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David Maxwell

Department of Prosthodontics, Faculty of Dentistry, University of Indonesia, Jakarta,
david.maxwell02@ui.ac.id

Fadhillah Nur Amalina

Department of Prosthodontics, Faculty of Dentistry, University of Indonesia, Jakarta

Ira Tanti

Department of Prosthodontics, Faculty of Dentistry, University of Indonesia, Jakarta

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ORIGINAL ARTICLE

Relationship between Temporomandibular Disorder and Quality of Sleep in a Sample of Nurses in a Type C Private Hospital in Depok, West Java, Indonesia

David Maxwell, Fadhillah Nur Amalina, Ira Tanti

Department of Prosthodontics, Faculty of Dentistry, University of Indonesia, Jakarta
Correspondence e-mail to: david.maxwell02@ui.ac.id

ABSTRACT

Temporomandibular disorder can affect the quality of sleep. **Objective:** To analyze the association between temporomandibular disorder and quality of sleep among nurses in a type C private hospital using the ID-TMD and PSQI Indonesian version questionnaire. **Methods:** This cross-sectional study assessed the data of 92 nurses in Hasanah Graha Afiah Hospital, Depok City, West Java, Indonesia. Three questionnaires were administered to each hospital nurse. The ID-TMD questionnaire was used to evaluate temporomandibular disorder; the PSQI Indonesian version was used to evaluate quality of sleep. **Results:** The results showed significant differences between temporomandibular disorder and quality of sleep among nurses in a type C private hospital ($p = 0.02$). **Conclusion:** There was a relationship found in this study between temporomandibular joint disorder and quality of sleep in a type C private hospital.

Key words: cross-sectional studies, nurses, questionnaires, sleep hygiene, temporomandibular disorders

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INTRODUCTION

Temporomandibular disorder has several etiologies that are complex and multifactorial, such as occlusal condition, trauma, emotional stress, deep pain input, and parafunctional activity. The symptoms comprise pain in masticatory muscles, pain in the temporomandibular joint, ear pain, headache, limited or deviation in mandibular movement, and clicking sound.¹ Quality of sleep is an accepted clinical construction, used to describe an individual's complex sleeping pattern.² Poor quality of sleep is a common characteristic often observed in individuals with chronic pain.³ A study by Oliviera et al. showed that temporomandibular disorder can influence an individual's quality of sleep.⁴

Nursing is a profession that requires humanity, empathy, and specific expertise.⁵ Nurses provide 24-hour care to patients every day; thus, rotational shiftwork is inevitable for nurses working in hospitals. This rotation

can disrupt circadian rhythm and cause difficulty in obtaining good quality of sleep. Some studies have shown that nurses with rotational shiftwork are prone to poor quality of sleep and stressful workload.⁶

A study by Oliveira et al. showed that 74.5% of nurses had temporomandibular joint disorders.⁴ This high incidence is associated with the characteristics of the profession, which demands high energy in the hospital environment, and may produce a psycho-emotional condition in the form of work stress.⁷ Stress can impact the body by activating the hypothalamic-pituitary-adrenal axis, which will cause contraction of intrafusal fibers and overall increase in muscle tone.¹ Therefore, work stress can generate temporomandibular disorder.^{7,8}

This study was performed to investigate the relationship between temporomandibular joint disorder and quality of sleep. This research has not previously been performed in Indonesia. Both measuring tools in this project, the ID-TMD and Pittsburgh Sleep Quality

Index (PSQI), are already in available in the Indonesian language and have been assessed for validity and reliability.

METHODS

This study was approved by the Ethics Committee Board of the Faculty of Dentistry Indonesia. This cross-sectional study comprised 92 subjects who met the inclusion criteria and signed an informed consent form for participation. The inclusion criteria were as follows: men or woman who had been a nurse in a hospital for more than 6 months; nurses with rotational shiftwork in the past month (night and day shift every 7 days), who had good overall health condition, and who had never had temporomandibular joint disorder.

