

Relationship between Work Stress Levels and the Frequency of Migraine Occurrence: Literature Review

Haikal Farhan Nagata¹, Rahayu², Andi Abdillah³

²Medical Faculty University of Muhammadiyah Malang, East Java, Indonesia

¹Neurology Department Medical Faculty University of Muhammadiyah Malang, East Java, Indonesia

³Surgical Department Medical Faculty University of Muhammadiyah Malang, East Java, Indonesia

Article Info

Article history:

Received March 01, 2023

Revised April 20, 2023

Accepted July 25, 2023

Keywords:

Stress level

Migrain

DOI:

10.22219/apisio.Vol1.AM2.42230

ABSTRACT

Background: Worker's workload tends to increase every year, so that's increasing the stressors. The higher the stressors, the heavier work stress appears. The kind of work stress is different in each person. According to data from GBD (Global Burden of Disease), people with work stress often complain of migraine, and stress was recorded as the second most frequent trigger in migraine cases. Migraine is still being studied up to now. Purpose: To determine the correlation between work stress level and the frequency of migraine. **Method:** Literature review taken references from 27 journals and 2 textbooks. The journals were taken from PubMed using levels of work stress and migraine frequency as the keywords, which were selected by international journals that indexed by Scopus and non-Scopus which were published no later than 2015. **Result:** The review showed that stress is often associated with migraine as trigger, and it roles as the risk factor for chronic migraine. In case of chronic migraine, there was high stress conditions occurs. In the other hand, high stress condition makes the stress resistance decreases that makes person susceptible to suffer from migraine. Migraine frequency is more common in the person who has high stress level than those with the low. Work load and type of work affect the frequency of migraine. Prevention and treatment of migraine in workers should be considered because it affects the level of absence and productivity of work. **Conclusion:** There were correlation between work stress level and the frequency of migraine

This is an open access article under the [CC BY-SA](#) license.



Corresponding Author:

Haikal Farhan Nagata

Medical Faculty University of Muhammadiyah Malang

Jl. Bendungan Sutami No 188A, Malang, East Java Indonesia

Email: nagata216@gmail.com

1. INTRODUCTION

Work carries its own risks and burdens in every field. For adults, work is certainly a mandatory requirement to support their families and children. Job demands also increase, and the amount of time dedicated to work automatically increases. According to data from the Central Statistics Agency (BPS), in February 2019, the percentage of full-time workers (working at least 35 hours per week) in Indonesia was 69.96%. According to BPS, East Java alone has a workforce of 21.59 million, an increase of 567,000 people compared to 2018. This number is comparable to the annual population increase.

According to the National Institute of Occupational and Health (NIOSH), stressors both inside and outside the workplace can certainly lead to work stress. The International Labour Organization (ILO) reports that approximately 10% of workers experience stress in Germany and Finland. In Europe, 28% of workers experience

work stress [1]. In Hong Kong, the cost of medical treatment due to work stress is quite high, reaching 4,000 billion Hong Kong dollars [2].

Stress causes individuals to experience mental burden, which can trigger primary headaches, one form of which is migraine. Stress causes changes in hormonal activity that can trigger migraines. Analysis of the 2016 Global Burden of Disease (GBD) study, including data from 132 countries, estimated that 1.04 billion people worldwide suffer from migraines, with a prevalence of 14.4% overall, 18.9% in women, and 9.8% in men. According to the Migraine Foundation 2020, 1 in 4 people in the US suffer from migraines, and 90% have a history of migraines. In Asia, particularly China, the prevalence of primary headache is 53.9%, including migraine at 29.2% and TTH at 24.7% [3].

Research suggests that migraine is the brain's response to stress. Repeated stress can cause changes in brain tissue, both functional and structural [4]. Previous research on the relationship between work stress and migraine found that the number of migraine patient reports found was higher in patients with a previous migraine diagnosis compared to new migraine cases (503 cases compared to 275 cases) [5].

2. METHOD

The method used in writing this article is a literature review. The literature review took references from 27 journals and 2 textbooks. The journals were sourced from the PubMed search engine with keywords such as "work stress levels and migraine frequency." The journals were selected from Scopus-indexed and non-Scopus-indexed international journals published no later than 2015.

