



ORIGINAL ARTICLE

Primary Prevention of Vascular Events in Patients in the Neurology Outpatient Clinic: Based on the 2009 U.S. Preventive Services Task Force (USPSTF) Recommendations on Aspirin Use

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ABSTRACT

Background: The aim of this study was to assess the risk of cardiovascular disease (CVD) and stroke in patients in the neurology outpatient clinic, and apply the 2009 U.S. Preventive Services Task Force (USPSTF) recommendations on aspirin use for the primary prevention of vascular events. In addition, the 10-year stroke risk was compared between the Framingham stroke risk (FSR) and the Korean stroke risk prediction (KSRP) model. **Methods:** Between April 2009 and June 2009, patients visiting the neurology outpatient clinic for headaches or dizziness were prospectively enrolled. The CVD and stroke risk was assessed using the Framingham scales and the KSRP model. **Results:** During the study period, a total of 93 patients were enrolled. Although aspirin was indicated in 43 patients (46%), based on the 2009 USPSTF recommendations, 23 patients (25%) were taking aspirin regularly. Ten patients (11%) were taking aspirin appropriately and 13 patients (14%) were taking aspirin inappropriately. Aspirin was indicated for the primary prevention of coronary heart disease in 89% of men; however, only 20% were taking it regularly. Aspirin was indicated for the primary prevention of stroke in 6% of women; however, 31% were taking it regularly. Aspirin was indicated in 6% of women according to the FSR model and in 33% according to the KSRP model. **Conclusions:** These results suggest that there may be an opportunity for decreasing vascular events and the risk of major bleeds by tailoring patient education on aspirin use.

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Key Words: Aspirin, Cardiovascular disease, Primary prevention, Stroke

INTRODUCTION

Aspirin provides primary prevention of vascular events in men or women whose risk for myocardial infarction (MI) or ischemic stroke, respectively, is high enough to outweigh the risk for gastrointestinal (GI) hemorrhage.¹ In 2009, the U.S. Preventive Services Task Force (USPSTF) updated the recommendations on aspirin use for the primary prevention of cardiovascular disease (CVD) and stroke, based on the cardiovascular and stroke risk calculations from the Framingham study.¹ The Framingham

Heart Study (FHS) has provided the most valuable information that can be used for the identification of CVD and stroke risk factors; multivariate functions have been developed to predict the absolute risk of CVD and stroke.² However, the Framingham cohort has certain unique features that may preclude generalization of these risk factors. There are several limitations in the application of the risks to other ethnic populations.³ Recently, the Korean stroke risk prediction (KSRP) model has been developed for stroke risk prediction; it provides a guide to identify groups at high risk for stroke among the Korean population.⁴

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The aim of the present study was to assess the risk of CVD and stroke, and apply the current recommendations on aspirin use for primary prevention in patients visiting the neurology outpatient clinic. In addition, the 10-year stroke risk was compared between the Framingham stroke risk (FSR) assessment and the KSRP model.

METHODS

Between April 2009 and June 2009, the patients in the neurology outpatient clinic for headache or dizziness were enrolled. Patients 45 or older in men and 55 or older in women were eligible for the study if they did not have a history of stroke and agreed to provide informed consent. The patient demographics, vascular risk factors, and medication history were collected at baseline. Physical examination, including blood pressure measurements, electrocardiogram (ECG), and blood

testing were performed as well. The medications taken regularly during the month preceding the visit were recorded. Hypertension was defined as a systolic blood pressure of at least 140 mmHg or a diastolic blood pressure of at least 90 mmHg. Diabetes mellitus (DM) was defined as present if the participant was receiving hypoglycemic treatment or the fasting serum glucose level was 126 mg/dL or higher.⁵ A diagnosis of left ventricular hypertrophy (LVH) and atrial fibrillation (AF) was made by ECG or self-report. Patients were classified as having a CVD history when they reported a history of myocardial infarction, coronary bypass, or angioplasty. Patients who smoked regularly during the previous year or had stopped during the previous year were classified as smokers. The risk factors on the KSRP were age, systolic blood pressure, diabetes, total cholesterol, cigarette smoking, physical activity, body mass index (BMI), and alcohol intake.⁴ The patients were asked about their physical activity and alcohol intake. High-resolution B-mode ultrasound measurements