Subjects were given explanations regarding the objective of the study; they then signed informed consent if they agreed. The following personal data were collected: name, birth place and date, age, sex, formal education, address, marital status, and monthly expenses. Subsequently, the participants completed the ID-TMD questionnaire and Pittsburgh Sleep Quality Index questionnaire (Indonesian version). The collected data were then processed and analyzed statistically. Univariate analysis was used to define each variable in the form of frequency distribution, percentage, and bivariate analysis on two related variables were analyzed using Chi-square.

RESULTS

The frequency distributions of temporomandibular disorder and good or poor quality of sleep among the subjects are shown in Table 1.

As shown in Table 1, there were 92 total subjects, with 55 exhibiting temporomandibular disorder (59.8%). The quality of sleep was measured using the PSQI Indonesian language version questionnaire, and subjects were categorized with poor quality of sleep at a total score PSQI >5. In this study, 59 subjects (64.1%) reported poor quality of sleep.

The total and average scores for each component of the PSQI Indonesian language version questionnaire are shown in Table 2.

As shown in Table 2, the average total PSQI score was 6.63 with standard deviation 2.36; the minimum score was 0 and the maximum score was 21. The distribution of Pittsburgh Sleep Quality Index (PSQI) Indonesian language version questionnaire scores is shown in Table 3.

As shown in Table 3, the first component of the PSQI is subjective sleep quality; 70 subjects (72.8%)

Table 1. Frequency Distributions of Temporomandibular Disorder (TMD) and Good or Poor Quality of Sleep

Variable		n=92Percentage (%)	
Temporomandibular Disorder	Non-TMD	37	40.2
	TMD	55	59.8
Quality of Sleep	Good Quality of Sleep	33	35.9
	Poor Quality of Sleep	59	64.1

Table 2. Total and average scores for each component of the Pittsburgh Sleep Quality Index (PSQI) Indonesian Language Version Questionnaire

Component PSQI	Average	Standard Deviation
Sleep Quality	1.22	0.51
Sleep Latency	1.3	0.75
Sleep Duration	1.2	0.93
Sleep Efficiency	0.2	0.56
Sleep Disturbances	1.47	0.58
Sleep Medication	0.23	0.57
Daytime Dysfunction	1.02	0.55
Total Score PSQI	6.63	2.36

reported good quality of sleep. The second component of the PSQI is sleep latency; 11 subjects (12%) had good sleep latency, as indicated by the ability to fall asleep easily within 15 minutes, in the prior month. The third component of the PSQI is sleep duration; 35 subjects (38%) had sleep duration 5–6 hours per day, in the prior month. The fourth component of the PSQI is sleep efficiency; 80 subjects (87%) had sleep efficiency >85%, in the prior month, as indicated by efficient sleep that was good enough because the time discrepancy for sleeping did not widely different from the time spent in bed. The fifth component of the PSQI is sleep disturbances; 90 subjects (97.8%) reported sleep disturbance in the prior month, including waking in the middle of the night or early morning, getting up to use the bathroom, inability to breathe comfortably during sleep, coughing or snoring loudly, experiencing nightmares, feeling excessively cold or hot, and/or experiencing pain during sleep. The sixth component of the PSQI is sleep medication; 15 subjects (16.3%) took medicine (prescription or over-the-counter) to help sleep. The seventh component of the PSQI is daytime dysfunction; 12 subjects (13%) reported no problems remaining awake while driving, eating, or engaging in social activity.

The relationship between temporomandibular disorder and quality of sleep was analyzed using an Chi-squared test, as shown in Table 4.

