Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 5, 2025

CO-RELATION BETWEEN DAYTIME SOMNOLENCE AND PERIODONTAL DISEASES -A CLINICAL ANALYSIS.

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ABSTRACT

Background and Objectives: Periodontitis is becoming a highly prevalent disease globally. Daytime Somnolence which is a key symptom of Obstructive sleep apnea, is a common disorder and is characterized by repeated collapse of breathing during sleep time. It has been found that periodontal diseases may increase in severity in subjects exhibiting Daytime Somnolence. The aim of the present study was to find out the co-relation between daytime somnolence and periodontal diseases

Materials and Method: Source of the data: Patient reporting to the Department of Periodontology. Sample size- 500 patients , Sampling method-Convenience sampling. Period of Study- 9 months Materials - Mouth mirror, UNC-15 Probe.

Results: In the present study the results showed statistically significant increase in pocket probing depthsand decrease in clinical attachment level with Daytime Somnolence parameters.

Conclusion: Results of the study revealed that there was a co-relation between Daytime Somnolence , which is a key symptom of obstructive sleep apnea and periodontal disease states.

Keywords: Sleep related breathing disorders, Daytime somnolence, Obstructive sleep apnea, Epsworth Sleepiness Scale, Stop-Bang Questionnaire, Berlin Questionnaire, Periodontal diseases..

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INTRODUCTION

Periodontitis has been implicated in many systemic diseases such as diabetes, cardiovascular diseases, hypertension, stroke, Obesity, Kidney disorders[3]Prevalence of periodontal disease is greater in males than in females and it increases with age. Periodontal infection can be modified by behavioral factors, hormonal imbalances, drugs, systemic conditions, immunological, factors and hematological disorders.[4]Risk factors for periodontal disease are age, smoking, obesity and socioeconomic factors. Recently periodontal disease has received increasing attention because it may have relationship to not only systemic disease like diabetes, coronary heart disease, osteoporosis but also to obstructive sleep apnea.[5]Periodontitis and OSA both are associated with systemic inflammation and cardiovascular disease and found that the prevalence of periodontitis in patients with OSA was
fourfold higher[6]. Periodontitis and OSA are common is disorderthat associated with systemic inflammation, and OSA is also associated with systemic inflammation, so we examined the fact if they are interconnect with each other or not.[7]Snoring is a common symptom of such obstruction , hypoventilation and central apneas ,which all lead to recurrent episodes of hypoxia, hypercapnia ,sleep fragmentation and elevated sympathetic tone. Snoring signifies the intermediate collapsibility of upper airways. If this collapsibility results in diminution of air flow , it advances towards OSA
hypopnea syndrome. Excessive Daytime somnolence (EDS) is a key symptom of OSA characterized by persistent sleepiness and often a general lack of energy, even during the day after apparently adequate or even prolonged nighttime sleep.[8]The relationship between periodontitis and obstructive sleep apnea (OSA)
had not been investigated before the study by Gunaratnam et al[14](2009). Periodontitis is a multifactorial disease that has polymicrobial etiology modified by various systematic and enviormental factors. The periodontal and systemic diseases has a two way connect. Numerous researches have been published focusing relationship between diabetes, pregnancy, cardiovascular diseases and periodontitis.[15] Very few studies are carried out to indicate relationship between OSA and periodontitis thus, it is important to find out the link between OSA and periodontal disease in an attempt to establish it as a risk factor. This study was an attempt to imperative look for that link.

MATERIALS AND METHOD

Materials

Mouth mirror
UNC 15 probe.

Methodology-Periodontal parameter CAL, PPD, GBI, will be assessed using UNC 15 probe,

- OSA will be assessed using ESS, Stop Bang and Berlin Questionnaire, Mallampati index.

OSA SCREENING QUESTIONNAIRE AND INDEX:-

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STOP-BANG QUESTIONNAIRE (NETZER NC et al 1999)[10]

1.	**Snoring**	Do you snore loudly (louder than talking or loud to be heard through closed doors)?	YES	NO
2.	**Tired**	Do you often feel tired, fatigued, of sleepy during daytime?	YES	NO
3.	**Observed**	Has anyone observed you stop breathing during your sleep?	YES	NO
4.	**Blood Pressure**	Do you have or are you being treated for high blood pressure?	YES	NO
5.	**BMI**	Is your BMI more than 35kg/m^2?	YES	NO
6.	**Age**	Is your age over 50 years old?	YES	NO
7.	**ckCircumference**	Is your neck circumference greater than 40cm?	YES	NO
8.	**Gender**	Is your neck circumference greater than 40 cm?	YES	NO

