

Relationship between occurrence of acute stroke and job strain

Samad Shams Vahdati

Tabriz University of medical sciences <https://orcid.org/0000-0002-4831-6691>

Alireza Ala

Tabriz University of medical sciences <https://orcid.org/0000-0001-8231-2937>

Naeimeh Hosseinzadeh

Tabriz University of medical sciences <https://orcid.org/0000-0002-7550-6124>

Maryam Rahimpour Asenjan

Tabriz University of medical sciences <https://orcid.org/0000-0002-9594-8472>

Gisou Gorashian

Tabriz University of medical sciences <https://orcid.org/0000-0001-6271-1930>

Amirreza Jabbaripour Sarmadian (✉ amirjps@gmail.com)

Tabriz University of medical sciences <https://orcid.org/0000-0001-7677-8458>

Short Report

Keywords: Acute Stroke, Stroke, Job Strain, Job, Stress

Posted Date: April 19th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1571636/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background

Stroke is a type of circulation dysfunction in some areas of the brain that causes neurologic events. Stroke is one of the main causes of morbidity, mortality and disability around the world which has various risk. Psychosocial stress can be known as a risk factor for stroke.

Objectives

Due to the considerable prevalence of stroke in our country and the lack of studies related to stroke and occupational stress in our area, in this study we aimed to find out the relation between job strain and stroke, as well as the two types of strokes.

Methods

The present study was designed and conducted as an observational and analytical study. This study included patients who self-referred to the emergency department with neurologic defects from 1 January 2019 to 1 July 2019 and were admitted as stroke patients. Demographic data of patients, determined by interview and the type of stroke diagnosed by imaging, were recorded and collected by the researcher through a researcher-made checklist.

Results

In this study, 301 participants were enrolled. Patients' mean age was 66.93 ± 15.41 years. 49.2% of these patients were male and 50.8% were female. 1.7% of them had night shift jobs and 7% had high job. In our study housewives (46.8%), employees (10.6%), farmers (7.9%) and self-employments (7.3%) were suffering stroke more frequently. 91% had an ischemic stroke and 9% had hemorrhagic stroke.

Conclusions

Based on statistical analysis and mathematical data no significant relation was found between job types, job difficulties, night shifts, and stroke.

Introduction

Stroke is a type of circulation dysfunction in some areas of the brain that causes neurologic events (Frizzell, 2005). Stroke is one of the main causes of morbidity, mortality and disability around the world which has various risk factors such as hypertension, atherosclerosis, coronary artery disease, family

history, diabetes, smoking and etc. (Everson et al., 2001; Frizzell, 2005; Fransson et al., 2015; Hosseinzadeh et al., 2022).

Psychosocial stress can be known as a risk factor for stroke. There are several studies about the relationship between cardiovascular diseases and psychosocial stress but studies about the relationship between psychosocial stress and stroke are rare. Job strain is one of the main measures of psychosocial stress (Fransson et al., 2015). According to the definition of the World health organization (WHO) a healthy job is one that the job strain on the employees is harmonized with their job controls, abilities and facilities and they also have appropriate supports. Occupational stress is a response from employees when job strain and job demand are not compatible with their knowledge, abilities and supports. So, they are always challenging to cope with their tasks and duties. Stress exists in different situations and cases but often exacerbates when employees do not receive sufficient support (Burton, 2010). A meta-analysis study performed on 6 cohort studies involving 138782 participants in 2015, concluded that high strain jobs are associated with increased risk of stroke especially in women (Huang et al., 2015). Different agents will influence these kinds of studies such as age, sex, night shifts, etc. (Everson et al., 2001; Frizzell, 2005; Burton, 2010; Fransson et al., 2015; Huang et al., 2015; Hosseinzadeh et al., 2022).

There are two main types of brain stroke; hemorrhagic stroke (20% of strokes) and ischemic stroke (80% of strokes). Hemorrhagic stroke is due to the rupture of brain vessels and ischemic stroke is due to the occlusion of brain vessels (Ojaghihaghghi et al., 2017)

Objectives: Although there are several studies focusing on ischemic stroke and its relation with stressful occupations (May et al., 2002) there aren't sufficient studies about stressful occupations associated with hemorrhagic stroke. Due to the considerable prevalence of stroke in our country (Hosseini et al., 2010) and our province and the lack of studies related to stroke and occupational stress in our area, in this study we aimed to find out the relation between job strain and stroke, as well as the two types of strokes.

Methods

The present study was designed and conducted as an observational and analytical study. This study included patients who self-referred to the emergency department with neurologic defects from 1 January 2019 to 1 July 2019 and in the final review were admitted as stroke patients. Patients with incomplete medical records and whose stroke had been ruled out, were excluded from the study. Finally, 301 patients were enrolled in this study.

