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Anxiety and Sleep; The Compounding Impact on Endodontic Therapy

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Author`s Contribution

[1,3,6]Substantial contributions to the conception or design of the work; or the acquisition, Final approval of the study to be published, [2,7]Active participation in active methodology, [4,5]analysis, or interpretation of data for the work, Drafting the work or revising it critically for important intellectual content

Funding Source: None
Conflict of Interest: None

Received: Dec 09, 2023
Accepted: May 26, 2024

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ABSTRACT

Objective: To understand association of sleep and anxiety with pain during root canal therapy.

Methodology: Total of 500 patients were included at endodontic care in Islam Dental College, Sialkot from August - December 2020, who were seeking endodontic care at Islam Dental College, Sialkot. Responses were measured during the endodontic therapy, segregating pain into mild, moderate and severe pain. Association between sleep and anxiety with level/type of pain, considering level of significance at or below 0.05 was noticed

Results: The independent variable, anxiety, reported pain on the visual analog scale as: Mild (M = 2.01, SD = .853, n = 250), Moderate (M = 2.86, SD = .870, n = 158) and Severe (M = 3.42, SD = .952, n = 92) and sleep reported pain on the visual analog scale as: Mild (n = 250), Moderate (n = 158) and Severe (n = 92). Levene's Test for anxiety showed the variance of homogeneity, p-value = 0.007. The ANOVA was for anxiety was significant p = 0.000. Levene's test for sleep showed p-value = 0.141. The significance of ANOVA for sleep showed p = 0.680.

Conclusion: Assessment of sleep and anxiety are fundamental predictors when it comes to pain management during endodontic treatment. It is of high significance the patients should be educated and managed both in dental and life style modification perspectives. Yes, we have techniques and equipment that help achieve better pain control, but risks are associated with each. A better approach would be to focus on life style elements that will improve overall quality of endodontic care.

Keywords: Dental anxiety, Endodontic pain, Local anaesthesia, Sleep, Pain.

Cite this article as: Sana U, Noor N, Zahid N, Ahmad M, Shaikh MH, Naz S, Athar M. Anxiety and Sleep; The Compounding Impact on Endodontic Therapy . Ann Pak Inst Med Sci. SUPPL-1 (2024): 478-483. doi. 10.48036/apims.v20iSUPPL-1.928

Introduction

Anxiety has a significant potential to negatively impact one's life [1,2]. Individuals suffering from anxiety face difficulty in a number of life style matters[3]. Anxiety can also affect the quality of an individual's sleep, causing them to wake up feeling exhausted[1]. Anxiety can also impact endodontic therapy[5]. Individuals who suffer from anxiety may have a more difficult time undergoing dental procedures[2]. They may experience more pain and discomfort during the procedure[3]. Anxiety and sleep deprivation have shown to compound their impact on pain and pain control during and after endodontic therapy.[5] The relationship between anxiety and sleep is complex. Treating one can often help to manage other along with positive impact during the endodontic therapy.[5] Endodontics being a complex multi-factorial procedure, management of pain during and after endodontic therapy

remains the biggest hurdle for patients avoiding endodontic care.[6] Local anaesthesia remains the mainstay for pain control during endodontic therapy. Proprioception, anxiety and visualization of endodontic therapy as an extremely painful procedure are the factors that adds an element of fear influencing endodontic care.[6]

Patient's perception and mental health also plays a significant role during the endodontic procedure.[5] Endodontic treatment has always being perceived as a stressful and anxious experience. Anxiety and sleep deprivation have been associated with increased pain perception during endodontic therapy when it comes to pain[6]. Physical and emotional stress associated with increased anxiety and sleep deprivation are proven attributes for increased pain perception during treatment.[6,7,8] Along with other fundamental elements, the emotional well-being of the patient has significant role in pain control and outcome of endodontic treatment[9]. Pain alleviation and the preservation of natural teeth are the two main goals of restorative dentistry.[10] Sometimes, this painful sensation might be dentinal hypersensitivity.[11] Antibiotics are also prescribed by endodontists, and various decisions & factors are also taken into account prior to their prescription.[12-14] Nowadays, there is a sharp rise in the number of people suffering from anxiety.[15]

Focusing on the fundamental elements like sleep, anxiety and pain formulate the major generators of heightened pain perception among endodontic patients.[6] Our rational was to understand the relationship between sleep deprivation, pain and anxiety, its compounding impact on endodontic therapy.

