



Geographical Differences in Trigger Factors of Tension-Type Headaches and Migraines

Mei-Ling Sharon Tai¹ · Sharon Xue Er Yet¹ · Ting Chung Lim¹ · Zhen Yuan Pow¹ · Cheng Beh Goh^{1,2}

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Abstract

In this review, we discussed the types and frequencies of trigger factors of primary headache [migraine and tension-type headache (TTH)] among adult patients. We assessed the influence of geographical location, ethnicity and gender on the various trigger factors of a migraine and a TTH. We also evaluated the trigger factors among the multi-ethnic Southeast Asian adult patients. In a recent study, odor triggered more migrainous headaches compared to the other primary headaches. Odor was observed to be specific of migraines. Moreover, stress is one of the most common trigger factors for patients with migraines and TTHs worldwide. Migrainous patients have an increased sensitivity in comparison to non-migrainous patients. Furthermore, these patients have much difficulty in adapting to the high level of sensitivity, and the sensitized brain is therefore more vulnerable to trigger factors. In addition, the presence of one trigger factor may increase the exposure of other trigger factors. This phenomenon is more marked in the patients with migraines who have stress and menstruation as triggers, predisposing them to be more sensitive to other triggers. In conclusion, the geographical location factor has an influence on the trigger factors of headaches. Ethnicity may have an effect due to the cultural differences. Change in weather and sunlight are important commonly identified trigger factors for headaches. Moreover, gender differences in some trigger factors are present among the patients with headaches, especially sunlight and sleep deprivation. More research studies can be conducted to have a better understanding on trigger factors in the future. This will enable proper identification of trigger factors, leading to a decrease in the number of headache episodes and an improvement in quality of life for patients.

Keywords L Headache · Migraine · Tension-type · Trigger factors

Abbreviations

TTH	Tension-type headache
ICHD-III	International headache criteria III
SPSS	Statistical package for social sciences

Introduction

Primary headache is a common complaint presenting to hospitals and clinics worldwide [1, 2]. In Malaysia, the most common primary headache subtypes presenting to outpatient clinics were migraine followed by tension-type headache (TTH) [3]. An evaluation of the trigger factors of headaches is important because a primary headache, especially a migraine, has a substantial economic impact [3, 4].

Assessment of trigger factors is frequently recommended as a management plan for both migraines and TTHs [2, 5]. Proper identification of the trigger factors of a headache by the clinicians and patients reduces the headache frequency [6]. In a community study conducted in Malaysia, the most common trigger factors for migraines and TTHs were sunlight, sleep deprivation and stress [7]. Ethnic variation may play a vital role in influencing the effect of triggers on TTHs and migraines [8].

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✉ Mei-Ling Sharon Tai
sharont1990@gmail.com

¹ Division of Neurology, Department of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia

² Hospital Sultan Ismail, Johor Bahru, Malaysia

The countries in Southeast Asia are located at the equatorial belt. Interestingly, Malaysia, Singapore and Brunei comprise three major ethnic groups: the Malays, Chinese and Indians. The other countries in Southeast Asia are Thailand, Indonesia, Myanmar, Vietnam, Laos and Cambodia. The population of Southeast Asia is believed to have different characteristics and features of headache trigger factors, as compared to other parts of the world.

There are very few published data regarding the frequency of trigger factors, gender differences and geographical variation of the trigger factors in Southeast Asia. Moreover, the literature on the trigger factors of TTHs among the Southeast Asians is very limited. In this review, we discussed the types and frequencies of trigger factors of a primary headache (migraine and TTH) among the adult patients. We assessed the influence of geographical location, ethnicity and gender on the various trigger factors of migraines and TTHs. We also evaluated the trigger factors among the multi-ethnic Southeast Asian adult patients.

Differences in Trigger Factors Among Patients with Migraines and TTHs

The most common trigger factors for both TTHs and migraines in previous studies were sleep deprivation, stress, change of weather and sunlight [2, 5, 9–16]. The other more common trigger factors of migraines and TTHs described in most other studies were environment, psychological factors, tiredness and menstruation [2, 9].

The most common trigger factors for TTHs according to the studies by Wang et al. and Zivadinov et al. were sleep deprivation, stress and change of weather [5, 17]. In addition, the most common trigger factor for migraines in previous studies was stress [5, 9, 10, 14, 16, 18, 19]. The other more common trigger factors for migraines in the study by Zivadinov et al. were sleep deprivation and change of weather [17].