Table 1. Baseline characteristics of patients, men and women

	Men (n=45)	Women (n=48)	p value
Age (years)	61.2±9.7	63.8±6.8	
SBP (mmHg)	127.8±12.1	128.7±9.6	
Antihypertensive therapy	22 (49)	17 (35)	
Diabetes mellitus	6 (13)	4 (8)	
Smoking	13 (29)	0 (0)	
History of cardiovascular disease	4 (9)	3 (6)	
Atrial fibrillation	1 (2)	0 (0)	
LVH on ECG	3 (7)	0 (0)	
Total serum cholesterol (mg/dL)	192.6±29.5	214.7±44.5	0.006
LDL cholesterol (mg/dL)	119.9±21.7	129.2±27.0	
HDL cholesterol (mg/dL)	45.1±10.5	51.6±11.7	0.006
Body mass index (kg/m ²)	24.3±3.0	23.8±2.4	
Any alcohol drinking	23 (51)	11 (23)	0.002
No physical activity	24 (53)	20 (42)	
Current aspirin use	8 (18)	15 (31)	

Data are means (SD) or numbers (%), unless otherwise indicated. SBP; systolic blood pressure, LVH; left ventricular hypertrophy.

Table 2. 10-year CHD/Stroke risk and aspirin use in men

Age	N (45)	CHD_F, (% range)	Stroke_F, (% range)	Stroke_K, (% range)	Current aspirin use	Indicated aspirin use in FSR
45-59	20	2-18	2.2-11.3	0.5-9	3/20	17/20
60-69	15	9-33	3.3-13.7	1.6-13.8	5/15	15/15
70-79	10	11-40	7.5-19.4	15.6-26.8	0/10	8/10

CHD_F; 10-year coronary heart disease risk using Framingham scale, Stroke_F; 10-year stroke risk using Framingham scale, Stroke_K; 10-year stroke risk of KSRP model.

were performed in some patients according to the guidelines of the Mannheim intima-media thickness Consensus using a GE Voluson 730 ultrasound scanner with a linear transducer. The coronary heart disease (CHD) and stroke risks were assessed using the Framingham scales (<http://www.mcw.edu/calculators/CoronaryHeartDiseaseRisk.htm> and www.westernstroke.org/PersonalStrokeRisk1.xls).⁶ The stroke risk according to the KSRP model was also assessed.⁴

RESULTS

During the study period, a total of 93 patients (headache in 56 patients, dizziness in 37 patients) were enrolled for the study. Table 1 shows the baseline characteristics of the enrolled patients. The mean age was 62.5 years, and 52% were women. Forty two patients (42%) had a history of hypertension, 10 patients (11%) had diabetes, 13 patients (14%) were current smoker, and 11 patients (7.5%) had a history of CVD. AF and/or LVH on ECG were documented in 4.3% of the patients. The frequency of smoking and alcohol was higher in men, whereas the total and high density lipoprotein (HDL) cholesterol levels were higher in women. Other baseline characteristics were similar in men and women.

While aspirin was indicated in 43 patients (46%), 23 (25%) were taking aspirin regularly with or without a doctor's prescription. In addition, only 10 patients (11%) were taking aspirin appropriately, 13 patients (14%) were taking aspirin inappropriately.

Table 2 shows the 10-year CHD/Stroke risk and the aspirin use in men. Aspirin was indicated for the primary prevention of CHD in 40 patients (89%) according to the assessment of the Framingham scale and the USPSTF recommendations.⁶ For the patients where aspirin was indicated, only eight patients (20%) were taking aspirin regularly and none were taking aspirin inappropriately. Table 3 shows the 10-year CHD/Stroke risk and aspirin use in women. Aspirin was indicated for the primary prevention of stroke in three women (6%); however, 15 patients (31%) were taking aspirin regularly. Among the study patients, 13 (87%) were taking aspirin inappropriately.⁶

The 10-year stroke risk according to the FSR and KSRP model was similar for the 45-69 year age group. The 10-year stroke risk according to the KSRP model, however, was higher in patients 70 years of age or older (Table 2, 3). Aspirin was indicated in 6% of women according to the FSR model and 33% for the primary

prevention of stroke according to the KSRP model.