Demographic data of patients, including age, gender, job type and having night shifts or not (any type of wake at night for occupational activities) determined by interview and the type of stroke (ischemic stroke or hemorrhagic stroke) diagnosed by imaging, were recorded and collected by the researcher through a researcher-made checklist. The interview was conducted by a patient's first-degree family and informed consent paper was signed and accepted by them Patients' information is kept confidential by the researcher.

Data were collected by a prepared checklist and then analyzed by SPSS 15.0 software, the descriptive exam was run for demographic data and Spearman Correlation was run for any relations.

This study was approved by the ethics committee of ***** University of Medical Sciences with the approval number of IR.TBZMED.REC.1398.964 on the date of December 9, 2019.

Results

In this study, 301 participants were enrolled and the data did not follow the normal distribution. Mean age was 66.93 ± 15.41 years with a mode of 69 years. 148 (49.2%) of patients were male and 153 (50.8%) were female. 5 (1.7%) of them had night shift jobs and 296 didn't have. 21 patients (7%) had high job strain as defined by the Department of Labor and Social Welfare and the WHO (Burton, 2010).

Housewives (46.8%), employees (10.6%), farmers (7.9%) and self-employments (7.3%) were suffering stroke more frequently (**Figure 1**). 275 of patients (91%) had ischemic stroke and 26 of them (9%) had hemorrhagic stroke.

There was no significant relationship between stroke type and patients' jobs (P-Value = 0.703). There was no significant relationship between stroke type and patients' job difficulty (P-Value = 0.514). There was no significant relationship between stroke type and having night shifts (P-Value = 0.490).

Discussion

Recent studies have controversial results about the correlation between job strain and stroke so in this study we aimed to find out if there is any correlation or not. We could not find any significant relationship between job types, job strain and stroke types. Stroke was more commonly seen in housewives, employees, farmers and self-employments. Probably about employees and housewives, inactivity and about farmers and self-employment, high stress levels may be involved but this study does not have enough evidences to prove this hypothesis.

The pathogenesis of coronary heart disease and ischemic stroke is somewhat overlapped and atherosclerosis is the most common cause for them (Fisher and Folland, 2008). Job strain is often associated with some risk factors of cardiovascular disease (CVD) such as metabolic syndrome, high body mass index, glucose metabolic dysfunction, dyslipidemia and etc. which are also known as stroke risk factors (Chandola et al., 2008). There are several studies about how job strain can affect the cardiovascular system, for example by activating neuroendocrine feedback to stressors, hypothalamic-pituitary-adrenal axis dysfunction, metabolic syndrome, indirect effect of unhealthy behaviors such as smoking and lack of exercise and etc. (Vrijkotte et al., 2000; Brunner et al., 2002; Kunz-Ebrecht et al., 2004; Hemingway et al., 2005; Chandola et al., 2008).

A meta-analysis study by Fransson et al. (2015) for the purpose of investigating the association between job strain and different subtypes of stroke performed on 196380 working males and females from 14

European cohort studies, showed that job strain can cause an approximately 20% increased risk of acute ischemic stroke. There was no association between job strain and the overall stroke or hemorrhagic stroke. This correlation between job strain and ischemic stroke, is similar to the results of a meta-analysis study by Kivimaki et al. (2012) performed on 197473 participants from 13 European cohort studies, which noted an association between job strain and coronary heart disease.

A prospective study by Tsutsumi et al. (2009) examined the association between occupational stress and stroke risk performed on 6553 Japanese male and female workers showed a more than 2-fold increase in total stroke risk among male patients with high job strains compared to male patients with low job strains. In female patients, there was no statistically significant differences for any stroke incidence among the high strain and low strain jobs.

A meta-analysis study by Nyberg et al. (2013) was conducted on 47045 participants from eight studies to investigate the association between job strain and cardiovascular risk factors. This study showed that a patient with job strain has a higher prevalence of diabetes, smoking and physical inactivity. In this study no significant clinical difference was found in blood lipids, blood pressure, pulse pressure or prevalence of hypertension between patients with or without job strain.

A study by Torén et al. (2014) was performed to investigate the association between job strain, coronary heart disease (CHD) and stroke. They comprised 6070 men who were free from any previous history of CHD and stroke at baseline. It was concluded that exposure to job strain, increases the risk of CHD especially in smokers and blue-collar workers but no increase in stroke risk was seen.

Limitations: In this study, we only discussed the relationship between job strain and stroke rates without adjusting other possible variables so the effects of other variable may have an influence on the result. As this study was done for the first time in our region so we didn't perform it in the format of cohort, for confirmation any relation, we need the higher number of patients in a longer period of time.

