

Primary Prevention of Stroke



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Stroke is a major health burden in Korea as well as worldwide. About 105,000 Korean people experience a new or recurrent stroke and more than 26,000 die of stroke each year, which indicates that every 5 minutes stroke attacks someone and every 20 minutes stroke kills someone in Korea. Primary prevention is particularly important because >76% of strokes are first events. It is helpful for healthcare providers and patients to be able to estimate risk for a first stroke for an individual patient. Patients prefer being told their own individual risk through the use of a global risk assessment tool. An ideal stroke risk assessment tool should be simple, widely applicable and accepted. The Korean Stroke Society Stroke Risk Calculator is available online for use in estimating risk at <http://stroke.or.kr/diagnosis>. While management strategies for primary stroke prevention in high risk individuals are well established, they are underutilized, and existing methods of primary stroke prevention are not sufficiently effective. An international case-control study of 6,000 individuals found that 10 potentially modifiable risk factors explained 90% of the risk of stroke. Medications to control blood pressure and lipids, anticoagulants for at-risk individuals with atrial fibrillation, revascularization, cigarette smoking cessation, diet, and exercise are among the interventions broadly applicable to the general public. With so many interventions, optimization of stroke prevention for individuals requires systems of care that identify risk factors as they emerge and that gain control of emerging risk factors safely, expeditiously, and cost-effectively.

Key Words: Primary prevention, Risk factors, Stroke

Introduction

Stroke is a major health burden in Korea as well as worldwide. The most recent Global Burden of Disease 2010 estimates shows that the global burden of stroke continues to increase, with 16.9 million of people being affected by stroke annually, resulting in over 100 million disability-adjusted life years lost.¹ Since the population in Korea is aging fastest, stroke burden must substantially increase in the near future.² The estimated incidence is 216 per 100,000 person-years. About 105,000 Korean people experience a new or recurrent stroke and more than 26,000 die of stroke each year, which indicates that every 5 mi-

utes stroke attacks someone and every 20 minutes stroke kills someone in Korea. According to a nation-wide hospital-based stroke registry study, one in five ischemic strokes or transient ischemic attack (TIA) was a recurrent stroke.³ Stroke is also a leading cause of disability and healthcare expenditure in the United States. An estimated 6.8 million Americans ≥ 20 years of age has had a stroke. Overall stroke prevalence is approximately 2.8%.⁴ Each year, about 795,000 people experience a new or recurrent stroke. Approximately 610,000 of these are first attacks, and 185,000 are recurrent attacks.⁴

Primary prevention is particularly important because >76% of strokes are first events. An international case-control study of 6000 individuals found that 10 potentially modifiable risk factors explained 90% of the risk of stroke. About one-third of strokes are estimated to be preventable if appropriate medications and lifestyle changes occur at 100% compliance.⁵ One could postulate that secondary prevention after the first stroke could be even higher because

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providers can identify risk factors and optimize prevention medications prior to discharge.

Assessing the Risk of First Stroke

It is helpful for healthcare providers and patients to be able to estimate risk for a first stroke for an individual patient. Patients prefer being told their own individual risk through the use of a global risk assessment tool, although it has only a small effect on preferences for reducing risk and no effect on patient beliefs or behavior compared with standard risk factor education.⁶ Numerous individual factors can contribute to stroke risk. The levels of evidence supporting a causal relationship among several of these factors and stroke vary, and specific or proven treatments for some may be lacking. Although most risk factors have an independent effect, there may be important interactions between individual factors that need to be considered in predicting overall risk or choosing an appropriate risk modification program.

An ideal stroke risk assessment tool that is simple, is widely applicable and accepted, and takes into account the effects of multiple risk factors does not exist. Risk assessment tools should be used with care because they do not include all the factors that contribute to disease risk. These tools can help identify individuals who could benefit from therapeutic interventions and who may not be treated on the basis of any single risk factor. These calculators are useful to alert clinicians and patients of possible risk, but basing treatment decisions on the results needs to be considered in the context of the overall risk profile of the patient. The Korean Stroke Society Stroke Risk Calculator is available online for use in estimating risk at <http://stroke.or.kr/diagnosis>.

Generally Modifiable Risk Factors

Primary stroke prevention strategies have improved significantly with medical therapies over the last 60 years.