High risk of Sleep apnea if **YES** answered to 3 or more questions
Low risk of sleep apnea if **YES** answered to less than 3 questions

BERLIN QUESTIONNAIRE (NETZER NC at al 1999)[11]

Category 1.	1.Complete the following	1.Height/,Weight/,Age/ ,Gender:
	2. Do you snore?	2. Yes /No/ Don't know
	3. Your snoring is.	Slightly louder than breathing /As loud as talking / Louder thantalking / Very loud, can be heard in adjacent rooms
	4. How often do you snore?	Nearly every day/3-4 times a week / 1-2 times a week /1-2

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		times a month / never or nearly never
	Has your snoring ever bothered other people?	5. Yes/ No
	6. Has anyone noticed that you quit breathingduring your sleep?	6.Nearly every day/3-4 times a week/1-2 times a week/ 1-2 times a month / never or nearly never
Category 2.	7. How often do you feel tired or fatigued after your sleep?	7.Nearly every day / 3-4 times a week /1-2 times a week / 1-2times a month / never or nearly never
	During your wake time, do you feel tired, fatigued, or not up to par?	Nearly every day/3-4 times a week / 1-2 times a week/1-2 times a month / never or nearly never
	Have you ever nodded off or fallen asleep while driving a vehicle?	Yes/No , If yes, how often does it occur? Nearly every day. / 3-4 times a eek /1-2 times a week / 1-2 times a month / never or nearly never
Category 3.	0.Do you have high blood pressure? .BMI (Body mass index)	10.Yes/No/Don't know .____

Category 1 is positive if the total score is 2 or more points.
Category 2 is positive if the total score is 2 or more points.
Category 3is positive if the answer is 'Yes' or if the BMI of the patient is greater than 30kg/m2.

High Risk: if there are 2 or more categories where the score is positive.
Low Risk: if there is only 1 or no categories where the score is positive

EPSWORTH SLEEPINESS SCALE (DR. MURRAY JOHNS 1991)[9]

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired?
Use the following scale to choose the most appropriate number for each situation.

0 = would never doze, 1 = slight chance of dozing ,2 = moderate chance of dozing, 3 = high chance of dozing

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0-10 Normal range 10-12 Borderline 12-24 Abnormal

Total score= , Inference

Situation	chance of Dozing (0-3)
Sitting and reading	
Watching TV	
Sitting, inactive in a public place (e.g. A theatre or a meeting)	
As a passenger in a car for an hour without a break	
Lying down to rest in the after noon when circumstances permit	
Sitting and talking to someone	
Sitting quietly after a lunch without alcohol	
In a car, while stopped for a few minutes in the traffic	

Mallampati index/score:- (Friedman and Tanyeri)[1]

Mallampati index is the way of observing the position of the tongue and the view it allows at the rest indicating the risk of OSA. This score
was later revised by Friedman and Tanyeri.

Score	What is observed with tongue at rest mouth wide open
ClassI	Visualize the soft palate, uvula, tonsils and the oropharynx
Class II	Visualize the soft palate, most of the uvula, superior portion of the tonsils, not the oropharynx
Class III	Can see the soft palate but not the uvula, tonsils or into the oropahrynx
Class IV	Cannot see the soft palate or any structures below this, can only see the

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	hard palate

PERIODONTAL ASSESSMENT DONE BY-

1.Pocket probing depth , Clinical attachment level
2.Plaque index (Silness&loe,1964)
3.Gingival bleeding index (Ainamo& Bay 1975)

Inclusion Criteria –

1. Case definition as per AAP classification 1999.
2. Age group between 20-45 years (young adults)

Exclusion criteria-

1.Patients with conditions like Diabetes, hypertension, atherosclerosis and other systemic diseases known to affect periodontal status.
2. Pregnant and Lactating Women.
3. Obese patients and patients suffering from metabolic disorders
4. Patients with deleterious habits like alcohol consumption, tobacco habits and any other adverse habits.
5. Patients who have received any surgical or nonsurgical lperiodontal therapy in past6 months.
6. Patients with adenoids and tonsils or recent history of tonsillitis.
7. Patients with congenital disease and craniofacial anomalies.