Conclusion

Based on statistical analysis and mathematical data, no significant relationship was found between job types, job difficulties, night shifts and stroke. Housewives, employees, farmers and self-employments are more frequently suffering stroke.

Declarations

Authors' Contribution:

S.Sh.V.: Conceptualization; Methodology; Project administration.

A.A.: Supervision; Validation.

N.H.: Investigation; Formal analysis; Writing - Original draft.

M.R.A.: Writing – Original draft; Writing – Review & Editing.

G.G.: Data curation; Formal analysis; Resources.

A.J.S.: Investigation; Visualization; Writing – Review & Editing.

Acknowledgements:

Special thanks to the Emergency and Trauma care research center personnel and the emergency department staff. This study was submitted as a M.D. thesis with deputy of research register ID No. of 61119.

Funding:

There was not any financial support for this research.

Conflict of interest:

The authors declare no conflict of interest in this study.

References

1. Brunner E, Hemingway H, Walker B, et al. (2002) Adrenocortical, autonomic, and inflammatory causes of the metabolic syndrome: nested case-control study. *Circulation* 106(21): 2659–2665.
2. Burton J and Organization WH (2010) WHO healthy workplace framework and model: Background and supporting literature and practices. World Health Organization.
3. Chandola T, Britton A, Brunner E, et al. (2008) Work stress and coronary heart disease: what are the mechanisms? *European heart journal* 29(5): 640–648.
4. Everson SA, Lynch JW, Kaplan GA, et al. (2001) Stress-induced blood pressure reactivity and incident stroke in middle-aged men. *Stroke* 32(6): 1263–1270.
5. Fisher M and Folland E (2008) Acute ischemic coronary artery disease and ischemic stroke: similarities and differences. *American Journal of Therapeutics* 15(2): 137–149.
6. Fransson EI, Nyberg ST, Heikkilä K, et al. (2015) Job strain and the risk of stroke: an individual-participant data meta-analysis. *Stroke* 46(2): 557–559.
7. Frizzell JP (2005) Acute stroke: pathophysiology, diagnosis, and treatment. *AACN Advanced Critical Care* 16(4): 421–440.
8. Hemingway H, Shipley M, Brunner E, et al. (2005) Does autonomic function link social position to coronary risk? The Whitehall II study. *Circulation* 111(23): 3071–3077.
9. Hosseini AA, Sobhani-Rad D, Ghandehari K, et al. (2010) Frequency and clinical patterns of stroke in Iran-Systematic and critical review. *BMC neurology* 10(1): 1–10.

10. Hosseinzadeh N, Ala A, Rahnemayan S, et al. (2022) Demographic information and risk factors of stroke patients younger than 65 years old. *Frontiers in Emergency Medicine* 6(1): e4-e4.
11. Huang Y, Xu S, Hua J, et al. (2015) Association between job strain and risk of incident stroke: A meta-analysis. *Neurology* 85(19): 1648–1654.
12. Kivimäki M, Nyberg ST, Batty GD, et al. (2012) Job strain as a risk factor for coronary heart disease: a collaborative meta-analysis of individual participant data. *The Lancet* 380(9852): 1491–1497.
13. Kunz-Ebrecht SR, Kirschbaum C and Steptoe A (2004) Work stress, socioeconomic status and neuroendocrine activation over the working day. *Social science & medicine* 58(8): 1523–1530.
14. May M, McCarron P, Stansfeld S, et al. (2002) Does psychological distress predict the risk of ischemic stroke and transient ischemic attack? The Caerphilly Study. *Stroke* 33(1): 7–12.
15. Nyberg ST, Fransson EI, Heikkilä K, et al. (2013) Job strain and cardiovascular disease risk factors: meta-analysis of individual-participant data from 47,000 men and women. *PloS one* 8(6): e67323.
16. Ojaghhighighi S, Vahdati SS, Mikaeilpour A, et al. (2017) Comparison of neurological clinical manifestation in patients with hemorrhagic and ischemic stroke. *World journal of emergency medicine* 8(1): 34.
17. Torén K, Schiöler L, Giang W, et al. (2014) A longitudinal general population-based study of job strain and risk for coronary heart disease and stroke in Swedish men. *BMJ open* 4(3): e004355.
18. Tsutsumi A, Kayaba K, Kario K, et al. (2009) Prospective study on occupational stress and risk of stroke. *Archives of Internal Medicine* 169(1): 56–61.
19. Vrijkotte TG, Van Doornen LJ and De Geus EJ (2000) Effects of work stress on ambulatory blood pressure, heart rate, and heart rate variability. *Hypertension* 35(4): 880–886.

Figures

Figure 1

Frequency of jobs