DISCUSSION

Based on the 2009 USPSTF recommendations, the results of this study showed that aspirin was indicated in 46% of the patients presenting to the neurology outpatient clinic for headache or dizziness but only 25% of the patients were taking aspirin regularly. These results are similar to previous findings in small studies that investigated the frequency of aspirin use.^{7,8}

The 2009 USPSTF recommendations on aspirin use for the primary prevention of CVD and stroke are as follows:¹ 1) Aspirin administration is indicated for the prevention of MI in men 45-79 years of age that have an increased risk of infarction and a small risk of GI hemorrhage. 2) Aspirin administration is indicated for the prevention of stroke in women 55-79 years of age that have an increased risk of stroke and a small risk of GI hemorrhage. 3) There are insufficient data concerning the administration of aspirin for the prevention of CVD in men and women over the age of 80. 4) The administration of aspirin for the prevention of stroke in women less than 55 years of age and for the prevention of MI in men less than 45 years of age is not indicated.

In patients that are at high risk because they have occlusive vascular disease, long-term antiplatelet therapy reduces the risk of vascular events; the benefits of antiplatelet therapy substantially exceed the risks. For the primary prevention of vascular events, aspirin is frequently taken regularly with or without a doctor's prescription; in such cases the balance is less clear because the risks without aspirin and the benefits of aspirin, are generally an order of magnitude lower than in secondary prevention.^{1,9,10} In a collaborative meta-analysis, the use of aspirin showed a 12% proportional reduction in serious vascular events, due mainly to a reduction in non-fatal myocardial infarction, and the net effect on stroke was not significant.¹⁰

In this study, aspirin was indicated in 89% of men and 6% of women based on the USPSTF recommendations. However, 20% of men and 33% of women were taking aspirin regularly. Of the patients taking aspirin, only 44% were taking aspirin appropriately; 56% were taking aspirin inappropriately according to the Framingham scale. The FHS has provided the data needed for the identification of risk factors associated with CVD and stroke.¹¹ The FHS is the oldest and the most informative among all prospective studies on cardiovascular and stroke risk.¹² However, there are limitations in general applications of the risk

Table 3. 10-year CHD/Stroke risk and aspirin use in women

Age	N (48)	CHD_F (% range)	Stroke_F (% range)	Stroke_K (% range)	Current aspirin use	Indicated aspirin use in FSR
55-59	13	4-17	1.5-2.9	1.4-3.3	3/13	0/13
60-69	25	6-20	2.0-5.6	3.3-5.9	8/25	0/25
70-79	10	8-20	4.6-20.3	11.4-24.6	4/10	3/10

CHD_F; 10-year coronary heart disease risk using Framingham scale, Stroke_F; 10-year stroke risk using Framingham scale, Stroke_K; 10-year stroke risk of KSRP model.

functions obtained from the Framingham study to other ethnic populations due to the differences in diet pattern, life style, social environment, or genetic predisposition.^{3,4,13}

The KSRP model was developed to predict stroke risk among the Korean population and is based on a large sample size.⁴ In general, the actual rates of stroke events were similar to the rates predicted by the KSRP models. In this study, the 10-year stroke risk according to the KSRP model was higher in patients 70 years or older (Table 2, 3). Among the women patients, 33% had aspirin recommended for the primary prevention of stroke; these results are consistent with previous studies.^{13,14} In order to validate the 10-year stroke risk from the FSR data and the KSRP model, however, further clinical trials are required.

Several longitudinal studies have demonstrated that an increased carotid intima media thickness (C-IMT) can have an independent, synergistic risk prediction power for stroke and myocardial infarction.¹⁵ While a carotid ultrasonography screening policy is unwarranted in the general population, it could be considered in subjects with intermediate/high FSR to better stratify their actual risk.¹⁶ Further studies will be required to address the role of carotid ultrasonography in the primary prevention of high-risk subjects.