3. RESULTS AND DISCUSSION

Migraine is a complex extracranial disorder and is listed as the sixth most influential disorder globally by the WHO (World Health Organization). Its prevalence increases annually, reaching 15-18% worldwide [6]. This is often overlooked, and migraine is not considered a serious illness. Migraine incidence in the United States, the United Kingdom, and Asia incurs significant medical costs, especially for workers [2]. The prevalence of migraine is twice as high in women as in men, at 14.9% and 6.3%, respectively [7]. The prevalence of migraine in women is higher than in men due to ovarian hormones. Estrogen is a key trigger for migraine. This difference in sex hormones underlies why it is more common in women than in men. Therefore, in women, the risk factors for migraine persist from puberty to post-menopause [8]. In Indonesia, migraine reporting and treatment frequency are still rare due to the low prevalence of migraines. It is estimated that approximately 60% of migraine sufferers are unaware of their condition, with a migraine awareness rate of 8.83% [9].

Many factors can cause migraines, such as stress, hormonal changes, comorbidities, lack of sleep, certain foods or drinks, etc. In a study assessing factors that can cause migraines, stress was the second most common cause, accounting for 76% of cases [10]. Migraines are a maladaptive response of the brain due to a lack of homeostasis. The brain responds to stress by activating the HPA axis. Corticotropin-releasing hormone (CRH) and vasopressin (AVP) are produced by parvocellular neurons of the hypothalamic PVN. The parvocellular division of the PVN plays a central role in the homeostatic stress response. The PVN is key to the chain of events leading to the activation of the trigeminovascular system, which ultimately explains the low stress resilience in individuals susceptible to stress-induced migraines. Activation of the trigeminovascular system leads to the release of neuropeptides, perivascular inflammation, and the release of CGRP. CGRP is what causes cerebral and dural vascular dilation, the release of inflammatory mediators from mast cells, and nociceptive transmission from intracranial blood vessels to the nervous system. This is why migraines can occur, and serum CGRP is often found in migraine cases [11].

An analysis of the 2016 Global Burden of Disease (GBD) study, including data from 132 countries, estimated that 1.04 billion people worldwide suffer from migraines. Migraines are common among workers in the US, Spain, Europe, and Asia. Worker burnout is influential and associated with migraines [12]. According to this study, certain types of jobs and workloads influence the frequency of migraines. Jobs with high stress or heavy workloads increase the risk of migraine attacks. In a study in Taiwan, healthcare workers had a higher risk of migraines than non-healthcare workers [13]. This is due to professional demands, shift work, sleep quality, and fatigue, which are all factors that trigger migraines in healthcare workers. Migraines are a significant contributor to decreased work productivity and absenteeism. Migraine severity and trigger factors are important issues that must be addressed in workers, necessitating immediate treatment and prevention efforts [14].

In a study on stress in workers, migraine cases were found to be more frequent among patients with a prior migraine diagnosis than among new migraine patients, with a ratio of 503 to 275 [5]. This is related to and suggests chronic migraine, which is caused by ineffective treatment for acute migraine, obesity, depression, and high or persistent stress [15]. Migraine recurrence in patients with chronic migraine is 2 to 3 times more frequent than in

patients with regular migraine. The sensory threshold of the limbic system decreases with continued migraine occurrence and the absence of changes or interventions to address migraine triggers, increasing the likelihood of migraine attacks [15]. Furthermore, another study reported high levels of stress in 42.5% of patients with chronic migraine [16]. Workers in Spain reported a higher prevalence of chronic migraine compared to those with regular migraines [12]. High levels of stress and migraine occurrence were found in workers with heavy workloads. A study in rats induced by continuous stress showed a relevant baseline threshold decrease not only in migraine occurrence but also in pain [17]. This study suggested that stress not only causes migraines but is a risk factor for chronic migraine. Migraine frequency was higher in individuals with high levels of stress compared to those with low levels of reported stress (16.6 vs. 9.0%; $p < 0.0001$) in a Canadian study [7]. Managing stress can reduce the frequency, pain, and duration of migraines [18].

Several studies have shown that stress and migraines, if left untreated, can create a vicious cycle. Untreated stress can trigger persistent migraines, and if left untreated, migraines can become chronic, increasing in frequency. Therefore, the results of the discussion and analysis above indicate that job stress levels are associated with migraine frequency.

4. CONCLUSION

Based on the results of a literature study, a relationship was found between the level of work stress and the frequency of migraines. An increase in the level of work stress also increases the frequency of migraines.