Methodology

Five hundred patients were included, August -December 2020, who were seeking endodontic care in Islam Dental College, Sialkot, after the ethical approval from institution. Anxiety and sleep were documented by the number sleep hours that the patient's communicated. Pain perception was documented using the numeric pain scale. All patients seeking endodontic care during the said time period were included in this descriptive cross sectional study.

Modified Dental Anxiety Scale (MDAS) was used to scale the anxiety levels. Where 0 =non-anxious and 4=extremely anxious16. Patient's anxiety according to MDAS was recorded as, 0-10 = Mildly anxious, 11-20 = Moderately anxious, 21-30 = Severely anxious and 31-40 = extremely anxious patients. The number of sleep hours was documented based upon the average number of sleep hours that the patients were able to recall and document, after taking informed consent from the patients.

Patient's subjective response was documented using the visual analogue scale (VAS), where 10-30mm represented mild pain, 31-60mm represented moderate pain while 70-100 represented severe pain.[17] Responses were measured during the endodontic therapy, segregating pain into mild, moderate and severe pain. ANOVA test was used for data analysis. Association between sleep and anxiety with level/type of pain, considering level of significance at or below 0.05 was noticed. Descriptive statistics i.e frequencies and percentages were described in the form of graphs, tables.

Results

The results were assessed using the one-way ANOVA. Visual analogue scale was used. Frequency of Anxiety Scale is shown in table I.

Table I: Frequency of Anxiety Scale.

	N	%	Valid Percent	Cumulative Percent
mild-anxious (0-10)	86	17.2	17.2	17.2
moderate anxious (11-20)	180	36.0	36.0	53.2
severe anxious (21-30)	112	22.4	22.4	75.6
extremely anxious (31-40)	122	24.4	24.4	100.0
Total	500	100.0	100.0	

More than half of the patients enjoyed less than 6 hours of sleep, whereas 47.2% patients have a good sleep of more than 7 hours. Numeric pain scales are shown in table II.

Table II: Frequency of Pain Visual Analog Scale.

	N	%	Valid Percent	Cumulative Percent
mild pain (1-3)	250	50.0	50.0	50.0
moderate pain (4-6)	158	31.6	31.6	81.6
severe pain (7-10)	92	18.4	18.4	100.0
Total	500	100.0	100.0	

Table III: One-way ANOVA.

		Sum of Squares	df	Mean Square	F	Sig.
Anxiety	Between Groups	157.832	2	78.916	102.575	.000
	Within Groups	382.368	497	.769		
	Total	540.200	499			
Sleep	Between Groups	.194	2	.097	.387	.680
	Within Groups	124.414	497	.250		
	Total	124.608	499			

Table IV: One-way ANOVA Descriptive.

		N	Mean	SD	Std. Error	95% Confidence Interval for Mean		Min	Max
						Lower Bound	Upper Bound		
Anxiety	mild pain (1-3)	250	2.01	.853	.054	1.91	2.12	1	4
	moderate pain (4-6)	158	2.86	.870	.069	2.72	3.00	1	4
	severe pain (7-10)	92	3.42	.952	.099	3.23	3.62	1	4
	Total	500	2.54	1.040	.047	2.45	2.63	1	4
Sleep	mild pain (1-3)	250	1.49	.501	.032	1.43	1.55	1	2
	moderate pain (4-6)	158	1.47	.501	.040	1.39	1.55	1	2
	severe pain (7-10)	92	1.43	.498	.052	1.33	1.54	1	2
	Total	500	1.47	.500	.022	1.43	1.52	1	2

The ANOVA for anxiety was significant (p-value= 0.000), as shown in table III.

Table IV shows the one-way ANOVA descriptive analysis. Levene's Test for anxiety showed the variance of homogeneity, where p-value = 0.007 whereas, the statistical significance of sleep on pain control in endodontic therapy pain control was not established, p-value =0.141 (Table V). Figure 1 shows the anxiety levels of the patients. Figure 2 shows the numeric pain scale.

