Original article

Does sleeping cycle affect the periodontal health?

Dr. Dhaval Sarvaiya, Dr. Mahesh Chavda , Dr. Neeta Bhavsar, Dr. Kirti Dulani, Dr. Shraddha Shah

Department of Periodontology, Government Dental College and Hospital, Ahmedabad, Gujarat, India.
Corresponding author : Dr. Mahesh Chavda

ABSTRACT

Objective: The study is for the corelation among sleep duration, sleep time, and periodontitis among population and the mediation effect of WBC.

Methods: Total number of 80 sample size is selected for this study (age 30 to 55 years). Patients were questioned about the duration and timing of sleep. For WBCs counts venous blood collected from forearm-antecubital vein. For the periodontal evaluation Community Periodontal Index (introduced by the World Health Organization in1997) was selected.

Results: Result of this study shows that those who were going to bed for daytime are higher rated periodontitis. Long-time sleep (more than 9 hours) were suffering from severe periodontitis as compared to others. P value < 0.001, P value obtained by Chi-Square.

Conclusions: The study's finding suggest that an extra-long sleep duration and going to bed during the daytime are corelated with periodontitis.

INTRODUCTION

Sleep is increasingly recognized as a critical component of healthy development and overall health. Healthy sleep comprises many dimensions, including adequate duration, good quality, appropriate timing, and the absence of sleep disorders. Not getting enough sleep at night is generally associated with daytime sleepiness, daytime fatigue, depressed mood, poor daytime functioning and so on. Sleep and inflammation mediators are closely linked. If the quality of sleep is disturbed then the levels of inflammatory cytokines will be increased in saliva as well as blood. Most important cytokines involved in it are IL-1, TNFα, IL-6, IL-21 etc. The significant correlation between clinical periodontal parameters and   salivary cytokines is founded between clinical attachment level (CAL) and IL-21. In periodontitis, neutrophils are initially predominant cells of host defense mechanism, and have a significant role in inflammation and pathogenesis. White blood cells (WBCs), an immune indicator, plays a vital role as a mediator. Leukocytes, especially neutrophils, produce a specific molecule being directly responsible for the inflammatory response.

OBJECTIVE

The objective of this study is to investigate the relationship between sleep time & duration
with periodontitis and white blood cells (WBC) as a mediator.

METHODOLOGY

For this study, selected sample size number are 80(age 30 to 55 years). Patients are to be questioned about the duration and timing of sleep. Venous blood is to be collected from forearm-antecubital vein. For measuring periodontal status, Community Periodontal Index (introduced by the World Health Organization in1997) was selected

| (a) | (b) |

Fig: (a) blood collection from forearm (antecubital vein), (b) CPI by WHO-CPI probe

Exclusion criteria:

(1) History of any major health (2) Sleep disorders (3) Patients under medications like anti-anxiety and (4) anti-depressants (5) Current smokers.

**RESULTS**

1.White blood cells (WBCs) count by sleep time

SLEEP TIME	NUMBER OF PATIENTS	WBCS COUNT MEAN $\pm$ SD
going to bed at night (9 pm- 1 am)	58	6831 $\pm$ 200
going to bed at midnight (1 am -4 am)	16	5443 $\pm$ 126
going to bed at daytime (4 am-9 pm)	6	6900 $\pm$ 180

Comparison between WBCs (white blood cells) count and sleep time
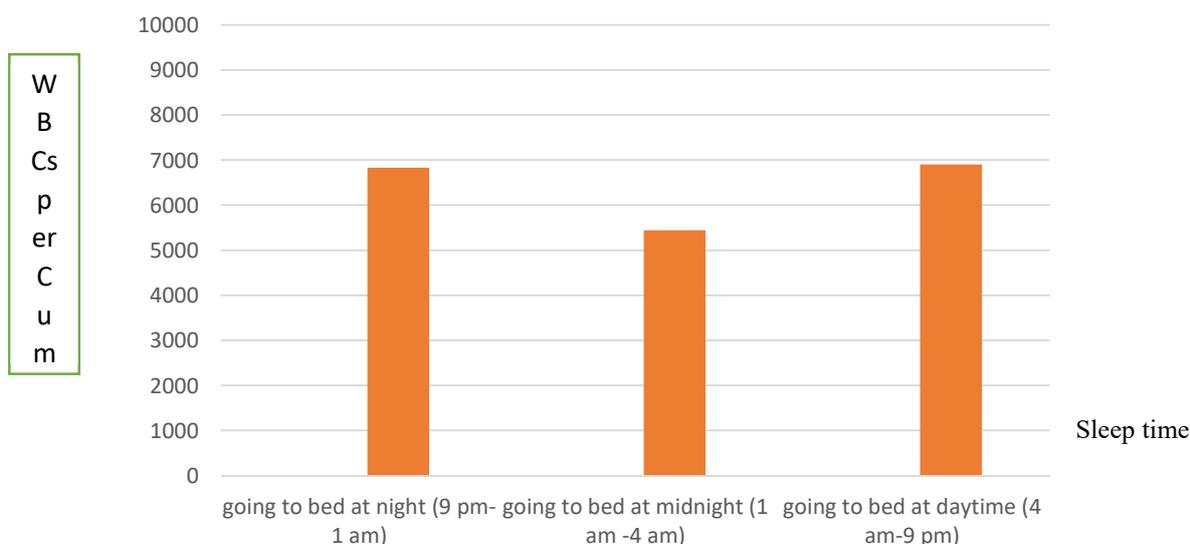
2. White blood cells (WBCs) count by sleep duration

