Pharmacophore

ISSN-2229-5402

Journal home page: http://www.pharmacophorejournal.com

Pharmacophore
an International Journal
ISSN 2229-5402

THE RELATIONSHIP BETWEEN MORTALITY RATE WITH ISCHEMIC STROKE AND AF AND CHADS$_2$ SCORE

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ARTICLE INFO

Received:
03th Jun 2017
Accepted:
29th Nov 2017
Available online:
14th Dec 2017

Keywords: *Chads2, death, atrial fibrillation, stroke*

ABSTRACT

Introduction: there are many factors to predict stroke risk and mortality in patients with stroke and atrial fibrillation. The most common used system for classifying the risk of stroke is CHADS2 scoring system. This cross-sectional study was conducted to assess relationship between mortality rate of patients with ischemic stroke and atrial fibrillation and CHADS2 score.
Materials and Methods: 300 patients diagnosed as ischemic stroke and atrial fibrillation among patients of neurology ward of Imam Khomeini Hospital of Urmia in Iran were selected to participate in the study during 2005 and 2015 using simple randomized sampling method. CHADS2 risk factors were collected from medical files of the patients. Then, their CHADS2 score and mortality rate were measured and they were analyzed using SPSS22 software.
Results: In 300 patients studied in research, the incidence of mortality was 23.8%. The mean score of CHADS2 was 2.35 ± 1.33. In the group in which patients had a score of 4 or 5, the incidence of mortality was 57.14%, in the group in which patients had a score of 2 or 3, the incidence of mortality was 22.72%, and in the group in which patients had the score 0 or 1, the incidence of mortality was 2.4%. A significant increase in the mortality incidence of patients with higher CHADS2 score was found (P <0.001).
Conclusion: The results showed that the incidence of mortality increases with increasing CHADS2 score, but gender had no effect on the incidence of mortality.
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To Cite This Article: Mohammad Reza Amiri-Nikpour*, Surena Nazarbaghi, Farhad Eskandari, (2017),"The relationship between mortality rate with ischemic stroke and af and chads$_2$ score", ***Pharmacophore, 8(6S),*** *01-08.*

Introduction

Cerebrovascular diseases are the third cause of death after heart disease and cancer in the United States. (1-3). Stroke is the most important cerebrovascular disease that despite medical advances and increased public awareness, it is still the most important cause of death caused by single disease (4). The term "cerebrovascular disease" means brain abnormalities resulting from damage to blood arteries that these three processes are: 1. thrombotic obstruction of arteries 2. Embolic obstruction of arteries 3. Tearing of vessels

Thrombosis and emboli cause damage to ischemic or infraction of specific areas of the brain. «Stroke» is clinical manifestation of all mentioned states, especially when they acute (5-7). Stroke is a syndrome characterized by acute onset of neurologic disorder for at least 24 hours. Stroke is caused due to two types of vascular dysfunction in the brain that includes ischemia or bleeding. Ischemia is the most common cause of stroke that can occur due to local thrombus or embolization of remote locations such as the heart (2). Annually, about 22 million people in the world are affected by stroke (8). In the United States, about 750000 strokes happen annually. Incidence rate of stroke in the developed countries has been declined, while it is increasing in developing countries (8). The incidence of stroke is associated with increased age, so that approximately two-thirds of all cases of stroke are seen in people over 65 years, and its incidence in males is higher than that in females. It is also higher in black-skinned people compared to white-skinned people (1). Stroke patients with stroke suffer from depression, dysfunction, reduced their role in life, and lack of adequate social protection. Generally, three categories of

