

**ASSOCIATION BETWEEN SMOKING WITH MIGRAINE ATTACKS FREQUENCY AND PAIN INTENSITY IN CHRONIC MIGRAINE PATIENTS****Fitria Adinda S<sup>1\*</sup>, Rusli Dhanu<sup>2</sup> & Fasihah Irfani Fitri<sup>2</sup>**<sup>1</sup>Resident Department of Neurology, Faculty of Medicine, University of North Sumatera<sup>2</sup>Department of Neurology Staff, Faculty of Medicine, University of North Sumatera**DOI: 10.5281/zenodo.2656421****Keywords:** Chronic Migraine, Migraine Attacks Frequency, Pain Intensity, Smoking.**Abstract**

**Background:** Smoking is a risk factor for chronic pain. Smoker patients with chronic pain also have more severe pain intensity. The relationship between migraines and smoking is still controversial. This study aims to determine the relationship of smoking to the frequency of attacks and pain intensity in chronic migraine patients.

**Method:** This study used a cross-sectional design, in chronic migraine outpatient in Adam Malik General Hospital Medan, Indonesia. The diagnosis is based on anamnesis according to the Classification of International Headache Society 2<sup>nd</sup> Edition. Migraine attack frequency and smoking habits are obtained from research data collection sheets. Pain intensity was assessed by visual analog scale (VAS).

**Results:** Of all 33 patients, there was 14 men (42.4%) and 19 women (57.6%). The number of smoker were 12 patients (36.4%). The mean frequency of attacks was  $3.03 \pm 2.01$  with the highest frequency was moderate attacks (60.6%). The mean VAS was  $6.85 \pm 1.81$ , with the highest pain intensity found in severe pain intensity (51.5%). With Fisher's test, it was found that there was a significant relationship between smoking and the frequency of attacks ( $p = 0.001$ ) and the Chi Square Test had a significant relationship between smoking and pain intensity ( $p = 0.005$ ).

**Conclusion:** There is a significant relationship between smoking with the migraine attack frequency and pain intensity in chronic migraine patients.

**Introduction**

Chronic migraine is a disabling neurologic condition that affects 2% of the general population. Patients with chronic migraine have headaches on at least 15 days a month, with at least eight days a month on which their headaches and associated symptoms meet diagnostic criteria for migraine.<sup>1</sup>

Annual 240 million people worldwide suffer from 1.4 billion headache attacks. Referral rate to the neurology outpatient clinic due to headache was 20% and so headache is a major goal for public health interventions. Recent studies showed that the prevalence of migraine was in range 10-20%.<sup>2</sup> The prevalence of smoking is also very high, world average of smoking cigarettes reaching 30%.<sup>3</sup>

Individuals with chronic pain have high rates of cigarette smoking. Some studies estimate the odds of smoking cigarettes among chronic pain patients as more than double compared to the general population.<sup>4</sup> Adults with pain report higher prevalences of smoking than adults without pain and, conversely, smokers are more likely to report pain, more intense pain, and pain interference than nonsmokers.<sup>5</sup>

Stress, smoking, pattern of sleep, weather change, missing a meal, bright light, certain food and alcohol consumption have been reported as major triggers of migraine. Several studies demonstrated the relationship between smoking and migraine with inconsistent results.<sup>6</sup> The aim of this study was to examine the association between smoking with migraine attacks frequency and pain intensity in chronic migraine patients.

**Methods****Study Samples**

The population in this study were all of chronic migraine outpatient at the Neurology Polyclinic of Adam Malik General Hospital Medan, Indonesia. The diagnosis of chronic migraine based on The Classification of



## INTERNATIONAL JOURNAL OF RESEARCH SCIENCE & MANAGEMENT

International Headache Society 2<sup>nd</sup> Edition.<sup>7</sup>The study was approved by the institutional ethics committee. The inclusion criteria in this study were patients diagnosed with chronic migraine based on the classification of International Headache Society and patients who participate in this study as evidenced by signing the research informed consent sheet. Patients who had history of sleep disorders and stress were excluded from this study.

### Study Design

This study is a cross-sectional design study, in chronic migraine patients. Data on the migraine attack frequency and smoking habits are obtained through research data collection sheets. Where the frequency of attacks in this study is divided into the frequency of mild migraine attacks (less than three times a month) and the frequency of severe migraine attacks (more than or equal to three times a month). Smokers in this study were: (1) Mild smokers: less than ten cigarettes per day; (2) Moderate smokers: 10-20 cigarettes per day; and (3) Heavy smokers: more than twenty cigarettes per day. Pain intensity was assessed by visual analog scale (VAS). VAS values 0 to 3 are mild pain; 4 to 6 are moderate pain and 7 to 10 are severe pain.

### Statistical Analysis

Fisher test were used for relationship between smoking and migraine attacks frequency. Chi square tests were used to find out the relationship between smoking and pain intensity.