SLEEP DURATION	TIME IN HRS	WBCS COUNT MEAN $\pm$ SD
short	<6 hrs	7200 $\pm$ 987
moderate	6-8 hrs	6829 $\pm$ 400
long	8-9 hrs	7300 $\pm$ 308
extra long	>9 hrs	8800 $\pm$ 104

W B Cs p er C u m

Comparison between WBCs (white blood cells) count and sleep duration
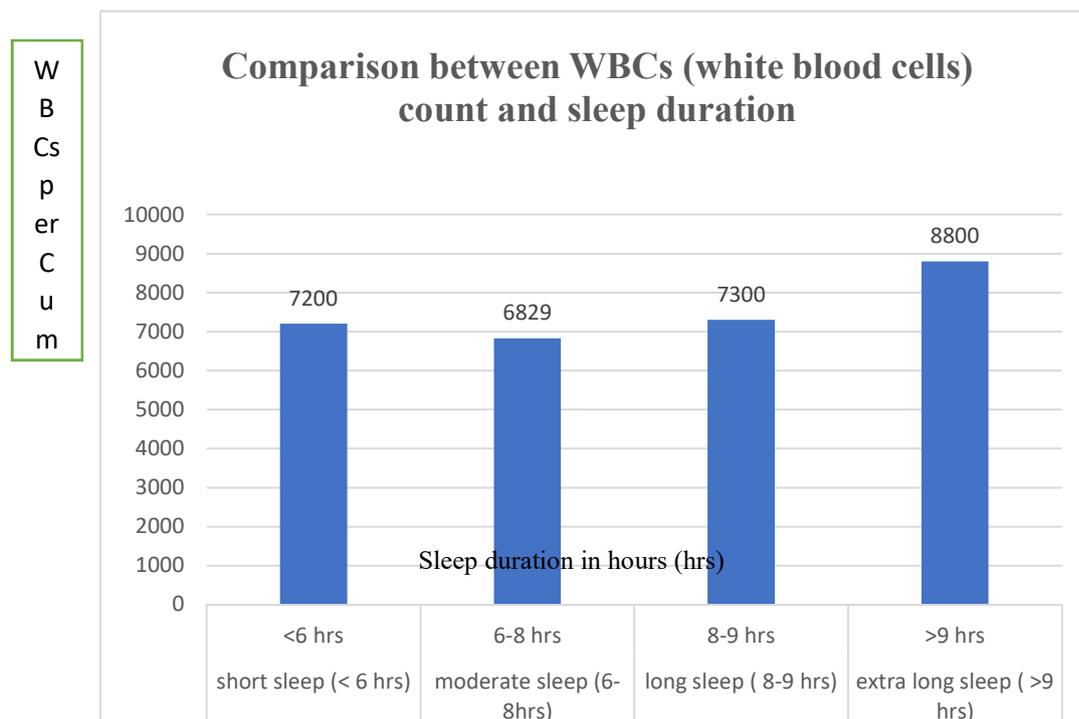
3. White blood cells (WBCs) count vs CPI score

COMMUNITY PERIODONTAL INDEX	NUMBER OF PATIENTS	WBCS COUNT MEAN $\pm$ SD
CODE 0	5	5465 $\pm$ 414
CODE 1	11	6887 $\pm$ 566
CODE 2	26	7601 $\pm$ 578
CODE 3	21	8397 $\pm$ 200
CODE 4	17	8754 $\pm$ 182

