

The Impact of Sleep on Pain Perception During Administration of Dental Local Anesthesia

USMAN SANA¹, SHAKEEL AHMAD², RAHEEM RAMZAN CHEEMA³, AMINA SAGHEER⁴, AMNA MEHWISH IKRAM⁵, SALMAN AHMAD⁶

¹Assistant Professor and Head Department of Operative Dentistry, Islam Dental College, Sialkot.

²Associate Professor, Department of OMFS, Islam Dental College, Sialkot.

³Senior Registrar, Department of Periodontology, Islam Dental College, Sialkot.

⁴Associate Professor, Department of Periodontology, Islam Dental College, Sialkot.

⁵Assistant professor and HOD dental materials department at Islam dental college.

⁶Senior Registrar, OMFS, Islam Dental College, Sialkot.

Correspondence to: Dr. Usman Sana, Email: usmansana4321@gmail.com, Cell # 03249402077

ABSTRACT

Objective: Was to understand and associate the role of sleep with pain perception in patients undergoing inferior alveolar nerve block for dental procedures.

Study Design: Study was quantitative correlational design in nature.

Place and duration of study: Department of Operative Dentistry, Dental section Islam Dental College, Sialkot. Duration of study was two years 2019-2020

Materials & Methods: Three hundred patients were included in the study, which were scheduled for inferior alveolar nerve block for their dental procedure.

Results: The study shows a statistical significance between sleep hours and pain to 0.000. Standard deviation for numeric pain scale and sleep hours according to one-sample T-Test was 0.786 and 0.501, respectively. Out of 155 cases with sleep deprivation presented with mild (76), moderate (44) and severe (35) pain. While the group with good sleep presented with mild (74), moderate (45) and severe (26) pain.

Conclusion: There exists a statistically significant relationship between perception of pain and sleep. In order to improve the quality of dental care professionals should educate their patients on the importance of good sleep hygiene along with dental hygiene.

Key Words: Sleep, pain, local anaesthesia.

INTRODUCTION

Pain during dental treatment can be modified by multiple factors. Sleep is one of the factors that are governed by pain. When it comes to body homeostasis, both pain and sleep have significant importance¹. For optimal body function and energy pain and sleep are the foundation². Pain perception is high in patients having less sleep hours.³ Dental phobia has direct relation with painful procedures.⁴ Effective and ineffective local anesthesia becomes a bad experience throughout patient's life. Anxious and stressful patients have tendency to react badly during painful procedures. Attempts should be made to control aggravating factors. One of the important factor is sleep deprivation among patients^{2,4}. Identifying sleep deprived patients before attempting painful procedures in dentistry can be helpful to overcome dental phobia and their pain. The quality of sleep depends upon the mode of the airway of the individual. The nasal breathers tend to have more undisturbed sleep as compared to the oral breathers who experience repeated arousal due to airway collapse during the sleep^{6,7}. Encouraging behavioral therapy and use of anxiolytic medicine before and after stressful procedures can also be helpful^{1,3,6}. Little data is available on the correlation of sleep and pain perceived during dental procedures. In this study we will attempt to understand the correlation of pain intensity and patient's pain perception during inferior alveolar nerve block.

MATERIAL AND METHODS

After getting approval from the ethical committee, 300 patients who presented in the department of Operative

Dentistry for their restorative needs were randomly selected. Their age range was between 10 to 70 years. Medically compromised, psychiatric patients and those on medication for their systemic diseases were excluded. Each patient was asked about the average sleep hours for the last one month. Inferior alveolar nerve block was administered for anaesthetizing mandibular teeth. Numeric pain scale was used where no pain = 0, mild pain = 1-3, moderate pain = 4-6 and severe pain = 7-10. Sleep was categorized as "sleep deprived" and "good sleep" groups, sleep deprived group cases included 4 to 6 hours of average night sleep, while good sleep group cases included 7-9 hours of night sleep. Benzocaine gel was used before giving inferior alveolar nerve block with 2% lignocaine with 100,000 IU epinephrine. Immediately after dental LA, perceived pain was asked and documented for each patient.

RESULTS

Out of 300 patients, 172 cases were females (57.3%), while 128 were males (42.7). 150 cases have mild pain (50.0%), 89 cases (29.7%) have moderate pain. 61 cases (20.4%) have severe pain. 172 (57.3%) cases were females and 128 (42.7%) cases were males. Mild pain was reported in 150 (50%), moderate pain was reported in 89 (29.7%) and severe pain in 61 (20.3) of the cases. Sleep deprived cases were 155 (51.7%) while cases with adequate sleep were 145 (48.3%). As per Kolmogorv-Smirnov and Shapiro-Wilk there exist a significance of 0.00 among sleep and pain. Standard deviation for numeric pain scale and sleep hours according to one-sample T-Test the

standard deviation was 0.786 and 0.501, respectively. Table 1 represents the distribution of gender, table 2 represents the frequency of numeric pain scale, table 3 represents the sleep hour distribution, table 4 represents the test of normality and table 5 represents the sample T-Test. Figure 1 and 2 represents the distribution of pain and sleep respectively.