### Results

This study involved 33 chronic migraine patients who were outpatient neurology clinic at the Adam Malik General Hospital Medan, Indonesia. Data on demographic characteristics showed that of 33 chronic migraine patients including 19 women (57.6%) and 14 men (42.4%). The average age of chronic migraine patients is  $41.45 \pm 12.02$  years. There were 21 patients who did not smoked (63.6%) while those who did smoked were 12 patients (36.4%).

The mean migraine attack frequency was  $3.03 \pm 2.01$  with the highest on the moderate migraine attacks ( $<3x$  / month), which were 20 patients (60.6%), while the severe migraine attacks ( $\geq 3x$ /month) was as much as 13 patients (39.4%). The mean degree of pain using VAS in this study was  $6.85 \pm 1.81$ , with the highest pain intensity found in severe pain intensity (7-10) as many as 17 patients (51.5%), while at moderate intensity (4-6) found in 16 patients (48.5%).(Table 1)

*Table 1. Demographic Characteristics of Research Subjects (n = 33)*

Characteristics	Frequency n=33	Presentation (%)
Sex		
- Male	14	42,4
- Female	19	57,6
Age, average $\pm$ SD (years)		41,45 $\pm$ 12,02
Smoking Habit		
- Smoking	12	36,4
- Non Smoking	21	63,6
Migraine attack frequency, average $\pm$ SD (x/month)		3,03 $\pm$ 2,01
Migraine attack frequency		
- Severe ( $\geq 3x$ /month)	13	39,4
- Moderate ( $<3x$ /month)	20	60,6
VAS, average $\pm$ SD		6,85 $\pm$ 1,81
Pain Intensity		
- Severe (7-10)	17	51,5
- Moderate (4-6)	16	48,5

The results of the study using the Fisher test showed an association between smoking and frequency of attacks in chronic migraine patients with p value = 0.001 (p <0.05). (Table 2)



## INTERNATIONAL JOURNAL OF RESEARCH SCIENCE &amp; MANAGEMENT

Table 2. Association between Smoking with Migraine Attacks Frequency

		Migraine attack frequency				p
		Mild		Severe		
		n	%	n	%	
Smoking habit	Non Smoking	18	85,7	3	14,3	0,001
	Smoking	2	16,7	10	83,3	
	Total	20	102,4	13	97,6	

Fisher Test

In statistical analysis using the chi square test showed a association between smoking and pain intensity in chronic migraine patients with p value = 0.002 ( $p < 0.05$ ). (Table 3)

Table 3. Association between Smoking and Pain Intensity

		Pain intensity				p
		Moderate		Severe		
		n	%	n	%	
Smoking habit	Non smoking	15	71,4	6	28,6	0,002
	Smoking	1	8,3	11	91,7	
	Total	16	79,7	17	120,3	

Chi square test

## Discussion

The subjects of the study consisted of 33 people with the most sex in chronic migraine patients found in women. Similar results were also found in Charles study, which is as many as 1 in 25 women who have chronic migraines with more than 15 days per month.<sup>8</sup> The average age of chronic migraine sufferers in this study was  $41.45 \pm 12.02$  years. In the Schwedt study shows that the highest prevalence results were obtained for women aged 18-49 years. Data from the United States show that the prevalence of chronic migraine increases throughout adolescence, peaks in midlife, and then declines after age 50 years.<sup>1</sup> The smoking habit of chronic migraine patients is found in patients who do not smoke as many as 21 patients. This is contrary to the research of Mesonero study who said the number of smokers in migraine patients is low.<sup>3</sup>

The average number of migraine attacks in this study was  $3.03 \pm 2.01$  with the highest frequency on the moderate migraine attacks ( $< 3x$  / month), as many as 20 patients. In line with the Mollaoglu study which conducted a study of precipitating factors in migraine patients who obtained results from 126 patients, 35.7% of patients increased the frequency of treatment twice as much.<sup>9</sup>

In this study it was found that the highest migraine attack frequency was found in chronic migraine patients who smoked compared to non-smokers. So that there was a relationship between smoking and the frequency of attacks in chronic migraine patients ( $p < 0.05$ ).