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factors can cause focal ischemia in the brain, including vascular disorders, cardiac disorders and hematological disorders. Arrhythmias are a group of cardiac disorders that can lead to stroke. Among in this class of arrhythmias, atrial fibrillation (especially when it is associated with cardiac rheumatic disease), and tachycardia-bradycardia syndrome sick sinus syndrome are known causes embolic stroke (2, 5). Atrial fibrillation is the most important cardiac arrhythmias in Western countries and it involves approximately 1% of the population (10). The rate of atrial fibrillation increases as age increases so that it reaches to 17.8% in the ages over 85 years (11). This arrhythmia is in the form of hyperactivity and irregular of atrium that leads to ventricular tachycardia (12). The role of arterial fibrillation has been known well in creating ischemic strokes (13), so that in people with atrial fibrillation who have not been treated, the risk of stroke is 5% (11). In the previous studies conducted in Birmingham, atrial fibrillation was introduced as one of the factors that cause increased mortality and morbidity in patients with stroke. In addition, in other analytical study conducted in Birmingham, the risk of atrial fibrillation has been estimated greater that before when it is associated with other risk factors of stroke (14-16). The most important criterion used for scoring the thromboembolism risk caused by atrial fibrillation is the criterion of CHADS2, in which he letter C indicates congestive heart failure, the letter H represents hypertension, letter A indicates the age over 75 years, the letter D represents the diabetes mellitus, and the letter S indicates previous history of ischemic stroke or transient ischemic stroke. Each of the above criteria has one score, except for the letter S that has two scores. Based on the obtained score, patients are classified into three groups: low risk (score 0), moderate risk (score 1) and high risk (score 2 or higher) (17 and 18). Since 2001 when the CHADS2 scoring system was developed as criterion for determining the risk of ischemic, it was entered formally to medical and scientific books until 2012. However, new theories have been developed for the use of this criterion classification and predictions in cases of stroke, such as determining the consequences of patients or determining the disability of patients (19, 20). The objective of this study was to examine the association between ischemic stroke and mortality in patients with atrial fibrillation and CHADS2 scoring system in patients hospitalized in Imam Khomeini Hospital of Urmia.

Method

The study is a cross-sectional research in which 300 samples who had AF in ECG available in the rhythm file were extracted and selected among the files of all of the patients admitted with a diagnosis of ischemic stroke in 2005 and 2015. All date of patients including age, gender, heart disease, hypertension, diabetes, vascular disease, history of ischemic stroke were included in the checklist. All patients received specific score based on CHADS2 scoring system. After extracting the data of all patients, researcher called patients with contact number of them recorded in the file of patients to register the mortality of patients. The cases that was impossible to follow them and to register their status or their information was incomplete in the file were excluded from the study. During the phone call, all patients were explained on the project and their verbal satisfaction for participation in the study and recording their information was obtained. After recording the information of the patients, all data were analyzed by using SPSS22 software.

Results

The sample size in this study was 300, which their mean age is 72.19 with a standard deviation of 11.08. Minimum age of them was 44 and the maximum age of them was 94 years. Out of total patients, 133 patients (44.3%) were male and 167 patients were female (55.7%). Among the study group, 72 people were died meaning that mortality rate in the study group is 23.8%, and 228 people were living (76.2%). Mortality rate of males was 21.8%, while female mortality rate was 25.74%, but there was no significant relationship between gender and mortality rate ($p = 0.42$). CHADs2 mean score of study group was 2.35 with a standard deviation of 1.33 in this study, 8.3% of subjects had zero score, 19.3% had score 1, 28.7% of them had score 2, 22.7% of them had score 3, and 14.7% of them had score 4, and 6.3% of them had score 5. In the group in which patients had the mean score of 4 and 5, the mortality rate was 57.14%, while the mortality rate for those with a score of 2 and 3 was 22.72%, and it was 2.4% in the patients who had scores of 0 and 1. Significant correlation was found between mortality rate and CHADs2 score of patients ($p < 0.001$).

