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ORIGINAL ARTICLE

Relationship Between Stress Level, Fatigue Symptoms, and Sleep Quality with Oral Health Behavior among Preclinical Student Faculty of Pharmacy, Indonesia

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Abstract

Objective: To determine the association of the stress level, fatigue symptoms, and sleep quality with oral health behavior of preclinical pharmacy students. **Material and Methods:** Observational analytic study surveyed the students of the Faculty of Pharmacy of Hasanuddin University. From the total 205 sample of pharmacy students, 77 students drawn from the 2017 year of study, 68 students from the 2016 year of study, and 60 students from the 2015 year of study. The study consisted of 4 questionnaires, which are Perceived Stress Scale, Fatigue Assessment Scale, Karolinska Sleep Questionnaire and questions that assess oral health behaviors reported per individual. Data were collected and analyzed statistically using Chi-square test and Fisher's exact test. The level of significance was set at 5%. **Results:** The percentage of oral health behaviors in terms of the frequency of tooth brushing, use of dental floss, use of tongue cleaner and use of mouthwash increase as the year of study. In contrast to the percentage of stress level, awakening difficulties symptoms, sleep disturbance symptoms, daytime sleepiness symptoms and fatigue symptoms tended to decrease according to the year of study. Significant associations found among students who are under stress with the frequency of dental floss ($p<0.05$). However, no significant association was found between the fatigue symptoms, awakening difficulties symptoms, sleep disturbance symptoms, and daytime sleepiness symptoms with oral health behavior ($p>0.05$). **Conclusion:** There is an association between stress levels with the use of dental floss.

Keywords: Stress, Psychological; Health Behavior; Sleep; Students, Pharmacy.

Introduction

Dental health status may be affected by the use of dental health equipment. Poor oral health behaviors are risk factors for oral diseases such as periodontal disease, caries, and others. The adult population survey in Brazil showed the prevalence of dental pain was 17.7% and in another population survey, the prevalence of dental pain was 18%. In a study among college students in Saudi Arabia reported the prevalence of dental caries occur 57% among men and 44% among women [1].

It has been recommended to brush twice a day with fluoride toothpaste, flossing daily, limit the consumption of snacks between meals, avoid high sugar consumption and consuming drinks with no added sugar, and regular dental preventive care. A recent survey among students in 26 countries, 32.8% reported brushing their teeth twice or more a day, 33.9% rarely and 24.3% never do a dental examination [1].

Various factors can affect oral health behavior. Previous research has shown that the factors that affect the frequency of teeth brushing in young adults are male gender, low socioeconomic status, poor oral health attitudes, alcohol use and smoking, lack of exercise, not enough consumption of fruits and/or vegetables, often eating chocolate, candy or chips per day, and poor mental health or psychological pressure [1]. In addition, the lack of the visit to the dentist was associated with male gender, lower socioeconomic status, younger age, poor oral health attitudes, rarely brushed their teeth, smoke, and fear of dental treatment [1].

Studies show an association between stress level, fatigue and sleep disturbances with oral health [2-4]. Some authors showed that the difference in the number of bacteria in stress and relax conditions [3], showed that stress may be associated with periodontal disease through physiological mechanisms [3], confirms that sleep disturbance, fatigue and lack of vitality have a negative impact on oral health [4].

Previous studies have shown that knowledge of the etiology of oral diseases and also understand the need to maintain good oral hygiene is a boost to the proper oral health behaviors and correlated with the oral health status better [5].

Pharmacy education is an important part of the provision of healthcare and well-being at the community level. In some areas, pharmacists are often the first contact and the only contact the patient have to healthcare professionals. Data from Saudi Arabia showed that nearly 34% of pharmacists reported 10 requests daily advice on oral health, especially with regard to dental pain, mouth ulcers, and bad breath. The complaints are generally dealt with the provision of medicines and only a small number of dental patients who are referred to a dentist [6].

Numerous studies have been conducted to evaluate the oral health pharmacy student and oral health-related behavior. Although the pharmacy students have sufficient knowledge on oral health, the results show that the pharmacy student had inadequate oral health behavior [6].

In an attempt to explain this phenomenon, it is important to consider the fact that the pharmaceutical studies program is one of the intensive courses that require the ability to memorize a lot of information. Pharmacy student showed the prevalence of stress are relatively higher than

students of other health professions that negatively affect the health and quality of life in general [7]. The ability of each individual to overcome challenges in the environment generates levels of stress, fatigue or different sleep disturbance and tends to affect their oral health behavior [8].

