



THE IMPACT OF TEA ON MIGRAINE AMONG UOC STUDENTS AND STAFF: A CROSS SECTIONAL STUDY

Beh Hon Yung^[a], Fatin Humaira Ridzuan^[b], Samihah Rifat Syed Yasir^[c],
Hairel Anuar Selamat^{[d]*}

Article History: Received: 21.04.2022

Revised: 16.08.2022

Accepted: 04.10.2022

Abstract: Migraine is a chronic disabling condition and has been linked with migraine for many years either as a trigger or relieving factor and as most of the population, including migraineurs, consume a considerable amount of caffeine daily, a question arises as to whether it influences their headaches. Thus, the purpose of this study is to study association between caffeinated and non-caffeinated tea consumption and migraine. **Materials and method:** A Cross-sectional study (N=69) with consecutive sampling was done among the staff and students at University of Cyberjaya. Data was collected with online questionnaire and analysed using JASP. **Results:** 16.4% respondents report caffeinated tea as a migraine trigger and Chi-square showed significant association between caffeinated tea and migraine with p value <0.01. Severe migraine is more common in non-habitual tea drinkers (18.1%) compared to habitual tea drinkers (16%) however not statistically significant (P value 0.818). **Conclusion:** Caffeinated tea triggered migraine headaches and non-caffeinated tea significantly relieved migraine headaches compared to caffeinated tea. Additional research can be done to study the effects of different types of non-caffeinated tea on migraine to optimize patient management.

Keywords: caffeinated tea, migraine, non-caffeinated, relieving factor, trigger factor

[a]. Faculty of Medicine, University of Cyberjaya, Persiaran Bestari, Cyber 11, 63000 Cyberjaya, Selangor, Malaysia.

[b]. Faculty of Medicine, University of Cyberjaya, Persiaran Bestari, Cyber 11, 63000 Cyberjaya, Selangor, Malaysia.

[c]. Faculty of Medicine, University of Cyberjaya, Persiaran Bestari, Cyber 11, 63000 Cyberjaya, Selangor, Malaysia.

[d]. Faculty of Medicine, University of Cyberjaya, Persiaran Bestari, Cyber 11, 63000 Cyberjaya, Selangor, Malaysia.

*Corresponding Author

DOI: 10.31838/ecb/2022.11.10.001

INTRODUCTION

Migraine is a common, disabling primary headache that is more prevalent than the combined number of those who suffer from diabetes, epilepsy and asthma (APPGPHD, 2010). In the Global Burden of Disease Study 2010 (GBD2010), it was ranked as the third most prevalent disorder in the world. There are many classifications of migraine as said in the International Classification of Headache Disorders, 3rd edition (beta version) but generally the clinical manifestations of migraine without aura are most characterized by recurrent episodes of headache often associated with nausea, vomiting, photophobia, and phonophobia. The impact and burden migraineurs suffer extends beyond the physical health. Their quality of life is affected through themes of work, school, family impact and disease costs (Leonardi and Raggi, 2019). Identifying trigger factors is an important aspect of the prevention of migraine attacks to improve the quality of life.

There are several intrinsic and extrinsic factors that can trigger a migraine attack including foods, alcohol, meteorologic or atmospheric changes, exposure to light, sounds or odors

(Hoffman and Recober, 2013). The diet factor, particularly coffee and its component; caffeine, has shown conflicting results despite common belief. Caffeine is known to be an adenosine receptor antagonist. Its role in cerebral blood flow can either be to stimulate vasodilation via the adenosine A2A receptor which produces nitric oxide (NO) or, contrary to this, via the adenosine A1 receptor, adenosine decreases NO release and produces vasoconstriction. Thus, depending on caffeine binding affinity and dose, it can either cause vasoconstriction or vasodilation (Nowaczewska, M., et al., 2020). Despite this knowledge, many studies on caffeine have concluded that its effect on headache is ambiguous. One has gone as far as to say that it can both relieve and trigger migraine (Alstadhaug and Andreou, 2019).

With this uncertainty, there is little research on other food items containing caffeine that may precipitate migraine episodes such as tea. Although tea can be either caffeinated or non-caffeinated, when talking about tea the general assumption is that it is made from the infusion of the leaves of *Camellia sinensis*, thus referring to caffeinated tea. Tea has been cultivated for thousands of years for medicinal purposes and there is now increasing evidence of its health benefits, particularly due to the polyphenols which are the major active compounds present in teas (Khan and Mukhtar, 2018). The components of herbal or non-caffeinated teas have also been proven to relieve migraine symptoms, one such common herb being Feverfew tea which many have self-incorporated in their treatment regime for migraine (Hylands, D.M., et al., 1985).