Table 1. The frequency of distribution of CHADs2 score among died and living patients

Living status		CHADS2						Total
		0	1	2	3	4	5	
	Living	25	56	72	47	22	6	228
	Died	0	2	14	21	22	13	72
Total		25	58	86	68	44	19	300

Table 2. frequency distribution of gender among died and living patients

Living status		Gender		Total
		Male	Female	
	Living	104	124	228
	Died	29	43	72
Total		133	167	300

Discussion And Conclusion

Atrial fibrillation is the most important preventable cardiac arrhythmia increasing the risk of ischemic stroke by 4 to 5 times (21 and 22). Atrial fibrillation also increases the mortality caused by ischemic stroke (23). In our study, 133 males (44.3%) and 167 females (55.7%) were included. In this regard, 72 people were died from study group meaning that the mortality rate in the study group is 23.8%, and 228 people were living (76.2%). Mortality rate of males participating in this study was 21.8%, while the mortality rate of females was 25.74%, but significant relationship was not found between gender and the mortality rate of patients ($p = 0.42$). CHADs2 mean score of study group was 2.35 with standard deviation of 1.33. In the group with CHADs2 mean score of 4 and 5, the mortality rate was 57.14%, while the mortality rate in those with score 2 and 3 was 22.72%, and it was 2.4% in the group with score 1 and 0, and significant relationship was found between the CHADs2 score and mortality rate ($p<0.001$). In the study conducted by McGrath, it was found that increased age and atrial fibrillation increase mortality in patients with ischemic stroke (24). In the study conducted by Tischer, mean score of CHADS2 in patients with ischemic stroke was 1.65 with SD of 0.92. It was generally concluded that that CHADS2 score in patients with ischemic stroke with AF rhythm was higher compared to patients who has only stroke, and the prevalence of atrial fibrillation reached to 54.2% by increasing the CHADS2 to 6 (25). However, in this study conducted on patients with stroke and AF rhythm, CHADS2 mean score was 2.35 with SD of 1.33. It indicates higher CHADS2 score in patients who had stroke and AF simultaneously. In a study conducted by Olesen on patients with AF, it was concluded that in people who have had low CHADS2 score, the risk of stroke and thromboembolism is lower compared to people who had higher score. In patients with zero score, the incidence of stroke and thromboembolism was 0.23 per 100 persons aged lower than 65 years per year, and 3.99 for the age group more than 75 years. In addition, heart failure, cardiac stroke, and vascular disease were associated significantly with increasing the risk of stroke and thromboembolism. As our study, CHADS2 score was the predictive criterion for disability and mortality and recurrence of stroke (26). In a study conducted by Welles, in patients with CHADS2 score of moderate or higher, the prevalence of stroke was higher compared to patients who had lower CHADS2 score (score between 0 and 1) ($P = 0.006$). This study showed that the CHADS2 scoring system predicts the stroke in patients with stable CHD without primary atrial fibrillation. In addition, as our study, it was shown that CHADS2 score is directly correlated with increased mortality rate and cerebrovascular events (27). In a study conducted by Tanka, it was shown that the risk score of patients with stroke and AF rhythm was significantly correlated with CHADS2 score ($P = 0.031$) and represents the relationship between adverse consequences and increased CHADS2 score (28).

Martin RC et al concluded that females are at greater risk (twice) to ischemic stroke arising from atrial fibrillation compared to males, which their results are not in line results of our study (29). Anticoagulant therapy should be performed to prevent ischemic stroke in patients with atrial fibrillation (30). By prescribing the drugs dabigatran (with dose of 150mg), warfarin or rivaroxaban (with dose of 20mg), thromboembolic events risk caused by this disease can be reduced in people who are at risk of stroke (31 and 32). However, in a cohort study, it was revealed that prescribing rivaroxaban, compared with warfarin and dabigatran, increases the probability of bleeding, despite reducing ischemic stroke risk (33). In a prospective study, it was concluded that taking anticoagulant drugs (warfarin, aspirin, and clopidogrel) does not lead to an increased risk of hemorrhagic cerebral stroke, in patients with atrial fibrillation (34).

Recommendations

Considering the significant relationship between the CHADS2 score and mortality rate of patients, it is recommended that future prospective studies to be conducted to examine the relationship between this score and the rate of recurrence of stroke in these patients. If significant relationship is found between them, people with high scores should be considered at higher risk for stroke recurrence so that more medical cares to be provided for them.

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