As shown in Table 4, the Chi-squared test using continuity correction showed a statistically significant association ($p < 0.05$) between temporomandibular disorder and quality of sleep. The relationships between

Table 3. Distribution of Scores on the Pittsburgh Sleep Quality Index (PSQI) Indonesian Language Version Questionnaire

Components of the PSQI	PSQI sub-component	Frequency	Percentage
Subjective Sleep Quality	Very Good	3	3.3
	Fairly Good	67	72.8
	Fairly Bad	21	22.8
	Very Bad	1	1.1
Sleep Latency	0	11	12
	1–2	47	51.1
	3–4	29	31.5
	5–6	5	5.4
Sleep Duration	>7 hours	27	29.3
	6 – 7 hours	25	27.2
	5 – 6 hours	35	38
	< 5 hours	5	5.4
Sleep Efficiency	> 85%	80	87
	75%–84 %	7	7.6
	65%–74 %	4	4.3
	< 65%	1	1.1
Sleep Disturbances	0	2	2.2
	1–9	47	51.1
	10–18	41	44.5
	19–27	2	2.2
Sleep Medication	Not during the past month	77	83.7
	Less than once a week	10	10.9
	Once or twice a week	4	4.3
	Three or more times a week	1	1.1
Daytime Dysfunction	0	12	13
	1–2	67	72.8
	3–4	13	13
	5–6	1.1	1.1

Table 4. The Relationship between Temporomandibular Disorder (TMD) and Quality of Sleep

TMJ Condition	Good Quality of Sleep		Poor Quality of Sleep		p Value
	n	%	n	%	
Non-TMD	19	51.4	18	48.6	0.02
TMD	14	25.5	41	74.5	

quality of sleep and sociodemographic factors (e.g., age, sex, educational level, socioeconomic status, and marital status) were analyzed using independent Chi-squared tests, as shown in Table 5.

As shown in Table 5, the Chi-squared test showed no statistically significant associations ($p > 0.05$) between quality of sleep and sociodemographic factors (e.g., age, sex, educational level, socioeconomic status, and marital status). Table 5 shows that more women (88.1%)

than men had poor quality of sleep. More subjects in the 25–44-year-old age group (71.2%) had poor quality of sleep than did those subjects in the <24-year-old age group. Of all subjects, 78% who had education lower than the level of bachelor's degree reported poor quality of sleep. Married subjects (55.9%) more frequently reported poor quality of sleep than unmarried subjects.

DISCUSSION

This study was conducted to analyze the relationship between temporomandibular joint disorder and quality of sleep by collecting data from nurses working in Hasana Graha Afiah Hospital, Depok. The questionnaires used in this project were ID-TMD and PSQI, with cross-sectional design. The advantage of this research was that it investigated the relationships between independent and dependent

Table 5. Relationships between Quality of Sleep and Sociodemographic Factors

No	Variable	Good Quality of Sleep		Poor Quality of Sleep		p value
		n	%	n	%	
1	Sex					*0.251
	Men	1	3	7	11.9	
	Women	32	97	52	88.1	
2	Age					**0.274
	<24	14	42.4	17	28.8	
	25–44	19	57.6	42	71.2	
3	Educational Level					**0.866
	<Bachelor's degree	27	81.8	46	78	
	≥Bachelor's degree	6	18.2	13	22	
4	Socioeconomic Status					*0.426
	Quintile 1 (<1.450.000)	7	21.2	11	18.6	
	Quintile 2 (1.450.000–2.000.000)	11	33.3	15	25.4	
	Quintile 3 (2.000.000–2.660.000)	4	12.1	7	11.9	
	Quintile 4 (2.660.000–4.010.000)	5	15.2	14	23.7	
	Quintile 5 (>4.010.000)	6	18.2	12	20.3	
5	Marital Status					**0.192
	Married	13	39.4	33	55.9	
	Unmarried	20	60.6	26	44.1	

*Fisher's Exact Test (the expected point <5 & the cell ≥20%)

**Continuity Correction (the expected point <5 & the cell 0%)

*Mann-Whitney (the expected point <5 & the cell ≥20%, for a 2x5 table)

variables in a rapid, simple, and inexpensive manner; the disadvantage of this study was that it was incapable of determining causal relationships with regard to the risk factors and their effects.