Table 1: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	172	57.3	57.3	57.3
	M	128	42.7	42.7	100.0
	Total	300	100.0	100.0	

Table 2: Numeric Pain Scale

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mild pain(1-3)	150	50.0	50.0	50.0
	moderate pain (4-6)	89	29.7	29.7	79.7
	severe pain (7-10)	61	20.3	20.3	100.0
	Total	300	100.0	100.0	

Table 3: Sleep Hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	sleep deprived (4-6)	155	51.7	51.7	51.7
	good sleep (7-9)	145	48.3	48.3	100.0
	Total	300	100.0	100.0	

Table 4: Tests of Normality

Sleep Hours		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Numeric Pain Scale	sleep deprived (4-6)	.309	155	.000	.757	155	.000
	good sleep (7-9)	.320	145	.000	.752	145	.000

a. Lilliefors Significance Correction

Table 5: One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Numeric Pain Scale	300	1.7033	.78574	.04536
Sleep Hours	300	1.4833	.50056	.02890

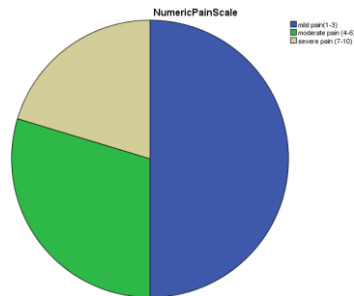


Figure 1: Frequency of Pain

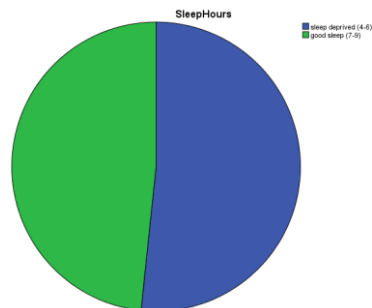


Figure 2: Frequency of sleep hours

DISCUSSION

There is strong correlation of pain perception and its relationship with sleep. Principally the mechanism for hyperalgesia and distorted sleep is prevention of opioid analgesia⁸. Reduced affinity of M- and D- opioid receptors results in sleep deprivation patterns. Rapid eye movement sleep deprivation reduces the opioidergic analgesia produced by enkaphalinase inhibitors and MAO-B substrates^{9,10}.

Serotonergic activity plays a very important in the role of sleep and pain regulation, that is regulated by MAO-B inhibitor deprenyl. Tryptophan reduction results in reduction of analgesic efficacy of morphine which effects the multiple neural pathways^{10,11,12}. Nasal breathing with normal average sleeping hours cases have mild pain perception during painful procedures, like inferior alveolar nerve block.^{6,7} Recent studies have shown that specific brain region plays critical role in sleep regulation as they do in pain regulation. Research has shown that sleep deprivation also contributes to chronic pain development^{13,14}. Sleep disturbances are responsible for up-setting the body metabolism and homeostasis¹⁵. We know that sleep and mental state are interrelated. Sleep is also connected with mental and emotional health; it has also demonstrated links between anxiety, depression and other mental conditions. The scientific evidence to date provides bidirectional relationship, as dental pain can impact our sleep pattern and timing; conversely sleep can negatively and positively impact dental procedures like inferior alveolar nerve blocks during dental treatment. Therefore, the relationship of sleep and pain, if disturbed, promotes pain perception in the long term.

There exists a strong correlation that those people who had adequate sleep showed much better state of mind before and during dental procedures. Not only this it also revealed that those who were well rested showed better efficacy of dental anesthesia. While those patients who were sleep deprived show more anxiety and pain perceptions when compared to those who were well rested. Both sleep and mental health are interrelated. Hence adequate sleep will help improve pain control in patients³.

Therefore, based on our limited data and its relation we can suggest that improving the sleep and sleep-related factors can positively impact not only quality of dental services. Not just limiting our study to sleep, we would like to go a step further and try to find the correlation between other daily routine factors that may help in improving overall health of our patients. They include role of breathing, exercise and physical fitness and hydration.

CONCLUSION

In our study the evidence shows that sleep deprivation aggravates pain sensitivity during the administration of Inferior alveolar nerve block. Less sleep hours and repeated arousal triggers complex neurobiological sequels which enhances the effect of pain perception. Therefore pre-operative assessment of patient's life style can have positive impact on the intra-operative and post-operative dental care.

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