these neighborhood differences.

Evidence was provided that disparities in stroke incidence (rather than case-fatality) are the primary contributor to the geographic and racial disparities in US stroke mortality, where the risk of incident stroke was 4.02 (95% CI, 1.23–13.11) greater for blacks than whites between the ages of 45 to 54 years, but decreased to 0.89 (95% CI, 0.33–2.20) at age >85 years.[4] Likewise, trends for higher stroke incidence were observed in the southeastern "Stroke Belt" region of the country with incidence rates 19% higher in the "buckle" of the Stroke Belt and 6% higher for the remainder of Stroke Belt.[4] Approximately 50% of the excess risk for incident stroke among blacks can be attributed to racial differences in the prevalence of the "traditional" risk factors identified in the Framingham Study with approximately half of that effect being attributable to racial differences in systolic blood pressure.[5]

The diurnal variations in stroke incidence were examined, where the Greater Cincinnati/Northern Kentucky Stroke Study (GCNKSS) estimated that 273 (14%) of 1854 strokes were "wake up" strokes detected on rising. There were no clinical or severity differences between these strokes and those occurring during waking hours, and 98 of the 273 patients would have been eligible for thrombolysis if stroke had occurred during waking hours.[6]

The reason for the frequently reported inverse association between birth weight and stroke risk is insufficiently understood. In a large population-based twin sample from Sweden, low birth weight was associated with twice the risk of stroke and coronary heart disease in dizygotic but not in monozygotic twins.[7] Results argue against an association between birth weight and stroke/coronary heart disease in the absence of genetic differences and suggest causes common to birth weight and vascular disease risk.

Individual Stroke Risk and Trigger Factors

Physical Activity and Other Lifestyle Factors

Regular physical activity decreases stroke risk; however, the role of abrupt rigorous activity is unclear. In the Stroke Onset Study, the risk of ischemic stroke was more than doubled within 1 hour after moderate or vigorous physical activity and such risk increase was stronger in people with lower habitual physical activity.[8] Thus, regular physical activity lowers overall stroke risk but may also reduce stroke risk associated with bouts of physical activity. In the Northern Manhattan Study, higher levels of physical activity were associated with a lower risk of silent brain infarcts on MRI, even after adjustment for blood pressure levels, diabetes, cholesterol levels, and other factors potentially in the pathway of action for physical activity. To the extent that silent brain infarctions

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represent a reliable surrogate measure for incident stroke risk, these results underscore the role of physical activity in stroke prevention.[9]

The more healthy lifestyle indicators subjects adhere to, the lower is the risk of stroke according to a large Finnish cohort study; approximately 55% of strokes could be prevented by adherence to 5 lifestyle factors (nonsmoking, normal body weight, physical activity, vegetable consumption, and alcohol consumption) supporting the importance of a healthy lifestyle in primary stroke prevention.[10]

Dietary Factors

Cocoa products and coffee may ameliorate stroke risk. In a meta-analysis of 3 studies, high chocolate consumption independently reduced the risk of stroke.[11] Causality cannot yet be inferred and caution is required given high sugar and fat contents of commercially available chocolate. Epidemiological data on coffee consumption and stroke risk yielded inconsistent results. In the Swedish Mammography Cohort, those women consuming >1 cup of coffee/day had an approximate 24% lower risk of stroke than women drinking no or small amounts of coffee.[12] If confirmed by future studies, chocolate and coffee could become tasteful remedies against the epidemic of stroke!

The Swedish Mammography Study also suggested that potassium and magnesium intake are inversely associated with ischemic stroke in hypertensive but not in nonhypertensive women strengthening previous findings of an interaction between potassium and magnesium intake and hypertension.[13] Fish consumption was a rather weak protective factor for stroke in a meta-analysis on 15 studies showing a 6% risk reduction for stroke by an increment of 3 fish servings/week.[14]

Association of Stroke Risk With Other Diseases

Depression was a significant risk factor of stroke (pooled adjusted hazard ratio, 1.45; 95% CI, 1.29–1.63) in a meta-analysis including 28 cohort studies. The authors estimate that 3.9% of stroke cases in the United States could be attributed to depression.[15] Given the high lifetime prevalence of depression, such association has great clinical and public health importance.

In the population-based Rotterdam Study, late-stage age-related macular degeneration was strongly associated with intracerebral hemorrhage but not with ischemic stroke suggesting yet undefined common underlying causal pathways in intracerebral hemorrhage and age-related macular degeneration.[16]

Stroke is a well-known risk factor for hip fracture. The other way around, a prospective case–control study from Taiwan now showed an approximate 50% increased risk of stroke within 1 year after hip fracture by still undetermined mechanisms.[17]

Stroke Symptoms and Stroke Therapy in Population Studies

Epidemiological studies also broadened our understanding of the role of previous neurological symptoms and medication regarding stroke risk.

In the REasons for Geographic and Racial Differences in Stroke (REGARDS) cohort, 18% of subjects without prior diagnosis of stroke or transient ischemic attack reported previous stroke-like symptoms. The risk of stroke independently increased by 21% for each of 6 symptoms reported. Such symptoms may represent in part undiagnosed stroke/transient ischemic attack, and the brief 6-question survey may be a remarkably cost-effective approach to detect a large portion of the population at high risk for incident stroke events.[18]

Discontinuation of low-dose acetylsalicylic acid prescribed for secondary prevention increased the risk of stroke/transient ischemic attack by approximately 40% within the next 31 to 180 days in a case–control study nested within a UK primary care database.[19] In a population-based study (GCNKSS), 5.2% of strokes occurred within 60 days (most of them within 2 weeks) after stoppage of antithrombotic medication, mostly due to physician-initiated withdrawal in periprocedural periods.[20] Therefore, clinicians need to be aware of the risk of interruption of anticoagulant therapy.

In a population-based cohort study from North Dublin, prestroke and ≤72 hours poststroke statin therapy were both independently associated with better early and 1-year outcome.[21] Baseline diastolic and change in systolic and diastolic blood pressure were associated with white matter lesions volume progression over 4 years in 1319 elderly subjects in a longitudinal population-based MRI study from Dijon. New antihypertensive treatment was linked with slowed white matter lesion progression in patients with high systolic baseline values.[22] Now clinical trials need to determine whether rapid statin therapy after stroke is beneficial and whether white matter lesion can serve as an early marker of successful antihypertensive treatment.

Disclosures

None.

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