▲

RESULTS

TABLE 1-Odd's ratio with respect to ESS in different variables (Age, Gender, PI, PPD,CAL)
TABLE 2-Odd's ratio with respect to Stop-bang questionnaire in different variables (Age, Gender, PI, PPD,CAL)

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Independent variable		Adjusted Odd's Ratio	
		OR	P value
Age	20-33 yrs	1	0.003
	34-45 yrs	1.83	
Gender	Males	1	0.056
	Females	1.66	
PI	0	1	
	1	3.9	<0.0001
	2	7.7	0.023
PPD	Upto 3 mm	1	0.019
	>3mm	2.14	
CAL	Upto 2 mm	1	
	>2 mm	3.901	0.277

Table-1

Independent variable		Adjusted Odd's Ratio	
		OR	P value
Age	20-33 yrs	1	0.012
	34-45 yrs	1.47	
Gender	Males	1	0.07
	Females	1.9	
PI	0	1	0.003
	1	1.89	0.003
	2	3.45	0.001
PPD	Upto 3 mm	1	0.009
	>3mm	1.06	
CAL	Upto 2 mm	1	
	>2 mm	1.1	0.833

Table-2

Table 3: Odd's ratio with respect to in Berlin questionnaire different variables (Age, Gender, PI, PPD,CAL)

Independent variable		Adjusted Odd's Ratio	
		OR	P value
Age	20-33 yrs	1	0.002
	34-45 yrs	1.24	
Gender	Males	1	0.21
	Females	1.36	
PI	0	1	
	1	2.03	0.005
	2	2.36	0.001
PPD	Upto 3 mm	1	0.003
	>3mm	2.37	
CAL	Upto 2 mm	1	
	>2 mm	1.048	0.091

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Table-4:Demographic distribution of study population among different age groups with Normal, borderline, abnormal subjects
withsleeapnea using Epsworthsleepiness sca

			ESS Questionnaire			Total
			Normal	Borderline	Abnormal	
Age group	20-33 yrs	n	166	102	19	287
		%	57.8%	35.5%	6.6%	100.0%
	34-45 yrs	n	74	115	24	213
		%	34.7%	54.0%	11.3%	100.0%
Total		n	240	217	43	500
		%	48.0%	43.4%	8.6%	100.0%
P value			<0.0001, S			

Chi square test

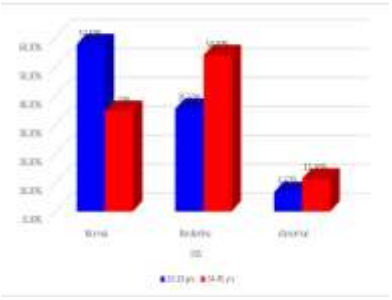

Table-5:Demographic distribution of study population among different age groups with Low high and high risk subjects using
Stop-bang questionnaire

			STOP		Total
			Low risk	High risk	
Age group	20-33 yrs	n	267	20	287
		%	93.0%	7.0%	100.0%
	34-45 yrs	n	182	31	213
		%	85.4%	14.6%	100.0%
Total		n	449	51	500
		%	89.8%	10.2%	100.0%
			0.007, S		

Chi square test

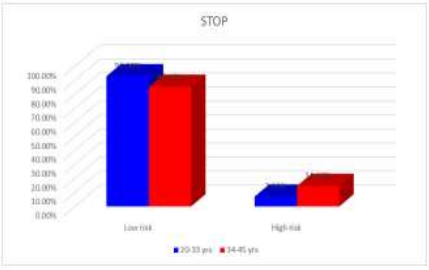

Table-6:Demographic distribution of study population among different age groups with Low high and high risk subjects using
Berlin questionnaire.

			BERLIN		Total
			Low risk	High risk	
Age group	20-33 yrs	n	260	27	287
		%	90.6%	9.4%	100.0%
	34-45 yrs	n	168	45	213
		%	78.9%	21.1%	100.0%
Total		n	428	72	500
		%	85.6%	14.4%	100.0%
			<0.0001, S		

Chi square test

Table-7:Demographic distribution of study population among different age groups with different category using Mallampattiscore.

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			Mallampatti Index				Total
			.00	1.00	2.00	3.00	
Age group	20-33 yrs	n	146	95	34	12	287
		%	50.9%	33.1%	11.8%	4.2%	100.0%
	34-45 yrs	n	82	84	34	13	213
		%	38.5%	39.4%	16.0%	6.1%	100.0%
Total		n	228	179	68	25	500
		%	45.6%	35.8%	13.6%	5.0%	100.0%
			0.04, S				

Chi square test

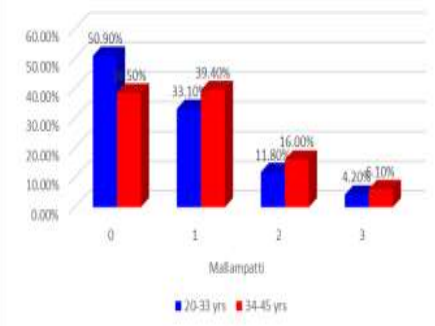

Table-8::Demographic distribution of study population among Gingivitits and periodontitis groups with the Epsworth
sleepiness scale.

