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Original Article

Evaluation of sleep quality in patients with trigeminal neuralgia

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Abstract

Background: This cross-sectional study evaluated the relationship between sleep disturbance levels and trigeminal neuralgia (TN) from 2019 to 2020 in the School of Dentistry of Shiraz University of Medical Sciences.

Methods: Forty-nine patients under treatment for TN referring to the Department of Maxillofacial Medicine of the School of Dentistry of Shiraz University of Medical Sciences, who were chosen according to availability sampling, were included in the study, and 40 healthy persons were also recruited for the control group. The Persian version of the Pittsburgh Sleep Quality Questionnaire (PSQI) was used to evaluate the participants' sleep disturbance. The final results were compared using the chi-square test, and more than 95% reliability was reflected as significant ($P<0.05$).

Results: The mean age was 56.89±10.93 for the TN participants and 37.12±9.55 for the control group. The sleep disturbance of patients with TN was meaningfully higher in comparison with the control group ($P<0.0001$). The mean level of sleep disturbances in each group between men and women was insignificantly different ($P>0.05$). However, the mean level of sleep disturbance of women and men in the TN group was meaningfully higher than that of the men and women in the control group ($P=0.001$). The mean level of sleep disturbance was higher in TN patients only in the age range of 41–50 years ($P=0.02$).

Conclusion: The patients with TN had meaningfully lower levels of sleep quality than the control group.

Keywords: Sleep quality, Trigeminal neuralgia, Sleep disturbance, Orofacial pain

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Introduction

Trigeminal neuralgia (TN) is defined as a common neuralgia condition with paroxysmal shock-like pain. The origin of the pain is located in the diverse branches of the fifth cranial nerve. There are no-pain periods between short periods of attacks (1).

The cause of TN is not known; however, the space-occupying masses consisting of vessel malformations, pontine angle tumors, and inflammation are responsible for 10% of TN cases (2). The pain is evoked spontaneously or by trivial stimuli like washing, shaving, or talking (3,4). Due to the intolerability and severity of attacks, patients may be noticeably bothered by TN (5).

There is a reciprocal relationship between pain and sleep, especially in chronic types of pain. However, studies have revealed that sleep disturbance is a more effective predictor of pain than the reveres (6,7). If pain is accompanied by a sleep disorder in an individual, the perception or severity of pain can increase (8).

Various types of chronic pain and headaches may affect sleep. Studies have reported fragmented sleep, waking during night sleep, improper sleep quality, and daytime sleepiness as common manifestations of low sleep quality (8-10). Insomnia is the most frequent complaint of patients with chronic headaches (11).

Moreover, sleep can not only trigger but also ameliorate different headaches. For instance, studies have shown that sleep can cause cluster headaches while, at the same time, it can alleviate tension-type headaches or migraine (12). A few studies have indicated the effect of TN on sleep patterns (12).

In a retrospective study on more than 3000 TN patients, TN was found to be highly associated with sleep disturbance (13). Also, Wang et al. confirmed the relation of TN and sleep disorders (14). An investigation confirmed a higher sleep disturbance prevalence in patients with TN related to multiple sclerosis (MS) and patients with chronic headaches (15).

Almoznino et al conducted a study in 2017 on the relationship between sleep disorder and chronic craniofacial pain, which includes the oral cavity, face, and head. Also, they reported great morbidity and high need for

healthcare. Their study discussed the relationship between pain, poor sleep, craniofacial pain, and management options (16).

This study aimed to evaluate sleep quality in patients with TN. Knowing the possible pathogenesis of such disorders can help researchers introduce a complete treatment protocol that considers all aspects.

Methods

This cross-sectional research, approved by the Shiraz University of Medical Sciences Ethics Committee (IR.SUMS.DENTAL.REC.1398.143), was conducted on 49 patients with TN (ICD-9-CM code 350.1) and 50 healthy controls from 2019 to 2020.

The patients referred to the Oral and Maxillofacial Medicine Department at the School of Dentistry of Shiraz University of Medical Sciences were included in this study as an evaluation group after a specialist confirmed their TN problems, and they signed a written consent form. The healthy persons referred to Shiraz Dental Faculty for their dental problems and were not affected by TN were assigned to the healthy control group.