Table V: Test of Homogeneity of Variance

	Levene Statistic	df1	df2	Sig.
Anxiety	5.005	2	497	.007
Sleep	1.964	2	497	.141

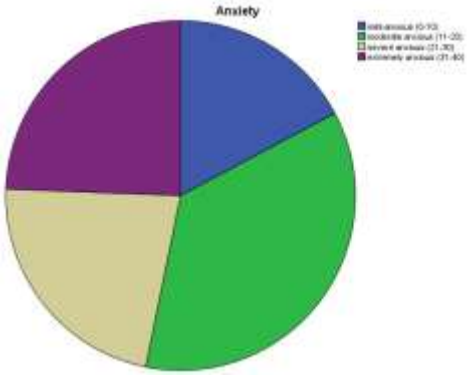

Figure 1. Pie chart representing the anxiety levels.

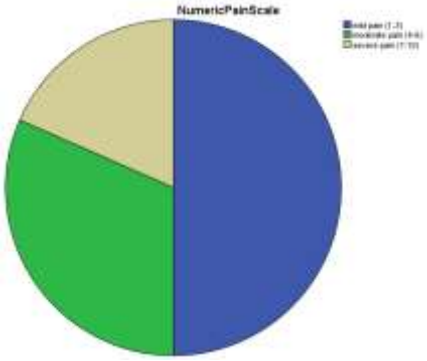

Figure 2. Pie chart representing the Numeric pain scale.

Discussion

The outcome of this study provided an insight on the relationship of anxiety and sleep on pain control during endodontic therapy. Anxiety and sleep were found to have significant impact on pain control during endodontic therapy.[1] Our study correlated a strong correlation of pain control during endodontic therapy while considering sleep and anxiety. Primarily educating professionals on the significance of sleep and anxiety management during endodontic therapy, secondarily educating and coaching patients on lifestyle elements among which sleep and anxiety are core elements that have significant impact on pain control during endodontic therapy.[16] The analysis supports the philosophy that where lifestyle elements have significant role in other aspect of life endodontic therapy is no exception.[17,18] The results suggest that incorporating fundamental life style elements like sleep and anxiety management can improve patient compliance and treatment outcome in endodontics.[1]

Nowadays, it is recognized that maintaining good dental health is crucial to maintaining overall physical health.[19] Ultimate loss of the dentition creates many problems for patients.[10] Knowledge & behaviour play major role in preserving the healthy teeth.[20]

Identifying the correlation between pain, sleep and anxiety during endodontic therapy will have profound effect in the ensuring positive treatment outcome.[1,3,5] Significant amount of research can be found discussing factors and attribute of the root canal microbiology, the instrumentation and techniques used for endodontic therapy, the irrigants used, intra-canal medicaments the sealer used and the choice of restorative materials.[21-23] No doubt that endodontic treatment and the armamentarium used has advanced and evolved significantly, but we need not overlook the fundamental elements associated with patients' health and wellbeing. [23] Sleep and anxiety have been proven to be among the fundamental elements of lifestyle and these elements have a significant role in pain control during endodontic therapy.[5] In this study, mean of pain score was 2.54, which is comparable to other researches.[24,25] In our study we found a statistical significance between anxiety and pain control during endodontic therapy, while the significance of sleep and pain control was not of statistical significance. Possible

reasoning for such outcome can be related with limited amount of data set, subjective calibration of pain scale and varied pain perception. Although sleep has been found to be insignificant in this analysis, but when consider the significance of sleep and its role on overall body metabolism and regulation of the physiological systems, sleep remains a fundamental element. In fact, sleep deprivation or disturbances as a result of pain and vice versa impact the body physiology.[26]

Interpreting and analyzing the results gives us a clear picture that anxiety has a statistical significance on pain management during endodontic treatment, while the current data does shows a statistical significant relationship of pain and sleep according to Levene's test of variance for homogeneity. Hence half of our hypothesis was not proven where anxiety showed a statistical significance with pain control while the second half of the hypothesis showed no significant relationship between sleep and pain control during endodontic therapy. These results build on the exiting evidence of the role of anxiety and pain control during endodontic therapy. Dental patients may present with swelling & severe pain.[27,28] Socioeconomic status is also a predictor of a wide range of outcomes over the course of a person's life, including their physical and psychological health.[29] Non-invasive and safe treatment modalities should be adopted; we emphasize the significance of public health initiatives as well.[30-32]

Generalizing the data may not be a smart choice until further extensive studies may be conducted to ensure the association of anxiety, sleep and pain control during endodontic therapy. Our findings reveals partial significance of pain control when considering anxiety and pain control, while the relation of sleep and pain control in endodontic therapy has shown little statistical significance.