The results of this study are in line with a study from Aras et al. which examined the effect of smoking on the frequency of attacks in migraine patients. The study showed an association between migraine and smoking ( $p = 0.002$ ).<sup>10</sup> In the Mesonero study, it was also stated that there were data that showed an association between smoking and migraines, although not statistically significant ( $p = 0.058$ ), but the prevalence of smokers was almost a third higher in migraine patients.<sup>3</sup>

The mechanisms underlying a potential relationship between cigarette consumption and migraine are unknown. Explanations include: an enhancing effect of smoking on the activity of brain monoamines, a decrease in nitric oxide production.<sup>3</sup> Cigarette smoking has several effects which may induce headache, such as alterations of nitric oxide levels in the brain, decreased monoamine oxidase activity (MAO), vascular changes because of carbon monoxide provoked anoxia and finally accelerated metabolism of common headache medications resulting in overall decreased clinical efficacy.<sup>11</sup>



## INTERNATIONAL JOURNAL OF RESEARCH SCIENCE & MANAGEMENT

This study was found that the highest severe pain intensity was found in chronic migraine patients who smoked compared to non-smokers. So that there was a relationship between smoking and pain intensity in chronic migraine patients ( $p < 0.05$ ). The results of this study are in line with a study from Bakhsaie et al. which examined the intensity of pain with smoking behavior. The study showed a significant correlation between pain intensity and smoking ( $p = 0.004$ ). In Weinberger et al. study, it was found that patients suffering from pain who smoked reported greater pain intensity and interference in function.<sup>5</sup>

Some mechanisms that explain the relationship between pain intensity in chronic pain and smoking status. Smoking has a relationship with alteration of the level of neuropeptide which plays a role in chronic pain. Patients with muscle pain who smoke have higher levels of P substance in spinal cerebral fluid. Smokers also have lower levels of beta-endorphins than non-smokers.<sup>12</sup> Several mechanisms have been suggested to explain this association between the intensity of pain in chronic pain states and smoking status. Smoking has been associated with alterations of the levels of neuropeptides that play a role in chronic pain states. Patients with fibromyalgia that smoke have higher levels of substance P in the cerebral spinal fluid. Smokers also have lower plasma beta-endorphin levels than non-smokers.<sup>13</sup>

### Conclusion

In this study it can be concluded that smoking has a significant relationship to the frequency of migraine attacks and pain intensity in chronic migraine patients.

### Suggestion

Further research needs to be done using a retrospective cohort study so that the relationship between smoking with migraine attacks frequency and pain intensity can be explained further.

### References

- [1] Schwedt T. Chronic Migraine. *British Medical Journal* 2014;348:g1416.
- [2] Fattahzadeh-Ardalani G, Sadeghieh-Ahari S, Amani F, Moghaddamnia V. Prevalence of migraine and tension headaches and related factors, 2014. *Int J Res Med Sci* 2017;5:2016-20.
- [3] Lopez-Mesonero L, Marquez S, Parra P, Gamez-Leyva G, Munoz P, Pascual J. Smoking as a Precipitating Factor for Migraine: a Survey in Medical Students. *J Headache Pain* 2009;10:101-103.
- [4] Patterson AL, Gritzner S, Resnick MP, Dobscha SK, Turk DC, Morasco BJ. Smoking Cigarettes as a Coping Strategy for Chronic Pain is Associated with Greater Pain Intensity and Poorer Pain-Related Function. *J Pain* 2012;13(3):285-292.
- [5] Weinberger AH, Seng EK, Ditre JW, Willoughby M, Shuter J. Perceived Interrelations of Pain and Cigarette Smoking in a Sample of Adult Smokers Living with HIV/AIDS. *Nicotine Tob Res* 2019;21(4):489-496.
- [6] Sarker et al.: Association of Smoked and Smokeless Tobacco Use with Migraine: a Hospital-Based Case-Control Study in Dhaka, Bangladesh. *Tobacco Induced Diseases* 2013,11:15.
- [7] Indonesian Neurologist Specialist Association (PERDOSSI). Migraines. In: Sjahrir H, Machfoed MH, Suharjanti I, Basir H, and Adnyana MO. National Consensus IV. Headache Diagnostics and Management. Airlangga University Press. Surabaya 2013:11-54.
- [8] Charles A. Migraine. *The New England Journal of Medicine* 2017;377:553-61.
- [9] Mollaoglu M. Trigger Factors in Migraine Patients. *Journal of Health Psychology* 2012;18(7):984-994.
- [10] Aras YG, Gungen BD, Kotan D, Gungen AC. Effect of Smoking on Migraine Attack Frequency in Patients with Migraines. *ACU SaglikBilDerg* 2016,2:75-78.
- [11] Aamodt AH, Stovner LJ, Hagen K, Brathen G, Zwart J. Headache Prevalence Related to Smoking and Alcohol Use. The Head-HUNT Study. *European Journal of Neurology* 2006,13:1233-1238.
- [12] Bakhsaie J, Ditre JW, Langdon KJ, Asmundson GJG, Paulus DJ, Zvolensky MJ. Pain Intensity and Smoking Behavior among Treatment Seeking Smokers. *Psychiatry Research* 2016,237:67-71.
- [13] Weingarten TN, Moeschler SM, Ptaszynski AE, Hooten M, Beebe TJ, Warner DO. An Assessment of The Association Between Smoking Status, Pain Intensity, and Functional Interference in Patients with Chronic Pain. *Pain Physician* 2008;11:643-653.