Stress can be regarded as a state of mind and body that happen due to the many stimulants needs. However, long-term stress can cause changes in the emotional, psychological and decreasing attitude response [3]. It is well known that students are more prone to chronic stress due to a variety of needs and challenges of education. Exams and fear of poor performance and limited relaxation time is the most influential factor causing stress for students [9].

Finally, the high-stress levels can cause sleep disturbance. Sleep problems and problems related to sleep disturbance is a problem that relevant in a modern society with a prevalence of insomnia-related symptoms among young adults is approximately 70% [10]. The inadequate duration and quality of sleep are associated with various psychological disorders and health problems. These abnormalities include serious conditions such as depression, anxiety, and drug abuse. As a result, sleep disturbance and stress can cause symptoms of fatigue, which is a major component of burnout syndrome and chronic fatigue syndrome [4].

There is a possibility that stress, fatigue or sleep disturbances can disrupt the daily oral health behavior. The purpose of this study was to determine the associations of the stress level, fatigue symptoms, and sleep quality with oral health behavior of preclinical pharmacy students of Hasanuddin University, Indonesia.

Material and Methods

Study Design

This study was an observational analytic study with a cross-sectional design and implemented at the Faculty of Pharmacy, University of Hasanuddin on 4 to 8 December 2017. The study population was 429 preclinical student Faculty of Pharmacy at Hasanuddin University.

Data Collection

The samples were taken using proportional random sampling. The inclusion criteria of this study were: a preclinical student that in an active study and enrolled in the second semester of 2017 at the Faculty of Pharmacy, University of Hasanuddin and willing to participate in the study and signed a written informed consent. The exclusion criteria of this study are that students who do not answer completely each question on the questionnaire.

The overall preclinical students are 429 students, 161 students of 2017 study year, 142 students of 2016 study year and 126 students of 2015 study year. Furthermore, by using proportional random sampling method, 48% samples were taken from each study year, which is in 2017 study year consisted of 77 students, 68 students from 2016 study year, and 60 students from 2015 study year.

There are four things that are measured in this study; Pharmacy student's oral health behavior to maintain their oral health, such as frequency of brushing, use of dental floss, and use of

mouthwash. Pharmacy student stress level, which is the level of feelings and perceived pressure due to the influence of different situations. Perceived fatigue symptoms and sleep quality such awakening difficulties, daytime sleepiness and sleep disturbance symptoms.

Assessment conducted in this research based on the research that has been done to assess oral health behavior, the assessment is done by answering 4 questionnaires regarding the frequency of tooth brushing, use of dental floss, use of tongue cleaner, and the use of mouthwash by students to maintain their oral health. The questionnaire consists of more than two times a day, twice a day, once a day, less than once a day, and never [8]. The assessment criteria were modified into once a day or less and twice a day or more. This was done for the statistical analysis.

Assessment of the stress level carried by answering 10 questions of Perceived Stress Scale (PSS) by Cohen which was assessed using a 5-point scale (never = 0, almost never = 1, sometimes = 2, less frequently = 3, very often = 4). Then the score is added up. A score of 0-13 was considered a low-stress level. A score of 14-26 was considered moderate stress levels. A score of 27-40 was considered a high-stress level. The assessment criteria were modified into a score 0-26 score was considered a low/moderate stress level and a score 27-40 was considered a high-stress level [8,11].

Fatigue symptoms were assessed by answering 10 questions of Fatigue Assessment Scale (FAS) which was assessed using a 5-point scale (never = 1, sometimes = 2, regular = 3, often = 4, always = 5). Then the scores were added. If the score is equal to or more than 22, it is considered to have fatigue symptoms. If the score is less than 22, it is considered with no fatigue symptoms [8]. Sleep quality was assessed by answering three questions of Karolinska Sleep Questionnaire (KSQ) regarding the symptoms of awakening difficulties, symptoms of sleep disturbance, and symptoms of daytime sleepiness which were assessed using a 6-point scale (never = 6 rarely = 5, sometimes = 4, often = 3, very often = 2, always = 1). The score of each question is calculated. A score equal to or less than 3 for each question are considered there were symptoms to those questions and a score of 4-6 is considered there were no symptoms to those questions [8].