The limitation of this study was that our sample size was limited and it will require a larger data set to make the implications generalized. Second important factor to consider is that as the responses collected had subjective influence and it may not be a true representation of the actual situation. However, increasing the number of patients and larger data set may help us generalize our results and its implications in dentistry. Secondly larger data will be used for data analytics and artificial intelligence. This holds a promising future both in data science and dentistry.

Conclusion

Anxiety is a condition that can have a significant impact on most aspects of one's life, including their sleep patterns and their dental health. While anxiety can cause a person to experience difficulty sleeping, it can also affect their dental health in a number of ways. For instance, anxiety can lead to apprehension and compromised endodontic care during and after therapy. Therefore, coaching patients not only on improving their oral hygiene but also their life style elements like anxiety and sleep can have positive outcome when it comes to endodontic care.

References

1. Shannon S, Lewis N, Lee H, Hughes S. Cannabidiol in Anxiety and Sleep: A Large Case Series. Perm J. 2019; 23:18-041. https://doi.org/10.7812/TPP/18-041
2. Nagendrababu V, Pulikkotil SJ, Suresh A, Veettil SK, Bhatia S, Setzer FC. Efficacy of local anaesthetic solutions on the success of inferior alveolar nerve block in patients with irreversible pulpitis: a systematic review and network meta-analysis of randomized clinical trials. Int Endod J. 2019; 52:779-789. https://doi.org/10.1111/iej.13072
3. Ahmad AH, Zakaria R. Pain in times of stress. Malays J Med Sci2015; 22:52-61.
4. Lauriola, M, Tomai, M, Palma R. Intolerance of uncertainty and anxiety-related dispositions predict pain during upper endoscopy. Frontiers in Psychology 2019; 10: 1112. https://doi.org/10.3389/fpsyg.2019.01112
5. Dou L, Vanschaayk MM, Zhang Y, Fu X, Ji P, Yang D. The prevalence of dental anxiety and its association with pain and other variables among adult patients with irreversible pulpitis. BMC Oral Health. 2018 Jun 7;18(1):101. https://doi.org/10.1186/s12903-018-0563-x
6. Khan AA, Diogenes A. Pharmacological Management of Acute Endodontic Pain. Drugs. 2021 Sep;81(14):1627-1643. https://doi.org/10.1007/s40265-021-01564-4
7. Angelo Z, Polyvios C. Alternative practices of achieving anaesthesia for dental procedures: a review. J Dent Anesth Pain Med. 2018;18: 79-88. https://doi.org/10.17245/jdapm.2018.18.2.79
8. Locker D, Shapiro D, Liddell A. Negative dental experiences and their relationship to dental anxiety. Community Dent Health. 1996; 63:86-92.
9. Guzeldemir E,Toygar HU,Cilasun U.Pain perception and anxiety during scaling in periodontally healthy