Many modifiable risk factors, including cigarette smoking, blood pressure (BP), blood lipids, diabetes, chronic kidney disease, and adiposity for stroke have been identified, and the causal relevance of several risk factors is now well established.⁷ Widespread changes in health behaviors and use of best medical treatments for these risk factors are responsible for some of the dramatic declines in vascular mortality rates. Diet, exercise, stress, and sleep are receiving attention as environmental modifiers of chronic inflammatory diseases such as cerebral atherosclerosis. Accumulating data indicate that psychosocial stress and a high-fat, high-cholesterol diet aggravate cerebrovascular disease, whereas regular physical activity and healthy sleeping habits help prevent it. Regular physical activity and dietary modifications improve lipid profiles, weight, and body mass index, which are known cerebrovascular risk markers.

Polypill

As the number of people at higher risk for cardiovascular disease (CVD) and stroke increases, the development of creative pharmacotherapy interventions becomes increasingly important. In 2003, Wald and Law presented the idea of a hypothetical polypill intended to reduce the risk of CVD and stroke by at least 80% while maintaining a relatively safe profile.⁸ Medications initially considered for a hypothetical polypill included a statin to target low-density lipoprotein cholesterol (LDL-C), folic acid for serum homocysteine, aspirin for platelet function, and antihypertensive for blood pressure reduction. This multicomponent combination tablet would be administered to patients older than 55 years regardless of the presence of risk factors for CVD. Several formulations of the polypill are under development, and 4 clinical trials have been published. Results reported thus far show more promise in higher risk patients.⁸ The medications that make up the polypill components have been shown to be effective for secondary prevention of stroke. Patients with these risk factors will most likely dem-

onstrate long-term benefit from the polypill. In lower risk primary prevention patients, the risk of adverse effects may outweigh the benefit.

Conclusions

While management strategies for primary stroke prevention in high risk individuals are well established, they are underutilized, and existing methods of primary stroke prevention are not sufficiently effective.¹ Medications to control BP and lipids, anticoagulants for at-risk individuals with atrial fibrillation (AF), revascularization, cigarette smoking cessation, diet, and exercise are among the interventions broadly applicable to the general public. With so many interventions, optimization of stroke prevention for individuals requires systems of care that identify risk factors as they emerge and that gain control of emerging risk factors safely, expeditiously, and cost-effectively. Access to care is necessary but not sufficient to guarantee optimal stroke prevention. Integration of inpatient and outpatient services and incentivizing efforts directed at preventing stroke must also be considered.

References

1. Feigin VL, Norrving B. A new paradigm for primary prevention strategy in people with elevated risk of stroke. *Int J Stroke* 2014;9:624-626.
2. Hong KS, Bang OY, Kang DW, Yu KH, Bae HJ, Lee JS, et al. Stroke statistics in Korea: part I. Epidemiology and risk factors: a report from the Korean Stroke Society and clinical research center for stroke. *J Stroke* 2013;15:2-20.
3. Jung KH, Lee SH, Kim BJ, Yu KH, Hong KS, Lee BC, et al. Secular trends in ischemic stroke characteristics in a rapidly developed country: results from the Korean Stroke Registry Study (secular trends in Korean stroke). *Circ Cardiovasc Qual Outcomes* 2012;5:327-334.
4. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Blaha MJ, et al. Heart disease and stroke statistics--2014 update: a report from the American Heart Association. *Circulation* 2014;129:e28-e292.
5. Kahn R, Robertson RM, Smith R, Eddy D. The impact of prevention on reducing the burden of cardiovascular disease. *Circulation* 2008;118:576-585.
6. Meschia JF, Bushnell C, Boden-Albala B, Braun LT, Bravata DM, Chaturvedi S, et al. Guidelines for the primary prevention of stroke: a statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* 2014;45:3754-3832.
7. Herrington W, Lacey B, Sherliker P, Armitage J, Lewington S. Epidemiology of Atherosclerosis and the Potential to Reduce the Global Burden of Atherothrombotic Disease. *Circ Res* 2016;118:535-546.
8. Carey KM, Comee MR, Donovan JL, Kanaan AO. A polypill for all? Critical review of the polypill literature for primary prevention of cardiovascular disease and stroke. *Ann Pharmacother* 2012;46:688-695.