Statistical Analysis

Statistical evaluation was done using Chi-square test and Fisher's exact test. The significance level was set at 5%. The analyses were performed with the Statistical Package for the Social Sciences (SPSS), version 24.0 (SPSS Inc., Chicago, IL, USA).

Results

According to the Table 1, it shows that the total amount of students were 205 participants, namely 174 (84.9%) were women with the highest number of women were in 2017 study year which was 67 (87%) and 31 (15.1%) were male with the highest number of male in the 2015 study year which was 11 (18.3%).

Age 16 years was 1 (0.5%) student which were in 2017 study year, age 17 years were 12 (5.9%) students which were in 2017 study year, age 18 years were 89 (43.4%) students with the

highest number was 61 (79.2%) students in 2017 study year, age 19 years were 49 (23.9%) students with the highest number were 32 (47.1%) in 2016 study year, age 20 years were 48 (5.9%) students with the highest number were 39 (65%) in 2015 study year, age 21 years were 5 (2.4%) people which were in 2015 study year, and age 22 years were 1 (0.5%), student which was in 2015 study year.

Table 1. Samples distribution based on the sex and age on every year of study.

Variables	Year of Study			Total
	2017 N (%)	2016 N (%)	2015 N (%)	N (%)
Gender				
Male	10 (13.0)	10 (14.7)	11 (18.3)	31 (15.1)
Female	67 (87.0)	58 (85.3)	49 (81.7)	174 (84.9)
Total	77 (37.6)	68 (33.1)	60 (29.3)	205 (100.0)
Age				
16 years	1 (1.3)	0 (0.0)	0 (0.0)	1 (0.5)
17 years	12 (15.6)	0 (0.0)	0 (0.0)	12 (5.9)
18 years	61 (79.2)	27 (39.7)	1 (1.7)	89 (43.4)
19 years	3 (3.9)	32 (47.1)	14 (23.3)	49 (23.9)
20 years	0 (0.0)	9 (13.2)	39 (65.0)	48 (23.4)
21 years	0 (0.0)	0 (0.0)	5 (8.3)	5 (2.4)
22 years	0 (0.0)	0 (0.0)	1 (1.7)	1 (0.5)
Total	77 (37.6)	68 (33.1)	60 (29.3)	205 (100.0)

Table 2 shows the distribution of stress levels, awakening difficulties, sleep disturbance, daytime sleepiness, and fatigue in preclinical students.

Table 2. Samples distribution based on the stress level, awakening difficulties, sleep disturbance, daytime sleepiness, and fatigue on every year of study.

Variables	Year of Study			Total
	2017 N (%)	2016 N (%)	2015 N (%)	N (%)
Stress Level				
Low/medium	66 (85.7)	55 (80.9)	52 (86.7)	173 (84.4)
High	11 (14.3)	13 (19.1)	8 (13.3)	32 (15.6)
Total	77 (37.5)	68 (33.2)	60 (29.3)	205 (100.0)
Awakening Difficulties				
No symptom	48 (62.3)	50 (73.5)	44 (73.3)	142 (69.3)
Symptom	29 (37.7)	18 (26.5)	16 (26.7)	63 (30.7)
Total	77 (37.5)	68 (33.2)	60 (29.3)	205 (100.0)
Sleep Disturbance				
No symptom	55 (71.4)	49 (71.4)	48 (72.1)	152 (74.2)
Symptom	22 (28.6)	19 (28.6)	12 (27.9)	53 (25.8)
Total	77 (37.5)	68 (33.2)	60 (29.3)	205 (100.0)
Daytime Sleepiness				
No symptom	21 (27.3)	23 (33.8)	19 (31.7)	63 (30.7)
Symptom	56 (72.7)	45 (66.2)	41 (68.3)	142 (69.3)
Total	77 (37.6)	68 (33.2)	60 (29.3)	205 (100.0)
Fatigue				
No symptom	16 (20.8)	8 (11.8)	13 (21.7)	37 (18.1)
Symptom	61 (79.22)	60 (88.3)	47 (78.3)	168 (81.9)
Total	77 (37.5)	68 (33.2)	60 (29.3)	205 (100.0)

Based on the stress levels, low/medium stress level more commonly found which were 173 (84.4%) students compared to the high-stress level. The highest number of high-stress level was in 2017 study year which was 14.3%. Based on the symptoms of awakening difficulties, no symptoms were more common which were 142 (69.3%) compared to those who had symptoms. The highest number of awakening difficulties symptom was in 2017 study year which was 37.7%. Based on the symptoms of sleep disturbance, no symptoms of sleep disturbance is more common which were 152 (74.2%) compared to those who had symptoms of sleep disturbance. The highest number of sleep disturbance symptom was in 2017 study year which was 28.6%. Based on the daytime sleepiness symptoms, those who had symptoms of daytime sleepiness are more common which were 142 (69.3%) compared with no symptoms of daytime sleepiness. The highest number of daytime sleepiness symptom was in 2017 study year which was 72.7%. Based on the symptoms of fatigue, those who had fatigue symptoms were more common which were 168 (81.9%) compared with no symptoms of fatigue with the highest number of fatigue symptoms was in 2016 study year which was 88.2%.

Table 3 shows the distribution of oral health behaviors in brushing, dental floss, tongue cleaners and mouthwashes on preclinical students of the Faculty of Pharmacy. Based on tooth brushing behavior, participants who brush their teeth twice a day or more were more commonly found which were 187 (91.2%) compared to those who use it once a day or less with the highest number of those who brush their teeth twice a day or more was in 2017 study year which was 93.3%. Based on the usage of dental floss, participants who use once a day or less were more commonly found which were 203 (99%) compared to those who use it twice a day or more. The highest number of those who use dental floss twice a day or more was in 2016 study year which was 2.9%. Based on the usage of a tongue cleaner, participants who use once a day or less were more commonly found which were 168 (81.9%) compared to those who use it twice a day or more. The highest number of those who use tongue cleaner twice a day or more was in 2016 study year which was 25%. Based on the usage of mouthwash, participants who use once a day were more commonly found which were 188 (91.7%) compared to those who use twice a day or more. The highest number of those who use mouthwash twice a day or more was in 2015 study year which was 13.3%.

Table 3. Samples distribution based on the oral health behavior in teeth brushing, dental floss, tongue cleaner, and mouthwash on every year of study.

Oral Health Behaviors	Year of Study			Total
	2017 N (%)	2016 N (%)	2015 N (%)	N (%)
Teeth Brushing				
Once a day or less	6 (7.8 %)	8 (11.8)	4 (6.7)	18 (8.8)
Twice a day or more	71 (92.2 %)	60 (88.2)	56 (93.3)	187 (91.2)
Total	77 (37.6 %)	68 (33.2)	60 (29.3)	205 (100.0)
Dental Floss				
Once a day or less	77 (100.0)	66 (97.1)	60 (100.0)	203 (99.0)
Twice a day or more	0 (0.0)	2 (2.9)	0 (0.0)	2 (1.0)
Total	77 (37.5)	68 (33.2)	60 (29.3)	205 (100.0)

Tongue Cleaner				
Once a day or less	70 (90.9)	51 (75.0)	47 (78.3)	168 (81.9)
Twice a day or more	7 (9.1)	17 (25.0)	13 (21.7)	37 (18.1)
Total	77 (37.5)	68 (33.2)	60 (29.3)	205 (100.0)
Mouthwash				
Once a day or less	74 (96.1)	62 (91.2)	52 (86.7)	188 (91.7)
Twice a day or more	3 (3.9)	6 (8.8)	8 (13.3)	17 (8.3)
Total	77 (37.5)	68 (33.2)	60 (29.3)	205 (100.0)

Table 4 shows that in preclinical students of Faculty of Pharmacy, there was a significant association between stress levels with the use of dental floss ($p<0.05$). There was no significant association between stress level with teeth brushing, use of tongue cleaner, and use of mouthwash ($p>0.05$).

Table 4. Association between stress level, fatigue, and sleep quality with oral health behaviors.