Those patients who were under treatment for sleep-related disorders or had psychological disorders (ICD-9-CM codes: 290–319; A codes: A210-A219), depression, etc., and those who were on any medication that can affect sleep were excluded from both the evaluation and control groups in the study. Finally, 49 patients who met the abovementioned criteria were enrolled in the evaluation group, and forty healthy persons were recruited as the control group.

The participants' sleep disturbance was assessed using the Pittsburgh Questionnaire of Sleep Quality (PSQI). The pain status and demographic data of patients with TN were recorded. The original PSQI questionnaire had been previously translated into Persian, and its reliability and validity had been confirmed (17).

This questionnaire was constructed originally by Buysse et al in 1989, and its Cronbach's alpha was measured at 87% (18). Farrahi Moghaddam et al. translated this questionnaire to Persian in 2012, and its Cronbach's alpha was measured at 0.77, which is acceptable (19).

The PSQI includes nine items, the fifth encompassing ten items measured on the Likert scale. In total, PSQI includes 19 items. Each item is scored on a 4-point scale with scores ranging from 0 to 3.

This questionnaire evaluates seven domains, including subjective duration, latency, sleep quality, disturbances, use of sleep medication, habitual sleep efficiency, and daytime dysfunction (20). Each component is denoted by a score ranging between 0 and 3 (0: not happened in the past week; 1: less than one occurrence per week; 2: once or twice in a week; and 3: three or more times occurrence per week).

The total score of all components ranges between 0 and 21. The higher scores are related to good sleep quality; a mean PSQI score under 5 indicates poor sleep quality (18).

The analysis of the data was done using version 18 of SPSS. The significance level was 0.05. The Kolmogorov-Smirnov test was used to evaluate and confirm the normality of our variables. Independent *t*-test was used to compare the mean PSQI scores between the two groups. ANOVA, Fisher's test, and Tukey's post hoc test were used to assess the mean PSQI scores between different age ranges.

Results

In this cross-sectional study, 89 participants were admitted, 49 in the TN group and 40 in the healthy control group. The mean age of participants was 56.89 ± 10.93 in the TN group and 37.12 ± 9.55 in the control group. The mean ages of participants in the two groups were significantly different ($P < 0.0001$)

The participants' sleep disturbance levels in both groups are shown in Table 1. The results show that sleep disturbance was significantly higher in TN patients than in the control group ($P < 0.0001$).

The mean sleep disturbance scores in participants in the TN and control groups were not significantly different concerning gender ($P > 0.05$) (Table 2).

The mean sleep disturbance score of women and men in the TN group was significantly higher than that of men and women in the control group ($P = 0.001$).

The mean sleep disturbance scores with regard to the patient's age range in both TN and control groups are shown in Table 3. As the table shows, the mean scores are not meaningfully different in the healthy control group. However, they are significantly different between age ranges in the TN group ($P = 0.01$)

The mean sleep disturbance score was higher in the TN patients than in the control group, only in the age range of 41–50 years ($P = 0.02$).

Table 1. The sleep disturbance scores in the TN and control groups

	Number	Mean score	Standard deviation	*P* value
Control	40	4.35	2.13	<0.0001
TN	49	7.48	3.31	

TN, trigeminal neuralgia.

Table 2. The mean sleep disturbance score regarding gender in TN and healthy controls

		Number (%)	Mean score	Standard deviation	*P*-value
Female	Controls	21 (52.5)	4.38	2.63	0.716
Male		19 (47.5)	4.31	1.45	
Female	TN	23 (46.9)	7.3	3.39	0.925
Male		26 (53.1)	7.65	3.29	

TN, trigeminal neuralgia.

Table 3. The mean level of sleep disturbance among different age ranges of TN patients and healthy controls

	TN			Control			*P* value
	Number	Mean score	Standard deviation	Number	Mean	Standard deviation	
Age (y)							
<30	1	4.00	_	15	4.33	1.71	0
31 to 40	4	6.00	2.16	12	4.91	2.64	0.474
41 to 50	12	5.92	1.89	10	3.70	2.35	0.020
51 to 60	14	6.92	3.12	3	4.33	0.57	0.185
Over 60	18	9.55	3.58	_	_	_	_
Total	49	7.48	3.31	40	4.35	2.13	0

Discussion

This study showed that patients with TN had a prominently higher level of sleep disturbance than those in the control group. Also, the mean level of sleep disturbance was found to be higher in both women and men with TN than in the control group.