subjects.J Periodontol. 2008;79:2247-55. https://doi.org/10.1902/jop.2008.080152
10. Mansoor A, Mansoor E, Sana A, Javaid MM, Khan AS, Hussain K. Physiological and socio-economic satisfaction level of patients for acrylic and cast alloy dentures. Pak J Physiol. 2023; 19 (4): 6-10 https://doi.org/10.69656/pjp.v19i4.1584
11. Mansoor A, Mansoor E, Sana A, Javaid MM, Asghar MS, Hussain K. Active role of potassium nitrate toothpaste for treating dentine hypersensitivity and maintaining their normal physiology. Pak J Physiol. 2023 Sep 30;19(3):39-42. https://doi.org/10.69656/pjp.v19i3.1582
12. Jawa ZA, Jawa LA, Jamil M, Sajid M, Javaid MM. Knowledge of antibiotic prescription for endodontic treatment in final year students and house officers. Pakistan J Public Health. 2018 May 16;8(1):18-21. https://doi.org/10.32413/pjph.v8i1.84
13. Basharat S, Kumar R, Mushtaq M, Mohsin M. Understanding regarding antibiotic resistance among health care professionals in government sector of tehsil Gujar Khan. Pakistan J Public Health. 2019; 9(3):144-8. https://doi.org/10.32413/pjph.v9i3.361
14. Ali M, Rasheed D, Irshad HH, Jamil M, Javaid MM, Sajid M. Knowledge Regarding Prescription of Antibiotic for Endodontic Treatment among House Officers of Multan. J Pak Dent Assoc. 2023;32(2):54-9. https://doi.org/10.25301/JPDA.322.55
15. Baqi A, Shaikh SP, Zia MS, Javaid MM, Malik MS, Zia Q. Determinants of Anxiety in Amputees Owed to Traumatic & Non-Traumatic Causes in Quetta. Ann Pak Inst Med Sci.. 2022 Sep 11;18(3):175-80. https://doi.org/10.48036/apims.v18i3.671
16. Stamos A, Drum M, Reader A, Nusstein J, Fowler S, Beck M. An Evaluation of Ibuprofen Versus Ibuprofen/Acetaminophen for Postoperative Endodontic Pain in Patients with Symptomatic Irreversible Pulpitis and Symptomatic Apical Periodontitis. Anesth Prog. 2019 Winter;66(4):192-201. https://doi.org/10.2344/anpr-66-03-06
17. Mills SEE, Nicolson KP, Smith BH. Chronic pain: a review of its epidemiology and associated factors in population-based studies. Br J Anaesth. 2019 Aug;123(2): e273-e283. https://doi.org/10.1016/j.bja.2019.03.023
18. Chimenti RL, Frey-Law LA, Sluka KA. A Mechanism-Based Approach to Physical Therapist Management of Pain. Phys Ther. 2018 May 1;98(5):302-314. https://doi.org/10.1093/ptj/pzy030
19. Habib MF, Mahmood H, Khan J, Mahmood Y, Javaid MM, Imtiaz N et al. Effectiveness of proper brushing technique based on repetition and reinforcement on the oral health status of school children a quasi-experimental interventional design. JPTCP. 2023 Oct 16;30(18):602-9. https://doi.org/10.53555/jptcp.v30i18.3044
20. Ashar T, Shakoor A, Sajid M, Zafar R, Javaid M, Afzal J. Parent's Knowledge and Awareness in Maintaining their Children's Oral Health: A Cross Sectional Survey. Pak J Public Health. 2020;10(4):226-30. https://doi.org/10.32413/pjph.v10i4.516
21. Yamaguchi M, Noiri Y, Itoh Y, Komichi S, Yagi K, Uemura R, Naruse H, Matsui S, Kuriki N, Hayashi M, Ebisu S. Factors that cause endodontic failures in general practices in Japan. BMC Oral Health. 2018 ;18(1):70. https://doi.org/10.1186/s12903-018-0530-6
22. Chen YT, Hsu TY, Liu H, Chogle S. Factors Related to the Outcomes of Cracked Teeth after Endodontic Treatment. J Endod. 2021 Feb;47(2):215-220. https://doi.org/10.1016/j.joen.2020.11.024
23. Neelakantan P, Romero M, Vera J, Daood U, Khan AU, Yan A, Cheung GSP. Biofilms in Endodontics-Current Status and Future Directions. Int J Mol Sci. 2017 Aug 11;18(8):1748. https://doi.org/10.3390/ijms18081748
24. Noor N, Azhar R, Sartaj R, Mujtaba H, Humayoun S, Javaid MM et al. Severity of Post Obturation Pain in Single Versus Multiple Sittings Endodontic Treatment Using Rotary Nickle Titanium Instruments. Ann Pak Inst Med Sci. 2023;19(3):220-4. https://doi.org/10.48036/apims.v19i3.764
25. Noor N, Mujtaba H, Humayoun S, Umer MF, Javaid MM, Rehman A. Comparison of Endodontic Pain observed with Sodium Hypochloride, Hydrogen peroxide and Norman Saline based Root canal irrigants. Ann Pak Inst Med Sci. 2022;18(1):3-8. https://doi.org/10.48036/apims.v18i1.634
26. Li MT, Robinson CL, Ruan QZ, Surapaneni S, Southerland W. The influence of sleep disturbance on chronic pain. Current Pain and Headache Reports. 2022 Oct;26(10):795-804. https://doi.org/10.1007/s11916-022-01074-2
27. Jehan R, Mujtaba H, Noor N, Shoaib M, Noor A, Afzal J et al. Root resorption in ameloblastoma: a radiographic analysis of 35 cases. Biomedica. 2022;38(1):18-22. https://doi.org/10.51441/BioMedica/5-647
28. