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Sleep Late Impact on The Salivary pH Levels and Amylase Activity among Male Students who has Different BMI Category

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Abstract. [The lack of sleep could damage the circadian rhythm, which has implications for health issues. Here we conduct a survey on Students from the Faculty of Social and Political using purposive random sampling, by targeting student who has sleep duration low than 8 hours. We are using a questionnaire to gain information about the sleeping duration and also the Body Mass Index (BMI). Moreover, we also collect saliva samples from the students. pH Universal Indicators are used to measure the pH levels of saliva. We predict the salivary amylase activity by measuring the decrease of the substrate. We found about 27 students have a sleep duration of fewer than 6 hours. Then 19 students have a sleep duration of about 8 - 6 hours. Finally, only 5 students have a sleep duration of more than 8 hours. Our study suggests there is no significant difference between the 3 categories of sleep duration on saliva pH levels and salivary amylase activity. The same for the BMI categories. Although there are small differences sleep duration and BMI is not the major factor influencing the pH levels and amylase activity in saliva.]

Keyword: *[BMI, Health Issue, pH levels, Salivary Amylase, and Sleep duration]*

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1 Introduction

Sleep behaviour has a correlation with stress conditions [1]. In this case, sleep behaviour influences sleep quality. Low quality of sleep could be indicating stress, anxiety, and depression state of psychics [2]. Low quality of sleep shows short duration of sleep and non-restful sleep. The university student could also have a bad quality of sleep caused by the stress condition during the exam [3]. Indeed it is important to keep good behaviour of sleep. Many aspects indicate sleep quality including sleep duration [2]. The lack of proper sleep duration could promote hypertension [4]. The proper duration of sleep for adults is about 8 hours per day [5].

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Stress conditions can be detected by the increase of salivary amylase activity but not saliva flow rate [6] [7] [8]. The duration of work or study that need more concentration is very stressful [7]. The selection and exam could also trigger stress conditions [8]. University students have many factors that might be the cause of stress. Here our study tries to understand the correlation between sleep duration, salivary amylase activity, and stress among male students.

2 Materials and Methods

We conduct purposive random sampling targeting male students who have a short duration of sleep. To collect the saliva samples we use passive drool methods [9]. We selected students before lunch. The sleep duration data is collected via a questionnaire. We use the pH universal indicator to measure the pH levels of saliva [10]. For measuring the salivary amylase activity we make the amylum standard curve first. Then, we measure the absorbent of the amylum after mixing it with amylase extract from saliva via the Spectrophotometers at 540 nm to predict the concentration [11]. We use this formulation to predict the activity of salivary amylase:

$$Amylase\ activity = \frac{solubilized\ amylum\ absorbant - mix\ amylum\ amylase\ absorbant}{solubilized\ amylum\ absorbant} x\ 100\%$$

We are analysing the data with the application of SPSS 16. The Shapiro-Wilk test is used to analyse the data normality [12]. The Kruskal-Wallis test is used to analyse the significant differences among the 3 categories of sleep duration in the saliva pH levels and salivary amylase [13]. The same test was also used to test significant differences between the 2 parameters among the 4 categories of BMI.

2 Result and Discussion

Poor sleep quality is more common among the grove of social humanities students, resulting in a high risk of being stressed [14]. We also find the same phenomenon at the faculty of Social and Political Science Universitas Sumatera Utara (USU). There are 27 students who have a sleep duration of few than 6 hours per day. Then, 19 students have a sleep duration of about 8-7 hours per day. finally, only 5 students have a sleep duration of more than 8 hours per day. Yet, there are no significant differences ($p>0.05$) neither the saliva pH levels and the salivary amylase activity among the 3 categories of sleep duration (shown in table 4 and 5). However, we still find some of them lack sleep duration and have a high salivary activity which is about 74%. This perhaps indicates that stress conditions are not always related to sleep duration [1]. We indeed have more data related to the quality of sleep, rather than only sleep duration [2].

The normality test show if the data of pH levels of saliva (shown in table 2) and salivary amylase activity (shown in table 3) has non-normal distribution (p-value<0.05). Then, we continue to analyse the data using Kruskal-Wallis Test. The results show no significant differences ($p>0.05$) between the pH levels of saliva from the 3 categories of sleep duration

(shown in table 4) and the same for salivary amylase activity from the 3 categories of sleep duration (shown in table 5).