Furthermore, only the patients in the 40–50 age range had higher levels of sleep disturbance than the control group. Similar levels of sleep disturbance were observed in different age ranges and comparisons between women and men in each group.

There are some reports about the effect of TN on sleep (13-15,21). In one study, more than half the TN patients reported often waking up with TN pain attacks, resulting in sleep disturbances. They assessed their sleep disturbance using questionnaires in an Australian TN Association conference (21).

Another evaluation reported 2.17 times higher risk for sleep disorders in TN patients. However, they estimated that only 1.22% of these patients had sleep disorders. The sleep disorders in their study had been assessed by a psychiatrist (13). Different methods of evaluation and different questionnaires are responsible for differences in sleep disorder prevalence between this study and ours.

Patients with TN associated with MS have a greater chance of developing sleep disorders. However, microvascular decompression improves sleep disturbances and pain attacks (14).

Some other studies have confirmed the relationship between sleep disturbance and TN (15,21,22). Wu et al reported a higher risk of developing sleep disturbance in TN patients than in healthy controls (23). These findings are in line with the results of this study.

Some previous assessments have connected painful situations to lower sleep quality bilaterally (24-28). The association of different types of headaches, including morning headaches, tension-type headaches, and migraine, with sleep disturbance has been confirmed (29,30).

Different types of sleep disturbance, like excessive sleep and sleep duration insufficiency, and poor quality of life have been associated with migraine-triggering factors. Another study reported more severe sleep disturbance in migraine patients than in those with tension headaches (31).

Our study demonstrated that, like other headaches, TN also affects sleep, causing lower sleep quality in patients in the TN group compared to healthy controls. Moreover, temporomandibular disorder (TMD)-induced pain has not shown any relation with sleep bruxism (32).

In another study, however, TMD patients showed better sleep quality than their healthy counterparts (33,34).

In contrast to the already-mentioned reports, Sanders et al. proposed that sleep disturbance can occur before the initiation of painful TMD disorders (6).

TN, which is a chronic, painful experience, affects the quality of life to the extent that patients with TN have painful and incapacitating experiences (35). Previous studies reported that patients with TN do not experience awakening by painful attacks of TN. In contrast, recent studies have shown that 50% of TN patients are awakened by painful attacks (36). The severity of sleep disturbance could be affected by the frequency and duration of headaches and TN attacks (28,37).

As for the causal factors, pain and sleep-wake regulation share common neurobiological systems, especially central serotoninergic neurotransmission, which can be responsible for both. The dysfunction of this system can lead to pain perception or sleep disturbance (38). There are some theories about the role of poor sleep disorder in the alteration of pain perception and processing (38,39).

Sleep deprivation may interfere with the descending pain inhibitory control system (39). A reciprocal association between pain processing and sleep quality can be imagined (38). This common neurobiological dysfunction is the first probable cause. Several studies have introduced the hypothalamus as the possible location of this dysfunction due to the connection between the brainstem, pain, and sleep regulation (25,27,40,41). This has been confirmed by the hypothalamus and brainstem activation found in MRI scans (42). In addition to the prescribed medication, environmental conditions can also affect sleep, anxiety, psychological disorders, and the prevalence of lower sleep quality (43).

There are some suggestions for future research. Excluding confounding factors as much as possible can homogenize the evaluated population. Matching the age of participants leads to a more precise comparison of the sleep disturbances. In addition, socioeconomic and cultural variables may affect sleep quality.

Other sleep quality indices and a greater sample size can be suggested. Cross-sectional research could not precisely measure sleep disturbance. Evaluations in the long term could show more accurate results.

Conclusion

The TN patients had significantly higher levels of sleep disturbance than their healthy counterparts.

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Authors' Contribution

Conceptualization: Fatemeh Lavaee, Azadeh Roosta.
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Competing Interests

There are no conflicts of interest to declare.

Consent for publication

Not applicable.

Data Availability Statement

The readers can access the data supporting the conclusions of the study by a request through an email to the corresponding author.

Ethical Approval

This cross-sectional study was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.DENTAL.REC.1398.143). Informed consent was obtained from all the participants before the study.

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