The limitations of this study include the following. In this study, aspirin use was based on self-report and this might have led to an underestimation of the current aspirin use among the patients. Due to the small sample size, we could not examine whether the risk factors of age, gender, diabetes mellitus, and high blood pressure may have influenced current aspirin use. In addition, the socioeconomic status was not determined and this could have resulted in inflating the number of individuals in the population taking aspirin. However, the results of this study showed that aspirin would be indicated in nearly half of the patients visiting the neurology outpatient clinic for headache or dizziness but only half of these patients took aspirin regularly. In addition, only 44% were taking aspirin appropriately, while 56% took aspirin inappropriately based on the 2009 USPSTF

recommendations. The results of this study suggest that there may be an opportunity for decreasing the rate of stroke as well as the risk for major bleeds through the tailored education of patients on aspirin use. The decision to take aspirin is still an individual one, which should be made after careful evaluation of the trade-off between the benefits and risks, particularly the risk of major bleeding.

REFERENCES

1. Aspirin for the prevention of cardiovascular disease: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med* 2009;150:396-404.
2. D'Agostino RB, Wolf PA, Belanger AJ, Kannel WB. Stroke risk profile: adjustment for antihypertensive medication. *The Framingham Study. Stroke* 1994;25:40-43.
3. Bineau S, Dufouil C, Helmer C, Ritchie K, Empana JP, Ducimetiere P, et al. Framingham stroke risk function in a large population-based cohort of elderly people: the 3C study. *Stroke* 2009;40:1564-1570.
4. Jee SH, Park JW, Lee SY, Nam BH, Ryu HG, Kim SY, et al. Stroke risk prediction model: a risk profile from the Korean study. *Atherosclerosis* 2008;197:318-325.
5. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care* 1997;20:1183-1197.
6. Wolff T, Miller T, Ko S. Aspirin for the primary prevention of cardiovascular events: an update of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med* 2009;150:405-410.
7. Glasser SP, Cushman M, Prineas R, Kleindorfer D, Prince V, You Z, et al. Does differential prophylactic aspirin use contribute to racial and geographic disparities in stroke and coronary heart disease (CHD)? *Prev Med* 2008;47:161-166.
8. Ballantyne CM, Hoogeveen RC, Bang H, Coresh J, Folsom AR, Chambless LE, et al. Lipoprotein-associated phospholipase A2, high-sensitivity C-reactive protein, and risk for incident ischemic stroke in middle-aged men and women in the Atherosclerosis Risk in Communities (ARIC) study. *Arch Intern Med* 2005;165:2479-2484.
9. De Berardis G, Sacco M, Strippoli GF, Pellegrini F, Graziano G, Tognoni G, et al. Aspirin for primary prevention of cardiovascular events in people with diabetes: meta-analysis of randomised controlled trials. *BMJ* 2009;339:b4531.
10. Baigent C, Blackwell L, Collins R, Emberson J, Godwin J, Peto

- R, et al. Aspirin in the primary and secondary prevention of vascular disease: collaborative meta-analysis of individual participant data from randomised trials. *Lancet* 2009;373: 1849-1860.
11. Wolf PA, D'Agostino RB, Belanger AJ, Kannel WB. Probability of stroke: a risk profile from the Framingham Study. *Stroke* 1991;22:312-318.
 12. Kannel WB, Dawber TR, Sorlie P, Wolf PA. Components of blood pressure and risk of atherothrombotic brain infarction: the Framingham study. *Stroke* 1976;7:327-331.
 13. Choi CU, Park CG. Estimating the probability of stroke in Korean hypertensive patients visiting tertiary hospitals using a risk profile from the Framingham study. *BMC Neurol* 2009;9:16.
 14. Park CG, Choi CU. Probability of stroke in Korean hypertensive patients visiting community-based hospitals: using a risk profile from the Framingham study. *J Hum Hypertens* 2009;23:252-258.
 15. Touboul PJ, Labreuche J, Vicaud E, Amarenco P. Carotid intima-media thickness, plaques, and Framingham risk score as independent determinants of stroke risk. *Stroke* 2005;36: 1741-1745.
 16. Prati P, Tosoletto A, Vanuzzo D, Bader G, Casaroli M, Canciani L, et al. Carotid intima media thickness and plaques can predict the occurrence of ischemic cerebrovascular events. *Stroke* 2008;39: 2470-2476.