In respect to all the components of tea, beneficial or not, one must then question whether we expect similar conflicting results on its impact to headaches as with caffeine, or can we achieve a more convincing role for tea? Tea is comparatively cheaper than other beverages and is the most consumed, second to water (Naveed and Hameed, 2014), therefore; by studying the impact of tea on migraine we can benefit not only those who

suffer from the condition but also the wider, general population who are subject to tea consumption. Thus, this study aims to evaluate the association of tea consumption and occurrence of migraine headaches. From this we can then establish whether tea is a relieving or triggering factor for migraine which hopefully can pave the way for more research into the management scheme as well as further our understanding of the disease pathology.

MATERIALS AND METHODS

This is a cross-sectional study. This research was conducted within 1 year from October 2020 to February 2021. The sample population were students and staff of University of Cyberjaya, Selangor, who had migraine. Other inclusion criteria include those who can understand the English language and those consenting to the study. The exclusion criteria were those who were not tea drinkers. The non-respondents were participants who refused to answer the survey and who failed to complete the survey.

The sample frame were all students and staff of University of Cyberjaya, and the sampling unit was all individuals who fulfilled the inclusion and exclusion criteria from the sampling frame. The overall sample size needed to meet the objectives of our research was 69 (this was calculated using a previous study done in university of Malaya in 2018) at a confidence interval of 95%. The sampling method used was consecutive sampling. A survey was conducted among the students and staff members of University of Cyberjaya. Participants were assured on the anonymity and confidentiality of the gathered data. All participation was voluntary, and consent was obtained digitally. The batch leaders and staff of each faculty in the university were contacted through email or phone number. The questionnaire was distributed via an online platform (Google form). Participants were asked 5 sets of questions through the questionnaire and responses were recorded confidentially. The 5 sections of questions were as follows: Section 1: Consent form, Section 2: Sociodemographic information of students, Section 3: Migraine, Section 4: Migraine disability Assessment Test (MIDAS), Section 5: Tea knowledge pattern.

Statistical analysis was carried out by the JASP programme. Non-response and invalid responses were viewed as missing values and were omitted from the analysis. The values of $p \leq 0.05$ was regarded as significant. Descriptive variables were presented as frequencies and percentages. The association between categorical data was determined by the Chi-square test. P value of less than 0.05 was considered statistically significant. Furthermore, odds ratio (OR) was utilised to observe the strength of association between two variables.

Ethical Considerations

The survey was approved by the University of Cyberjaya Research Ethics Review Committee (CRERC) with CRERC Reference number: UOC/CRERC/ER/314.

RESULTS

The prevalence of sociodemographic factors and MIDAS severity among participants from UOC.

In this study conducted among the students and staff at the University of Cyberjaya, according to table 1, the highest prevalence of respondents was from the age group of 18-29 (95.7%), female (82.6%) and 46.3% of them were Malay. A survey on migraine severity using MIDAS questionnaire was distributed by google forms. As per results from table 1, we have found that the prevalence with severe migraine was shown to be highest among non-Malaysians (83.3%).

The association between tea drinker, genders, and MIDAS severity

Out of 69 respondents, there were 57 tea drinkers (82.6%). Out of those, 21 tea drinkers were found to be habitual tea drinkers while the remaining 36 were non-habitual tea drinkers. According to table 2, severe migraine is more common in non-habitual tea drinkers which accounts for 18.1% compared to habitual tea drinkers (16%). However, chi-square analysis showed that there was no association between tea drinkers and MIDAS severity (p value 0.818). From the 69 respondents from UOC, 57 respondents have migraine. 46 respondents were female (80.7%), and 11 respondents were male (19.3%). According to Table 1, females (19.2%) had a higher incidence of severe migraine compared to male respondents (8.4%). Chi-square analysis shows no association between genders and MIDAS severity (p value 0.362).