			ESS			Total
			Normal	Borderline	Abnormal	
periostatus	Gingivitis	n	138	81	11	230
		%	60.0%	35.2%	4.8%	100.0%
	Periodontitis	n	102	136	32	270
		%	37.8%	50.4%	11.9%	100.0%
Total		n	240	217	43	500
		%	48.0%	43.4%	8.6%	100.0%
P value			<0.0001, S			

Chi square test

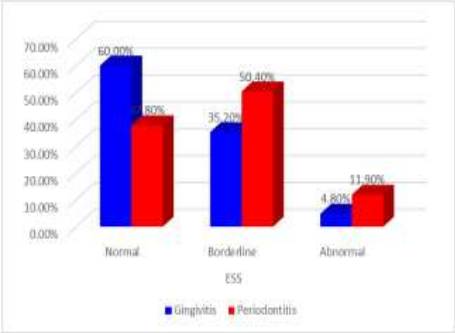

Table-9:Demographic distribution of study population among Gingivitits and periodontitis groups with the Stop-bang

questionnaire.

			STOP		Total
			Low risk	High risk	
periostatus	Gingivitis	n	217	13	230
		%	94.3%	5.7%	100.0%
	Periodontitis	n	232	38	270
		%	85.9%	14.1%	100.0%
Total		n	449	51	500
		%	89.8%	10.2%	100.0%
P value			0.001, S		

Chi square test

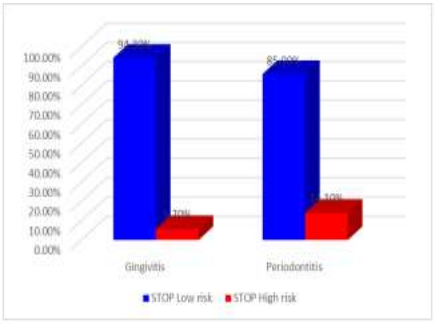

Table-10:Demographic distribution of study population among Gingivitits and periodontitis groups with the berlinsquestionnaire.

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			BERLIN		Total
			Low risk	High risk	
periostatus	Gingivitis	n	211	19	230
		%	91.7%	8.3%	100.0%
	Periodontitis	n	217	53	270
		%	80.4%	19.6%	100.0%
Total		n	428	72	500
		%	85.6%	14.4%	100.0%
P value			<0.0001, S		

Chi square test

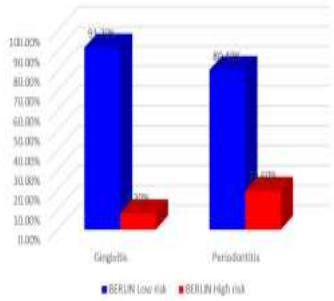

Table-11:Demographic distribution of study population among Gingivitits and periodontitis groups with the Mallampatti index.

			Mallampatti				Total
			.00	1.00	2.00	3.00	
periostatus	Gingivitis	n	128	67	29	6	230
		%	55.7%	29.1%	12.6%	2.6%	100.0%
	Periodontitis	n	100	112	39	19	270
		%	37.0%	41.5%	14.4%	7.0%	100.0%
Total		n	228	179	68	25	500
		%	45.6%	35.8%	13.6%	5.0%	100.0%
			<0.0001, S				

Chi square test

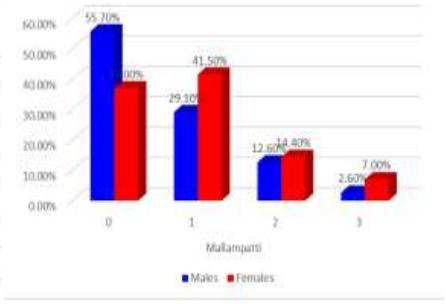

Table 1 These results were statistically significant (p=0.003). The results revealed that odd's of having day times omnolencewith respect to Epsworth sleepiness scale increase with age. Odd's ratio was higher in females, than in males. Mean plaque score and mean pocket probing depth across all subjects increase with age. Decrease in clinical attachment level was seen with an increase in Odd's ratio.