Variables	Oral Health Behaviors							
	Teeth Brushing		Dental Floss		Tongue Cleaner		Mouthwash	
	1x/day or less N	2x/day or more N	1x/day or less N	2x/day or more N	1x/day or less N	2x/day or more N	1x/day or less N	2x/day or more N
Stress level								
Low/medium	13	160	173	0	143	30	156	17
High	5	27	30	2	24	8	28	4
p-value	0.136[a]		0.024[b]		0.306[a]		0.647[a]	
Fatigue								
No symptom	1	36	37	0	29	8	33	4
Symptom	17	151	166	2	138	30	151	17
p-value	0.206[b]		0.671[b]		0.594[a]		0.900[a]	
Sleep Quality								
Awakening Difficulties								
No symptom	11	131	142	0	113	29	128	14
Symptom	7	56	61	2	54	9	56	7
p-value	0.432[a]		0.093[b]		0.297[a]		0.785[a]	
Sleep Disturbance								
No symptom	12	140	150	2	120	32	136	16
Symptom	6	47	53	0	47	6	48	5
p-value	0.448[a]		0.549[b]		0.116[a]		0.821[a]	
Daytime Sleepiness								
No symptom	2	61	63	0	53	10	56	7
Symptom	16	126	140	2	114	28	128	14
p-value	0.065[b]		0.479[b]		0.513[a]		0.785[a]	

[a]Chi-square test; [b]Fisher's exact test; sig<0.05.

For symptoms of fatigue, in preclinical student of Faculty of Pharmacy, there was no significant association between symptoms of fatigue with teeth brushing, use of dental floss, use of tongue cleaner, and use of mouthwash. For the sleep quality in terms of awakening difficulties, there was no significant association between awakening difficulties symptoms with teeth brushing, use of dental floss, use of tongue cleaner, and use of mouthwash. Similarly, for the symptoms of sleep disturbance, there was no significant association between sleep disturbance symptoms with teeth brushing, use of dental floss, use of tongue cleaner, and use of mouthwash. For symptoms of daytime sleepiness, there was no significant association between symptoms of daytime sleepiness with teeth brushing, use of dental floss, use of tongue cleaner, and use of mouthwash ($p>0.05$).

Discussion

The present study is the first attempt to examine the oral health-related behavior by considering the stress levels, sleep quality and fatigue among students of the Faculty of Pharmacy at the University of Hasanuddin. The cross-sectional design of this study may add to the understanding of the association of stress level, fatigue symptoms and sleep quality with oral health behavior.

This study reveals that the percentage of stress level, awakening difficulties symptoms, sleep disturbance, daytime sleepiness and fatigue symptoms in the preclinical students of the Faculty of Pharmacy has decreased over the study year. This finding is consistent with previous research on 92 students of the Medical Faculty of the University of Vilnius in Lithuania who said that the reason for this can happen because of the first-year students have just started the process of lectures at the university. The period of adaptation to the new environment among students and the first year of study was one of the known causes [8].

In addition, the percentage of oral health behaviors in terms of teeth brushing, use of dental floss, use of tongue cleaner and use of mouthwash increase as the year of study. This finding is consistent with research by Baseer et al who said that pharmacy students who have been educated for longer time behave better on the oral health when compared with students who had just recently studied [6].

The main finding of this study was only the stress level that had significant associations with oral health behavior, while there was no significant association between quality of sleep and fatigue symptom. Stress was associated with the inadequate use of additional dental hygiene equipment, which is the use of dental floss.

This study shows that low/medium stress level has significant associations with the use of dental floss once a day or less. This was partly due to the heavy workload experienced by students so that stress resulting less priority on oral hygiene behavior, given the fact that the pharmacy students is one of the intensive courses and has a considerable number of tasks [8]. In addition, this study demonstrates the use of dental floss once a day or less are more common than the use of dental floss twice a day or more. These results are consistent with research conducted said that the use of dental floss in Indonesia was still quite unpopular among the people [12].

This study also shows that the fatigue and sleep quality symptoms did not have a significant association with oral health-related behavior among pharmacy students at Hasanuddin University. These findings did not consistent with the studies said there is a significant association between sleep disturbance and fatigue with oral health behavior [8]. The explanation of these findings is that this study did not aim to differentiate between the symptoms of mental fatigue and physical fatigue. Most likely the pharmacy students were experiencing the symptom of mental fatigue due to the heavy workload. Psychophysiological studies show that mental fatigue improves response to an action, which in this case resulted in the possibility of no significant change in oral health behaviors [13].

Conclusion

The study shows that there is an association between stress level with the use of dental floss. But there was no significant association between fatigue symptoms and sleep quality with oral health behavior. Therefore, further research is needed to explain more about the associations between the symptoms with oral health behavior.

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