The types of triggering and relieving factors for migraine

Regarding table 3, there was a report of 67 respondents who drink caffeinated tea, 16.4% of respondents reported caffeinated tea as a trigger for migraine. Chi-square showed a significant association between caffeinated tea and migraine with a p-value < 0.01 . There were 69 respondents who drink coffee and 26% of the reports that coffee triggers migraine. Chi-square showed a significant association between coffee and migraine with a p-value < 0.01 . 20 respondents suffer from lack of sleep while the remaining 49 respondents have sufficient sleep. 18 (90%) out of 20 lack of sleep respondents reported that lack of sleep triggers migraine while 42 (87.7%) out of 49 respondents says sufficient sleep triggers migraine. However, using chi-square analysis, there were no association between total hours of sleep per day with migraine. According to table 4, 27 out of 69 respondent drinks non-caffeinated tea while the remaining 42 drink caffeinated tea. Among the respondents who drink non-caffeinated tea, 8 of them report that it relieves their migraine, whilst only 2 of the respondents who drink caffeinated tea report that caffeinated tea relieves migraine. From chi-square analysis, it shows that both caffeinated and non-caffeinated tea were associated with relieving factors for migraine. Another factor that we studied was the total hours of sleep per day. 20 respondents suffered from lack of sleep while the other 49 have sufficient sleeping hours. 17 (85%) out of 20 respondents reports lack of sleep can relieve migraine while 40 (81.6%) out of 49 reports that sufficient sleep can relieve migraine. However, chi-square analysis showed no association between total hours of sleep per day with relieving migraine.

FIGURES AND TABLES

Table 1. Sociodemographic factors of participants in UOC

MIDAS severity						
Sociodemographic Factors		Frequency (%)	Non-severe	Severe	Chi square (df)	P value
Age	18-29	66 (95.7)	54	12	0.660	0.416
	>30	3 (4.3)	3	0		
Gender	Female	57 (82.6)	46	11	0.830	0.362
	Male	12 (17.4)	11	1		
Race	Malay	32 (46.3)	26	6	0.077	0.782
	Non-Malay	37 (53.7)	31	6		

Table 2. Association between tea drinkers and MIDAS severity

Migraine Severity Level				
Types of tea drinkers	Non-severe (%)	Severe (%)	Total	P-value
Habitual tea drinkers	21 (84)	4 (16)	25	0.818
Non-habitual tea drinkers	36 (81.8)	8 (18.1)	44	

Table 3. Triggering factors for migraine

Triggering factors	Triggers Migraine		Total	Chi square (df)	P value
	Yes (%)	No (%)			
Caffeinated tea	11(16.4)	56(83.6)	67	30.2	<0.01
Coffee	18(26.0)	51(74.0)	69	15.78	<0.01
Total hours of sleep per day	Lack of sleep	18(90.0)	2(10)	20	0.230
	Sufficient sleep	42(87.7)	7(14.3)		

Table 4. Relieving factors for migraine

Relieving factors	Relieves Migraine		Total	Chi square (df)	P value
	Yes (%)	No (%)			
Non-caffeinated tea	8(29.6)	19(70.4)	27	8.201	0.004
Caffeinated tea	2(4.8)	40(95.2)	42		
Total hours of sleep per day	Lack of sleep	17(85.0)	3(15.0)	20	0.112
	Sufficient sleep	40(81.63)	9(18.40)		

DISCUSSION

The main goal of this research was to study the association between tea consumption and migraine among University of Cyberjaya's students and staff. Out of the 69 subjects studied, the male to female ratio was 1: 4.75. We found that 95.7% of the population was in the age group 18-29. The racial distribution of the respondents was: Malay 46.3%, Chinese 28.9%, Indians 11.5% and others 12.9%. This distribution is almost comparable to the racial distribution of the Malaysian population, which according to the Department of Statistics Malaysia 2020 was Malays 69.7 %, Chinese 22.5%, Indians 6.8%, and others 1%. The population in the University of Cyberjaya does not represent Malaysian population.