Stress has been described as a major trigger factor of migraines as well as TTHs in many patients [10, 14, 16]. It is unclear whether stress is more important in migraines or TTHs due to conflicting reports in the literature [10, 14, 16, 17]. Stress played a more important role as a trigger in migraines compared to TTHs in the study by Zivadinov et al. [17]. However, in another study by Haque et al., stress was well distributed among TTHs and migraines [20]. Moreover, in previous studies, there was no trigger factor which was significantly more frequent among the patients with TTHs in comparison to the patients with migraines [15, 20].

Increased Sensitivity in the Patients with Migraines

Migrainous patients are known to have an increased sensitivity in comparison to non-migrainous patients [12]. Furthermore, these patients have much difficulty in adapting

to the high level of sensitivity, and the sensitized brain is therefore more vulnerable to trigger factors [12, 21, 22].

This is also compounded by the fact that the presence of one trigger factor may increase the exposure of other trigger factors [5, 23]. This phenomenon is more marked in patients with migraines who have stress and menstruation as triggers, predisposing them to be more sensitive to other triggers [18].

Gender Differences in the Trigger Factors Among Patients with Primary Headaches in General

Women had primary headaches more significantly triggered by stress and odor [24]. In addition, both genders reported with equal proportions that their headaches were provoked by change of weather [24].

Gender Differences in the Trigger Factors Among the Patients with a Migraine

Regarding gender differences, there were conflicting reports in the literature on sleep deprivation. Female patients with a migraine presented with more sleep deprivation than the male migraineurs in a previous study [5]. However, another study showed that the male migraineurs had a higher proportion of sleep deprivation in comparison to the female migraineurs [18].

Stress was reported by 65.4 and 63.1% of the female and male migraineurs, respectively, in a previous study [18]. Sunlight has been described in the literature as a common trigger factor among female patients with a migraine [5]. However, there were conflicting reports on whether there was gender variation in the other triggers such as weather change and odor. In several studies, change of weather and odor were more common triggers in the female migraineurs than the male migraineurs [21, 25]. However, in other studies, the frequency of odor, weather and other trigger factors did not differ between the men and women with migraines [9, 17].

Gender Differences in the Trigger Factors Among Patients with a TTH

Furthermore, in terms of gender differences for TTHs, the female TTH patients had more sleep deprivation than the male patients in a previous study [5]. Andress-Rothrock et al. reported that the patients of either gender with a TTH were no more likely than the other gender to complain of trigger factors [9].

Differences in the Trigger Factors Between Chronic Migraines and Episodic Migraines

The patients with a chronic migraine were more likely to be provoked by odor than the patients with episodic migraines in a previous study [9]. Moreover, noise was a significant trigger

in the patients with chronic migraines than episodic migraines. The migraineurs have been described to have lower noise threshold, especially between attacks [4, 26, 27]. Stress was also a significant trigger factor in chronic migraines than episodic migraines [21]. Again, there was one study which showed that the patients with chronic migraines were not substantially more or less likely to report a trigger or multiple triggers than the patients with episodic migraines [9].

Geographical Impact on the Trigger Factors

Geographical factors with various types of weather, such as tropical weather and a Mediterranean climate, can influence all the types of trigger factors with the exception of stress [5, 10, 11, 17, 28]. This is mainly applicable to the patients with migraines who report environmental factors as triggers globally [4, 28], whereas stress is a trigger factor for all migraine and TTH patients worldwide [21, 28–31]. In a previous study comparing the participants with headaches in the Malaysian and Australian communities, there were significant differences in trigger factors, such as sunlight and change of weather [8].

Ethnic Differences in the Trigger Factors

Moreover, different ethnicity with its unique lifestyle has an impact on the types of trigger factors [5, 10, 11, 17]. The variation might be explained by cultural differences [8, 11, 32].

Sunlight as a Trigger Factor

Sunlight was a particularly common trigger factor in the equatorial and tropical regions of Asia. Sunlight was the most common trigger factor in the primary headache patients (47%) in one community study conducted in Malaysia [7]. Sunlight provoked a headache in 51.9% of the migraine patients and 55.7% of the TTH patients in this study [7]. Sunlight was the fourth most common (48.5%) identified trigger factor for primary headaches in general in another community study in Malaysia [8]. Moreover, sunlight was the most common trigger in the patients with a primary headache in a previous clinic-based Malaysian study [3].

In Thailand, the neighboring country situated at the north of peninsular Malaysia, sunlight was one of the top ten common trigger factors reported by the study participants aged ≥ 60 years old [33]. The Southeast Asian countries are situated at the equatorial region with sunlight present throughout the year. Therefore, sunlight is a particularly important trigger factor among the Malaysian and Southeast Asian patients.