WBCs per Cum

Comparison between WBCs (white blood cells) count and CPI
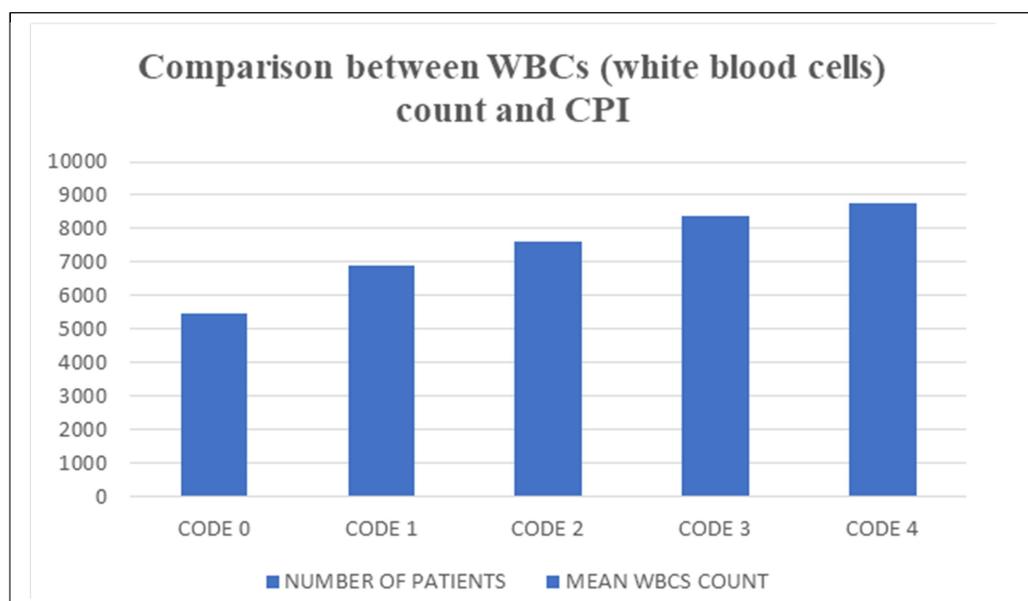
Community periodontal index (CPI)

$P < 0.001$, P values obtained by Chi-Square

DISCUSSION

- As for the studies on the relationship between sleep duration and health outcome are inconsistent.

- According to result of this study (table no.1) shows that those who were going for sleep in a day time has higher in count of WBCs cell (6900 ± 180 per cubic millimeter) as compared to those who were going for sleep at night (6831 ± 180 per cubic millimeter) , an article shows same result is Han DH and their colleague.

- Table no. 2 shows that those who were long sleeping time(more than 9 hrs), they have slight more number of white blood cells (8800 per cubic millimeter) as compared to short time of sleep (7000 per cubic millimeter). The study regarding this is done by Hoopes EK and their colleague.

- Table no.3 shows that community periodontal index (CPI) is directly proportional to white blood cells (WBCs). The white blood cells count was higher (8754 per cubic millimeter) in high score of community periodontal index (CODE 4). The article Kumar BP and their colleague shows same result.

- Kerenyi NA (1990) in his study found that melatonin production is always highest at night and disturbance of melatonin secretion because of night awakening and light exposure might cause periodontal inflammation through immune dysfunction.

- Kowalik K et al (2001) conducted a study on patients of periodontitis and have found significant higher level of leukocytes in them as compare to control group which is in parallel with the result of present study.

- Dong et al (2020) results show that the WBC count played a role in explaining the relationship between sleep time and periodontitis which is in the result of my study.

CONCLUSION

Collectively, the association between sleep (duration and time) and periodontitis was proven. Extra-long sleep duration (> 9 hours) and going to bed during the daytime with awakening during the night may be considered independent risk indicators of periodontal disease.

REFERENCES

1. Han DH, Kim MS, Kim S, Yoo JW, Shen JJ. Sleep time and duration are associated with periodontitis in a representative sample of Koreans. Journal of Periodontology. 2022 Feb;93(2):210-9.

2. Hoopes EK, D'Agata MN, Berube FR, Ranadive SM, Patterson F, Farquhar WB, Edwards DG, Witman MA. Consistency where it counts: Sleep regularity is associated with circulating white blood cell count in young adults. Brain, Behavior, & Immunity-Health. 2021 May 1; 13:100233.

3. Kościelniak BK, Charchut A, Wójcik M, Sztefko K, Tomasik PJ. Impact of fasting on complete blood count assayed in capillary blood samples. Laboratory Medicine. 2017 Nov 8;48(4):357-61.

4. Kirszenblat L, van Swinderen B. The yin and yang of sleep and attention. Trends Neurosci (Tins). 2015;38:776-786.

5. St-Onge MP, Grandner MA, Brown D, et al. Sleep duration and quality: impact on lifestyle behaviors and cardiometabolic health: a scientific statement from the American Heart Association. Circulation, 2016. 134:e367-e386.

6. Shan Z, Ma H, Xie M, et al. Sleep duration and risk of type 2 diabetes: a meta-analysis of prospective studies. Diabet Care. 2015;38:529-537.

7. Qin Y, Zhou Y, Zhang X, Wei X, He J. Sleep duration and breast cancer risk: a meta-analysis of observational studies. Int J Cancer. 2014;134:1166-1173.

8. Yin J, Jin X, Shan Z, et al. Relationship of sleep duration with allcause mortality and cardiovascular events: a systematic review and dose-response meta-analysis of prospective cohort studies. J Am Heart Assoc. 2017;6:e005947.

9. Irwin MR. Why sleep is important for health: a psychoneuroimmunology perspective. Ann Rev Psychol. 2015;66:143-172.