Table 2- In the age group 20-23 years the adjusted odd's ratio 1 and in the age group 34-45 years the odd's ratio was 1.47 with the Stop-bang questionnaire (95% CL=1-1.47). Which was not statistically significant (p=0.012).. Mean plaque score increase across all subjects increase with age. Decrease in clinical attachment level was seen higher with an increase in Odd's ratio. Table 3- The results revealed that odd's of having daytime time somnolence with respect to berlin questionnaire increase with age. Odd's ratio found higher in females as compared to males. Mean plaque score increase across all subjects increase with age. Decrease inclinical attachment level was seen higher with an increase in Odd's ratio (95% CI=11.048).Demographic distribution of study population among different age groups with Normal, borderline, abnormal subjects with sleep apnea using Epsworth sleepiness scale, Stop-bang question naire Berlin question naire.were increase in age. This difference was assessed by using Chi square test and this difference was found to be statistically significant.

DISCUSSION

Sleep disorders, which are becoming increasingly common disorder In these days. American Academy of Sleep Medicine [19](AASM) classified sleep disorders into seven diagnostic groups:An irregular respiratory rhythm is the hallmark of sleep-related breathing disorders (SRBD), originally known as sleep disordered breathing. Respiratory abnormalities cause

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 5, 2025

recurrent changes in sleep architecture, which may be linked to organ dysfunction and excessive daytime sleepiness (EDS).[20] The most frequent kind of sleep-related breathing disease is obstructive sleep apnea, which is defined by recurring partial or total pharyngeal collapse that obstructs the airway and results in breathing halt conditions like apnea.American Academy Of Sleep Medicine (AASM) defines it as the cessation of airflow for at least 10 seconds during sleep.Hypopnea- AASM defines it as a recognizable transient reduction of breathing for 10 seconds or longer. [17,21] .OSA is associated with variation in upper airway anatomy which leads to change in upper airway resulting in collapsibility. Patency of airway is maintained by the activity of upper airway muscles, which dilates and stiffens the airway and give rise to intraluminal pressure, which leads to collapse. [22]Some studies claimed that periodontitis and OSA are associated with systemic inflammation and found that prevalence of periodontitis in OSA was higher. There are various methods to assess the OSA like Objective tests- Polysomnography[13] (PSG),Multiple sleep latency tests, Maintenance of wakefullness tests. [23] Subjective tests like Apnea hypopnea index (AHI) [24] ,Epsworth sleepiness scale [9] (ESS), Stop-bang questionnaire[10] , Berlin questionnaire [11] ,Mallampatti index. Polysomnography[13] (PSG) monitoring which is considerd as a gold standard for diagnosis of OSA. Polysomnography (PSG) required monitoring which is expensive, and needs expert technician to monitor. PSG also require for whole night monitoring which is not suitable for many patients, cost related issues are also for some patients, even if cost were not an issue, long waiting times at the sleep laboratory are a frequent issue also. Several studies reported that the prevalence of OSA to be 2-3 times more common in adult males. It was reported that females and males the percentage of subjects suffering from Obstructive sleep apnea were 2% and 4% respectively. [43]Some other population based studies from india has been carried out results revealed that the prevalence of OSA is 2.4% in females and 13.4% in males which is threefold higher in males as compared to females. The exact reason behind the Gender difference is not known but hormonal differences could be responsible for it. [44]Results revealed that Daytime somnolence parameters showed marked increase in the presence of gingivitis and periodontitis, higher number of patientswereshowed positive scores in periodontitis than in gingivitis group. This indicates increase in degree of OSA with increased severity of periodontal diseases. Similar study was employed by Gunaratnam K [18] they evaluated first time the relationship between OSA and periodontal diseases. Study results suggested that the increased prevalence of periodontitis in OSA patients could be due to a meaningful association between OSA andperiodontitis. OSA could act as an inflammatory mediator for periodontitis or vice versa. Gamsiz-isik H (2016) [21] reported that inflammatory mediators like TNF- ∝, I L-1b and C-reactive level in gingival crevicular fluid have been increase in periodontal disease patients. In OSA patients there is repeated events of hypoxia and apnea which leads to an increase levels of TNF- ∝, interleukin-6 and C-reactive protein in the serum of OSA patients. A statistically significant correlation was also identified between the CAL and the pocket depth, respectively**.**

CONCLUSION

The present study used different screening questionnaire like Epsworth Sleepiness Scale, Stop-Bang Questionnaire, Berlin Questionnaire, Mallampati index. On analyzing the data there is a statistically significant co- relation between daytime somnolence and periodontal diseases. Periodontal diseases have been related to cardiovascular, obesity, rheumatoid arthritis, diabetes mellitus and obstructive sleep apnea due to shared inflammatory pathways. The clinical outcome of these findings suggest that it is recommended that physicians should be recommend to send their Daytime Somnolence patients to dentists for further periodontal examination and to treat

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Obstructive Sleep Apnea patients with various treatment modalities used by dentist likeMandibular Repositioning Devices,Tongue Repositioning Device.

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