Furthermore, in the study by Haque et al. conducted in Bangladesh, sunlight was an important trigger factor among patients with migraines (44%) and TTHs (28%) [20]. Bangladesh is a South Asian country located in the tropical region of Asia with characteristic heavy rainfalls [34]. In this

country, there are three distinct seasons comprising a hot, humid summer between March and June; a cool, rainy monsoon season between June and October; and a cool, dry winter between October and March [34]. During the summer season in Melbourne, Australia, 24% of the study subjects in the community described sunlight as provoking their headaches [8].

Weather Change as Trigger Factor

In terms of impact of weather change on migraines, the percentages reported in several studies were: Andress-Rothrock et al. (19%), Zivadinov et al. (49%) and Kelman et al. (53.2%) [9, 17, 21]. In another study by Zivadinov et al, there was a trend towards association between change of weather and migraines [17]. In a clinic-based study in the USA, patients with migraines reported slight seasonal variation, with more episodes during spring and autumn seasons [25].

In the study conducted by Zivadinov et al., 44.7% of the TTH patients reported that weather change triggered their headaches [17]. In Malaysia, change of weather was the eighth most frequently reported trigger factor of TTHs and migraines in a community survey [8].

In a study conducted on the patients with migraines in a general population of Mexican-Americans in San Diego County, USA, change of weather was the second most frequently reported trigger factor in the female migraineurs (54.4%) [28]. More than 33% of the men had this trigger in the study [28]. San Diego County is located in Southern California and has a temperate climate [28]. Very large sudden changes in barometric pressure and humidity occur during Santa Ana winds [28]. The hot and dry winds from the desert move towards the ocean, and are reported to be triggers of migraines [28, 35]. The winds may precipitate serotonin release, leading to episodes of migraines [28, 36]. Sulman also reported that approximately 20–30% of the migraine patients had weather change as a trigger [28, 36].

Stress, Sleep Deprivation and Menstruation

Stress, sleep deprivation and menstruation are very common trigger factors in patients with primary headaches worldwide. There is very little geographical variation in the frequencies of the sleep and sleep deprivation trigger factors in the world.

Stress as a Trigger Factor

Stress was one of the commonest trigger factors for a primary headache in the general population in Southeast Asia and Australia. In addition, stress was one of the most frequently reported trigger factors for migraines in the community and clinics in Southeast Asia and the West. There is no geographical variation in terms of prevalence of primary headache between Southeast Asia and the Western countries.

Stress as Trigger Factor in Southeast Asia

In a community study conducted in Malaysia, stress was the third most common trigger factor (36.6%) among the participants with primary headaches in general [7]. In this study, 33.3% of the migrainous patients and 46% of the TTH patients complained that stress was a provoking factor [7]. In another Malaysian community-based study, stress was identified to be the second most common trigger factor (65.5%) among the study subjects with primary headaches [8].

Moreover, stress was the second most frequently reported trigger of headaches in general in a community survey conducted in Singapore (49%) [37]. In addition, stress was the most common precipitating factor for migraines in a community-based study in Singapore (64.2%) [38].

In one community study conducted on the general population in Thailand, the number one trigger factor of migraines was stress (18.5%) [39]. Furthermore, in another previous study conducted in Thailand on the elderly participants aged ≥ 60 years old, the most common precipitating factor was stress (22%) [33]. In the Philippines, stress was the most common trigger factors in the hospitalized patients with a migraine [40].

Stress as a Trigger Factor in the Caucasian Countries and Japan

In the two previous clinic-based studies by Fukui et al. and Andress-Rothrock et al., 59 and 65% of the migraine patients, respectively, reported stress as a trigger factor [9, 18]. Other studies conducted by Kelman (79.7%), Karli et al. (78.3%) and Chabriat et al. showed that stress was one of the top three trigger factors of migraines [16, 21, 41]. In addition, stress was the most common precipitating factor for headaches in the general population in Australia (78%) [8]. Stress precipitates headache by a central mechanism through direct activation of the ascending reticular pathway [20].

Sleep Deprivation as a Trigger Factor

It is observed that there is no geographical variation in terms of frequency of sleep deprivation as a triggering factor in Southeast Asia and in other regions of the world.

Sleep Deprivation in Primary Headaches in General

In Singapore, sleep deprivation was the most frequently described trigger of migraines and TTHs generally in a community study (66.7%) [37, 38]. Similarly, in Malaysia, sleep deprivation was the most common trigger factor (71%) among patients with headaches in the community [8].