The results showed that 59.8% of the subjects experienced temporomandibular joint disorder, which was consistent with findings reported by Martins et al.¹⁰ Most subjects did not complain of signs and symptoms of this disorder. Okeson reported that 40%-60% of the general population experiences temporomandibular joint disorder, but less than 10% felt that this problem was sufficiently severe to require treatment.¹

The quality of sleep examination showed that 64.1% of the subjects had poor quality of sleep, but 72.8% of the subjects subjectively stated that they had good quality of sleep. The number was much lower than the results reported by Akbari et al. in a study of nurses in Iran: 85.7% of the subjects had poor quality of sleep. In the present study, the average PSQI score was 6.63 ± 2.361 , with the same cutoff point; this score was much lower than that reported in the study by Akbari et al. (7.13 ± 2.5).⁹

This study showed a relationship between the presence of temporomandibular joint disorder and the quality of sleep among nurses working in a hospital, consistent with the findings of studies by Oliveira et al. and Martins et al.^{4,10} Based on a study by Sitar

et al., poor quality of sleep was often reported by temporomandibular disorder patients with pain. Indeed, pain causes discomfort, and potentially leads to sleep disorder.¹¹ In this study, a cause-effect relationship between temporomandibular disorder and quality of sleep could not be established; however, the present study showed a relationship between independent and dependent variables (temporomandibular joint disorder and quality of sleep), consistent with the findings of the study by Oliveira et al., who showed that temporomandibular joint disorder could influence quality of sleep.⁴

In this study, there was a relationship between the quality of sleep and one of the work stress components, which is problem with patient's family. As many as 88.1% of female nurses reported poor quality of sleep; this percentage is higher than that of male nurses. This result is similar to that of the study conducted by Akbari et al., in which 85.4% of female nurses had poor quality of sleep.⁹ Sleeping and awakening in women are affected by hormones, especially during menstruation, pregnancy, premenopause and menopause; during these periods, women may experience sleep discrepancy.⁹ There was no relationship between quality of sleep and gender, which was consistent with the study by Akbari et al.; however, it contradicted the findings of the study by Patel et al.^{9,12}

As people aged, they experience changes in their sleep, including the onset of sleep, maintenance of sleep, how much time is spent on sleep, and the efficiency of sleep. The amount of sleep decreases as people age. Individuals 20-60 years of age experience reduction in slow wave sleep. In the present study, there was no relationship between quality of sleep and age, consistent with the findings of the study by Patel et al.^{9,12} The results may not have been similar because the study by Patel et al. had more subjects (9714), so it could better represent the population.

In this study there was no relationship between quality of sleep and education, consistent with the findings of the study by Akbari et al regarding nurses in Iran.⁹ However, according to Patel et al., increased education level has a protective effect for quality of sleep. Individuals with university education have lower chances of poor quality of sleep, compared with individuals who have a middle school level of education. Individuals with low levels of education may not be aware of the importance of sleep hygiene and do not utilize it at home. In a difference from the study by Patel et al. that involved many more subjects with various levels of education and jobs, all of the subjects in this study had the same job and reported education above middle school level.

The study by Patel et al. stated that individuals with low socioeconomic status had worse quality of sleep, compared with individuals with high socioeconomic status. Several factors related to poverty that can affect quality of sleep, such as living in a noisy environment, living in slums, exposure to violence, and poor sleep hygiene (uncomfortable bed, irregular bedtime, alcohol, and caffeine), can lower the quality of sleep.¹³ Nonetheless, in the present study, there was no relationship between quality of sleep and socioeconomic status. Differences in results may have occurred because Patel et al. studied more subjects (9714 respondents).

The limitations of this study is that the research only showed relationships, but not cause and effect interactions, because of the cross-sectional design (the research was limited to a short and specific timeframe). Moreover, the data that were collected were also based on subjective assessment, rather than via clinical assessment from physicians. One of the disadvantages of this research was recall bias, as the ability to recall information may vary among subjects. There was also bias from the subjects, in that they might be motivated not to give honest and true answers, intentionally or otherwise. The authors of this study informed the subjects that the questionnaire data were confidential and for research purposes only.

CONCLUSION

There was a relationship found in this study between temporomandibular joint disorder and quality of sleep in a type C private hospital.

CONFLICT OF INTEREST

The authors declare that there were no financial or non-financial conflicts of interest in this article.

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