Table 1 Age Distribution of Respondent who has sleep duration few than 8 hours

Age	Number of Students	Percentage (%)
17	2	4
18	12	24
19	20	40
20	6	12
21	4	8
22	-	0
23	2	4
24	2	4
25	2	4
TOTAL	50	100

Most of the respondent is new students with age around 18-19 years old (shown in table 1). Stress is more related to the final-year student who has to face the final exam that would be very stressful [3]. We suggest for the next research is more focusing on the final-year student.

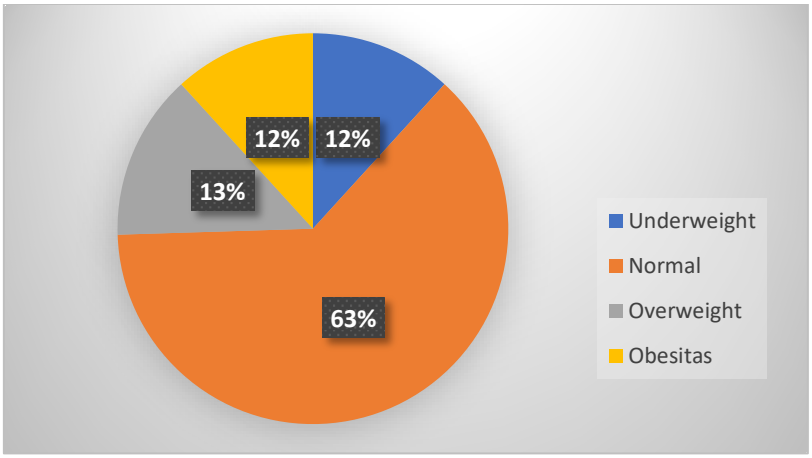

Fig 1. Index BMI of Student who lack of sleep duration

The BMI category among the students who have a sleep duration of few than 8 hours is dominated by the Normal category. Another study suggests that there is a correlation between stress and obesity conditions [15]. It seems focusing on obes samples will be resulting more correlation to the stress condition.

Table 2 Shapiro-Wilk Normalitity test on the saliva pH levels

Respontent	Statistic	df	Sig.
< 6 hours	.935	27	.078
8-6 hours	.876	19	.015
> 8 hours	.895	4	.207

Table 3 Shapiro-Wilk Normalitity test on the salivary amylase activity

Sleep duration	Statistic	df	Sig.
< 6 hours	.935	27	.089
8-6 hours	.876	19	.018
> 8 hours	.895	4	.405

Table 4 Kruskal-Wallis Test on the saliva pH levels between the sleep duration category

Category	the saliva pH levels
< 6 hours	6.5
8-6 hours	6.3
> 8 hours	6.8
Chi-Square	.214
df	1
Asymp. Sig.	.714

Table 5. Kruskal-Wallis Test on the salivary amylase activity between the sleep duration category

Category	Salivary amylase activity
< 6 hours	70.1 %
8-6 hours	69.7 %
> 8 hours	72.5 %
Chi-Square	.187
df	2
Asymp. Sig.	.911

All categories of BMI from the students (underweight, normal, overweight, and obese) shows no significant differences ($p>0.05$) neither in the saliva pH levels nor the salivary amylase activity between the category (shown in table 6). Nevertheless, obese students show the highest salivary amylase activity among all the BMI categories, which is about 73 %. Perhaps more data

is needed to suggest a correlation between obesity and salivary amylase activity. Previous study report that stress suppressants such as cigarettes could reduce body weight [16]. In the end, our results support the previous study that reported that there is no correlation between BMI and salivary amylase rate [17]. The same for the saliva flow, there is no correlation to the BMI category [18].

Table 6 Kruskal-Wallis Test on the salivary amylase activity between the BMI category

Category	Salivary amylase activity
Underweight	69.7 %
Normal	69.5%
Overweight	70.8 %
Obesitas	73.3 %
Chi-Square	1.159
df	3
Asymp. Sig.	.763

3 Conclusion

Our study suggests that there is no correlation between sleep duration with either saliva pH levels or salivary amylase activity because no significant differences among the 3 categories of sleep duration. Yet, the salivary amylase activity from the students who have a sleep duration of few than 6 hours per day is slightly higher than students who have a sleep duration between 8-7 hours per day. This is perhaps indicated stress condition but more research is needed to make the correlation clear. Other parameters, the BMI also shows no significant differences between all 4 categories on the salivary amylase activity. Nevertheless, obese students still have slightly higher salivary amylase activity which probably indicated stress condition.

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