Sleep Deprivation in Migraines

Sleep deprivation was one of the six most common precipitating factors for migraines in a community study in Thailand [39]. In the Singaporean study, sleep deprivation was the second most frequently reported trigger among migraine patients in the community (60.9%) [38].

In a previous community survey in Malaysia, 53.4% of the TTH and 40.4% of the migraine patients presented with sleep deprivation as trigger for their headaches [7]. Sleep deprivation was reported by 61.5% of the migraine patients in the study by Fukui et al. [18].

Sleep Deprivation in Migraines and TTHs

In a previous community survey conducted in Malaysia, 53.4% of the TTH and 40.4% of the migraine patients presented with sleep deprivation as the trigger for their headaches [7]. Sleep deprivation activates the sympathetic outflow to boost metabolic process for availability of energy, leading to the provocation of headaches [20].

In Haque et al.'s clinic-based study, sleep deprivation was more frequently present in the patients with migraines (20%) as compared with TTHs (14%) [20]. In a clinic-based study conducted in Holland, sleep deprivation was the third most common trigger factor among patients with headaches [15]. In this study, 74% of the migraine and 71% of the TTH patients complained that sleep deprivation was triggering their headaches [15]. Similarly, in two Malaysian clinic-based studies, sleep deprivation was the second most common precipitating factor with a reported percentage of 47.3% [3, 42].

Menstruation as a Trigger Factor

In Thailand, menstruation was the second most common trigger factor of migraines in a community survey (6.4%) [39]. However, the percentage reported was lower compared to the percentages in other studies [9, 17]. Menstruation as a trigger factor of migraines has been described in previous studies by Andress-Rothrock et al. in a clinic-based study (26.5%) and Zivadinov et al. in a community study (49.4%) [9, 17].

In terms of primary headaches, in Singapore, menstruation was one of the six more common precipitating factors of TTHs and migraines in the general population [37]. Moreover, 18% of the study participants with frequent and chronic TTHs, as well as 16% of the participants with migraines without an aura, reported menstruation as trigger for their headaches [38].

In contrast, in Malaysia, menstruation was the tenth most frequently identified trigger factor for headaches reported by study subjects in the general population [8]. In a

previous community study also conducted in Malaysia, menstruation was a triggering factor in 31 and 18.2% of the patients with migraines and TTHs, respectively [7]. With respect to TTHs, 45.7% of the TTH patients in the study by Zivadinov et al. had menstruation as a trigger factor [17].

Noise as a Trigger Factor

Noise was reported by 5% of the Migraine Patients in a Previous Study [9]. Noise was the fourth most common trigger factor of headaches in another study [19]. Noise which precipitates headaches is usually of low intensity and the same type encountered in daily life [43]. However, the noise experienced in daily life resulting in triggering of headaches varies between different people [43].

Odor as a Trigger Factor

In Kelman's study, 43.7% of the patients with migraines complained of odor as a trigger factor [21]. In a recent study, headaches provoked by odors may be considered as a factor which can distinguish between migraines and TTHs, and odor was believed to be specific to migraines [44••].

Clinical Applications and Limitations

The prevention of primary headaches by identification of triggers is as crucial as pharmacological management of headaches [5, 41]. Therefore, it is important to know more about the trigger factors [5, 17]. An evaluation of the environmental factors which persistently trigger migraines and TTHs in certain patients may be beneficial to reduce the frequency of headache episodes [12].

However, the biological mechanism by means the triggers generally precipitate migraine episodes remains obscure and unknown [12]. The literature on trigger factors of headache in Myanmar [45], Laos and Cambodia is limited.

In conclusion, the geographical factor has an influence on the trigger factors of headache. Ethnicity may have an effect due to the cultural differences. Change in weather and sunlight were important precipitating factors for headaches. Moreover, gender differences in some trigger factors were present among patients with headaches. In particular, sunlight was a more common trigger among women with migraines. The female patients with TTHs had more sleep deprivation than the male patients.

More research studies on trigger factors can be conducted in certain parts of Southeast Asia in the future. This will enable proper identification of trigger factors, leading to a reduction in the number of headache episodes and an improvement in quality of life for patients.

Compliance with Ethical Standards

Conflict of Interest Mei-Ling Sharon Tai, Sharon Xue Er Yet, Ting Chung Lim, Zhen Yuan Pow and Cheng Beh Goh declare no conflict of interest.

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- Of major importance

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