Original Article

Mental health and ischemic stroke in young adults: A case-crossover study in Iran

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ABSTRACT

Background & Aim: Stroke in young adults is rare but can be devastating for the affected individuals and their families. Some triggers of stroke may be acute but transient effects on the pathophysiological condition while other factors may be effective over a longer period.

Methods & Materials: This study was a case-crossover study on 18 young adults. The study included patients aged 15-49 years who hospitalized for ischemic stroke for the first time from June 2012 to September 2013. In this study, mental health status was considered during the 6-month period so that exposure within 1 month of stroke onset (hazard period) was compared with exposure during five control periods of 1 month preceding the hazard period.

Results: Conditional logistic regression showed there was an association between mental health and stroke so that for every 5 unit increase in mental health, odds of stroke will increase about 13-fold. In the other words, much higher scores on mental health, mental health condition weaker.

Conclusion: Mental health status is associated with the occurrence of ischemic stroke in young adults so that whatever mental health condition weaker odds of ischemic stroke incidence is high.

Introduction

Incidence of non-communicable diseases, such as cardiovascular diseases, stroke, diabetes Mellitus, cancer, chronic respiratory diseases, has recently increased for various reasons such as unhealthy and sedentary lifestyles, smoking, urbanization, industrialization, and improper diet, especially in low and middle-income countries. It is estimated to identify and control effective risk factors to prevent 40-50% of early mortality caused by these diseases (1, 2).

Based on estimating the global burden of disease, injuries, and studying risk factors (GBD, 2010), stroke is the second common cause of deaths and the third common cause of disability-adjusted life years worldwide in 2010 (3).

More than two-thirds of the global burden of stroke occurs in developing countries, and the mean age of patients is 15 years younger than those in developed countries (4, 5). The annual incidence of ischemic stroke is 2-12 cases per 100,000 in young people, worldwide, and 8 cases per 100,000 in Iran (6, 7). Usually, < 5% of strokes have been reported in young adults (8). Stroke in young adults is rare but can be devastating for the affected individuals and their families. Recently, there has been increasing interest in this topic owing to increasing stroke rates in the younger age group and improved patient evaluation and treatment options (9).

Various risk factors - including modifiable such as hypertension, diabetes mellitus, smoking, infection, alcohol abuse, lack of exercise, and overweight and non-modifiable, such as age, sex, family history of diseases - play an important role in the pathophysiology of

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ischemic stroke (10). Furthermore, some triggers of stroke may be acute but transient effects on the pathophysiological condition while other factors may be effective over a longer period (11). Stressful life events (SLEs), for example, nervousness, positive and negative emotional feelings, birth, death, etc., are significantly associated with stroke (12). However, these associations were identified in single studies (12, 13).

When stroke occurs in young persons, they may have a longer period of time to live with their disability, and this may contribute to a lifetime of medical complications. The lost productivity of a young working person may account for costs associated with stroke exceeding the costs of stroke in an older person (14). Therefore, this study has examined the risk of ischemic stroke associated with mental health status. In this study, we used a case-crossover approach to test the hypothesis that mental health status affects the acute risk of ischemic stroke in patients 15-49 years in Firoozgar Hospital of Tehran city, capital of Iran.

Methods

This study was a case-crossover study on 18 young adults. The study included patients aged 15-49 years who hospitalized for ischemic stroke for the first time from June 2012 to September 2013. Ischemic stroke diagnosis was made by neurologist and confirmed by brain computed tomography scan in < 49-year-old patients. In this study, exclusion criteria were as

follows patients with hemorrhagic stroke (caused by trauma or tumor), died, or not able to respond due to lack of alertness. In this study, mental health status was considered during the 6-month period so that exposure within 1 month of stroke onset (hazard period) was compared with exposure during five control periods of 1-month preceding the hazard period (Figure 1).

The data collection tool was the mental health checklist produced and standardized by Pramud Kumar, and its reliability and validity have been studied in Iran. The checklist contains 11 questions so that 6 questions were related to anxiety and stress, malaise, solitude, disappointment, and anger as well 5 questions were about physical issues such as headache, fatigue, sleep disorders, dyspepsia, and acidify. Responses were in the form of multiple choices, and as "rarely," "sometimes," "often," and "always." Answers were given to 1 to 4 scores. Total scores were variable from 11 to 44, respectively, show the highest (best) and lowest (weakest) person's mental health status.

Data were analyzed using the STATA software package (Stata Corporation, College Station, TX, USA) and odds ratio (OR) between mental health and stroke with 95% confidence interval (CI) was estimated using conditional logistic regression model.

The associate between mental health and stroke was summarized as (i) the OR (95% CI) for stroke per 5 unit increase in mental health scores and (ii) the OR (95% CI) between binary mental health (1: > median, 0: < median) and stroke.
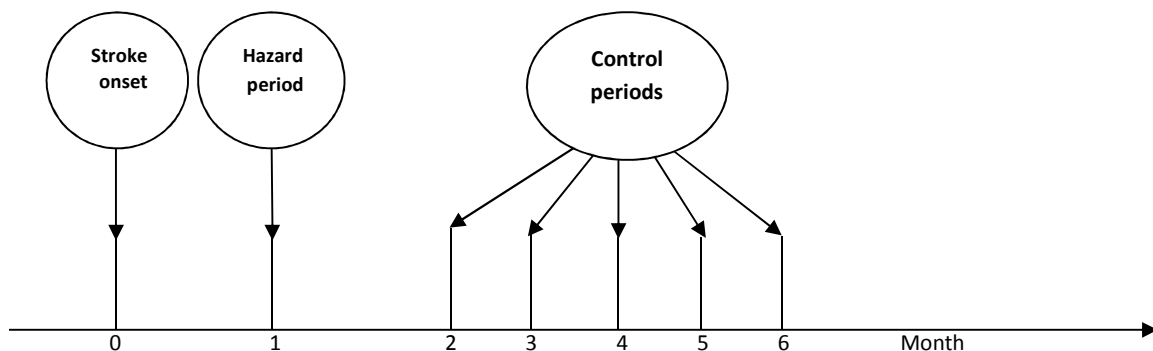

Figure 1. Schematic representation of case-crossover design

Results

In this study, the frequency (percentage) of female patients was 11 (61.1%). The mean (standard deviation) age of subjects was 36/61 (8/32). The characteristics of the study subjects are shown in table 1. Approximately, 11% of patients were illiterate, 33.3% and 27.8% had, respectively, under diploma and diploma, and 27.8% had university education. It was found that 22.2% were single, 61.1% married, 5.6% divorced, and 11.1% widowed. Regarding the time of stroke occurrence, 3% of cases happened at noon, 55.6% in the morning and 5.6% at night took place.

The estimated OR (95% CI, P value) for stroke per 5 unit increase in mental health score 13.04 (1.84-92.37, 0.001).

The association between binary mental health and stroke (OR = 39.29, CI = 4.93-312.51, P = 0.001).

There were no interaction between mental health and gender, job, educational level, marital status, smoking status on stroke (P = 0.900, P = 0.900, P = 0.900, P = 0.700, P = 0.900), respectively.

Discussion

This study was the first performed in Iran to assess the association between mental health status and stroke as a case-crossover design; case-crossover studies are the case-control version of crossover studies. In these studies, cases and controls are the same subjects, but in two (one case to one control) or more than two (one case to more than one control) different times (15), which control biases such as selection bias and confounding that there are intrinsically in case-control studies, and is the best method for assessing potential triggers, but it cannot be ignored that the recall bias may lead to overestimation (12).

The World Health Organization defines mental health as follows:

"A state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and can make a contribution to his or her community." As a result, neither mental nor physical health can exist alone. Mental, physical, and social functioning are interdependent (16). Therefore, mental health status can be measured and interpreted in both mental and physical aspects.

Table 1. Characteristics of the study subjects

Variable	Values
Age - mean (SD)	36/61 (8/32)
Female sex	11 (61/1)
Marital	
Single	4 (22/2)
Married	11 (61/1)
Divorced	1 (5/6)
Widowed	2 (11/1)
Educational level	
Illiterate	2 (11/1)
Under diploma	6 (33/3)
Diploma	5 (27/8)
University education	5 (27/8)
Job	
Employee	2 (11/1)
Self-employment	5 (27.8)
Student	1 (5/6)
Householder	9 (50)
Retired	1 (5/6)
Smoking status**	
Never smoking	13 (72/2)
Currently uses	5 (27/8)
Obesity (BMI)***	
< 30 kg/m^2	14 (77/8)
≥ 30 kg/m^2	4 (22/2)
History of hypertension****	
Yes	3 (16/7)
No	15 (83/3)
History of diabetes$^\$$	
Yes	3 (16/7)
No	15 (83/3)
History of migraine	
Yes	1 (5/6)
No	17 (94/4)
History of cardiovascular disease[#]	
Yes	3 (16/7)
No	15 (83/3)
History of cardiovascular disease or stroke in first degree relatives	
Yes	7 (38/9)
No	11 (61/1)

*n (%), except where otherwise indicated. **Cigarette:1 (never smoking), 2 (Currently, fewer than 20 cigarettes a day or now more than 20 cigarettes a day), ***BMI: < 30 and ≥ 30, ****History of hypertension was defined as (1) previously diagnosed by a physician or (2) receiving blood pressure-lowering treatment **or** self-reported history of hypertension, $^\$$History of diabetes mellitus was defined as (1) previously diagnosed by a physician (prescribed treatment) or (2) on oral hypoglycemic agents or insulin, #History of cardiovascular disease was defined as previous myocardial infarction, rheumatic valvular heart disease, and prosthetic heart valve were based on medical history or previously diagnosed by a physician (prescribed treatment). BMI: Body mass index, SD: Standard deviation

Our findings showed that patients with ischemic stroke more often suffered from anxiety and stress, malaise, solitude, disappointment, and anger, as well physical issues such as headache, fatigue, sleep disorders, dyspepsia, and acidify a month before the accident (stroke) compared with the previous periods (controls).

Another study also indicated that there is a significant relation between stroke and mental status. However, this study was conducted as the case-crossover design and during 6 months, it should be considered that the probability of recall bias would be high because it included all age groups even the elderly (12).

A research, carried out by Everson et al., (17) on the relation between anger and stroke a significant association was found between high levels of anger and stroke, but more studies are needed to determine the mechanisms involved in this event.

The study on precipitants of brain infarction roles of preceding infection/inflammation and recent psychological stress indicated that there were no significant differences between the stroke and control groups in the levels of SLEs within the prior 1 month or in negative affect scale scores within the prior 1 week (18). However, another study, by Paschalis et al., (19) as the case control design, showed that there was a statistically significant difference in the life events score between the stroke group and the control group. There was no significant correlation between the life events score and the severity of stroke (r = 0.15).

Koton et al. (13) also in the case-crossover study on ischemic stroke triggers showed an association between negative emotion and anger with stroke while such a relation was not observed between stroke and positive emotion. Hazard period was considered 2 hours before stroke, and control period was the same 2 hours the preceding day.

Another study also determined that mental factors can be associated to stroke. However, in this study, all types of stroke were considered (20).

The study on psychological distress and fatal and non-fatal ischemic stroke declared that the distress is as a predictor for fatal ischemic stroke, but there were not significant relations between psychological distress and non-fatal ischemic stroke and transient ischemic attack (21).

Conclusion

Our study can be a reference for assessing acute triggers of cerebrovascular diseases. It is recommended to design and perform other studies on various categories of SLEs, for example, job, education, finance, family and social relationship, and migration.

Acknowledgments

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