According to Lipton, R.B., et al., the prevalence of migraine is highest in the age group of 30-39 years for both females (24.2%) and males (7.44%), whilst generally being higher in females (17.1%) than in males (5.6%) (Lipton, R.B., et al., 2007). Our findings imply that, possibly due to the biological constraints of aging and higher levels of stress in adulthood, and the hormonal fluctuations of estrogen in women makes migraine more susceptible to adults and women, respectively. Our study found that females (80.3%) had a higher frequency of migraine compared to males (19.7%) however chi square

showed no significant association. Lipton, R.B., et al., also found that the prevalence of migraine was significantly higher in whites (female: 17.3%, male: 13.7%) compared to blacks (female: 5.7%, male: 4.1%) (Lipton, R.B., et al., 2007). Although socioeconomic status, diet and lifestyle may influence a race's susceptibility to migraine, we suggest that genetic vulnerability is more likely the factor for race-related differences in migraine prevalence. However, it is not conclusive to say that Malays have a higher prevalence of migraine in our study due to the significant portion of the race population being dominated by Malays.

Despite Malays constituting most of the study population and having higher prevalence of migraine, the prevalence of severe migraine was found to be higher in non-Malaysians (83.3%). This is likely due to the non-Malaysian group being a minority population group in our study. However, chi squared test did show significant association between ethnicity and MIDAS severity (p-value <0.001).

Furthermore, we found that in the population of the University of Cyberjaya, severe migraine is more common in non-habitual tea drinkers which accounts for 18.1% compared to habitual tea drinkers (16%). Our data analysis showed there was no association between tea drinkers and MIDAS severity (p-value 0.818). However, there were no available resources to refer to for this specific topic.

Upon studying the triggering factors for migraine, our study shows a significant association between caffeinated drinks (tea and coffee) and migraine, chi-square analysis suggests that there is a significant association with p -value < 0.01 . This result correlates with a study done by The American Journal of Medicine which showed there was a statistically significant nonlinear association between caffeinated beverage intake (p -value < 0.01) and the odds of migraine headache on the day. Total sleeping hours per day was also studied also in relation to migraine, which resulted no association according to chi square, this did not correlate with the study conducted by Lin, et al, 2016 which states that greater migraine frequency was associated with a higher prevalence of poor sleep quality. Results between literature review and our study differs may be due to the difference of underlying lifestyle routine in their daily life.

Several studies have shown that consumption of caffeinated beverage is a trigger factor for migraine headaches. A cohort study done by Mostofsky, E., et al., 2019 showed that high levels of caffeinated beverage intake may be a trigger of migraine and in another study done by Tai M.S., et al., 2018 minority of patients reported caffeinated tea as a trigger factor. In this research we decided to study the role of caffeinated and non-caffeinated tea as dietary relieving factor of migraine found out that majority of patients reported non-caffeinated tea as a relieving factor. We observed a significant association between migraine relieving factor and both caffeinated and non-caffeinated tea however there is no similar study to compare our results with.

The relationship between sleep and migraine is complex. Sleep has been described by many authors as a relieving factor of migraine. In this study 82.7% of migraine patients reported sleep as a relieving factor which is consistent with a retrospective cross-sectional study by Badrul, et al 2012 (58%) whereby majority of the participants relieve migraine headache by sleeping. Furthermore, we explored the relationship between total hours of sleep per day and migraine however there was no significant association. This could be attributed to the disproportionality of our study population as the number of participants with sufficient sleep were more than twice as high than those with insufficient sleep.

Our study consists of limitations. Firstly, the selected sociodemographic factors studied are age, gender, and ethnicity. This allows interpretation and analysis to be more representative of the Malaysian population. The use of small sample size for describing characteristic of a particular large group can lead to overestimation of results.

CONCLUSION

In conclusion caffeinated tea triggered migraine headaches and non-caffeinated tea significantly relieved migraine headaches compared to caffeinated tea. More research is needed to improve our understanding on the impact of tea on migraine as tea is the second most consumed beverage in the world. Additional research can be done to study the effects of different types of non-caffeinated tea on migraine in order to optimize patient management.

ACKNOWLEDGEMENT

We would like to thank everybody that contributed to this research, including the staff and students at University of Cyberjaya, Selangor. Despite the challenges of COVID-19, we were still able to receive cooperation and contribution from the participants involved to allow us to complete this research within the expected period.

We further extend our gratitude and appreciation to our supervisor, Dr. Hairel Anuar Selamat, the Deputy Dean of Student Affairs and lecturer of Family Medicine under the Faculty of Medicine, University of Cyberjaya, who guided us throughout the research.

Special thanks to Dr. Hafizah, the lecturer of Biostatistics of the Faculty of Medicine University of Cyberjaya for generously lending her advice and guidance to conduct this research. Lastly, we thank our families and friends for the continuous support and encouragement.

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