5. REFERENCES

- [1] D. Balayssac et al., "Work-related stress, associated comorbidities and stress causes in French community pharmacies: a nationwide cross-sectional study," **PeerJ**, vol. 5, no. 10, p. e3973, 2017, doi: 10.7717/peerj.3973.
- [2] O. L. Siu et al., "Occupational stress and its economic cost in Hong Kong: The role of positive emotions," **Int. J. Environ. Res. Public Health**, vol. 17, no. 22, pp. 1-22, 2020, doi: 10.3390/ijerph17228601.
- [3] W. Xie et al., "Prevalence and risk factors associated with headache amongst medical staff in South China," **J. Headache Pain**, vol. 21, no. 1, p. 5, 2020, doi: 10.1186/s10194-020-1075-z.
- [4] H. Y. Liu, K. H. Chou, and W. T. Chen, "Migraine and the Hippocampus," **Curr. Pain Headache Rep.**, vol. 22, no. 2, pp. 1-5, 2018, doi: 10.1007/s11916-018-0668-6.
- [5] I. S. Santos et al., "Job stress is associated with migraine in current workers: The Brazilian Longitudinal Study of Adult Health (ELSA-Brasil)," **Eur. J. Pain**, vol. 18, no. 9, pp. 1290-1297, 2014, doi: 10.1002/j.1532-2149.2014.489.x.
- [6] P. J. Goadsby et al., "Pathophysiology of migraine: A disorder of sensory processing," **Physiol. Rev.**, vol. 97, no. 2, pp. 553-622, 2017, doi: 10.1152/physrev.00034.2015.
- [7] A. M. Slatculescu and Y. Chen, "Synergism between Female Gender and High Levels of Daily Stress Associated with Migraine Headaches in Ontario, Canada," **Neuroepidemiology**, pp. 183-189, 2018, doi: 10.1159/000492503.
- [8] C. Todd, A. M. Lagman-Bartolome, and C. Lay, "Women and Migraine: the Role of Hormones," **Curr. Neurol. Neurosci. Rep.**, vol. 18, no. 7, pp. 1-6, 2018, doi: 10.1007/s11910-018-0845-3.
- [9] X. Wang et al., "The Prevalence and Awareness of Migraine Among University Students in Harbin, China," **J. Oral Facial Pain Headache**, vol. 29, no. 4, pp. 384-389, 2015, doi: 10.11607/ofph.1521.
- [10] C. D. Malone, A. Bhowmick, and A. B. Wachholtz, "Migraine: Treatments, comorbidities, and quality of life, in the USA," **J. Pain Res.**, vol. 8, pp. 537-547, 2015, doi: 10.2147/JPR.S88207.
- [11] M. Bahrudin, **Neurologi Klinis**. Malang: UMM Press, 2017, ISBN: 978-979-796-196-1.
- [12] V. González-Quintanilla et al., "Stress at work in migraine patients: Differences in attack frequency," **Neurología (English Edition)**, vol. 30, no. 2, pp. 83-89, 2015, doi: 10.1016/j.nrleng.2014.12.002.
- [13] W. Y. Kuo et al., "Higher migraine risk in healthcare professionals than in general population: a nationwide population-based cohort study in Taiwan," **J. Headache Pain**, vol. 16, no. 1, pp. 1-7, 2015, doi: 10.1186/s10194-015-0585-6.
- [14] V. Leso et al., "Shift work and migraine: A systematic review," **J. Occup. Health**, vol. 62, no. 1, pp. 1-10, 2020, doi: 10.1002/1348-9585.12116.
- [15] A. May and L. H. Schulte, "Chronic migraine: Risk factors, mechanisms and treatment," **Nat. Rev. Neurol.**, vol. 12, no. 8, pp. 455-464, 2016, doi: 10.1038/nrneurol.2016.93.
- [16] M. J. Cha et al., "Stress is associated with poor outcome of acute treatment for chronic migraine: A multicenter study," **Pain Med.**, vol. 19, no. 9, pp. 1832-1838, 2018, doi: 10.1093/pm/pnx269.
- [17] D. Kaufmann and K. C. Brennan, "The Effects of Chronic Stress on Migraine Relevant Phenotypes in Male Mice," **Front. Cell. Neurosci.**, vol. 12, pp. 1-14, Sep. 2018, doi: 10.3389/fncel.2018.00294.
- [18] L. S. Krøll et al., "Level of physical activity, well-being, stress and self-rated health in persons with migraine and co-existing tension-type headache and neck pain," **J. Headache Pain**, vol. 18, no. 1, pp. 1-9, 2017, doi: 10.1186/s10194-017-0753-y.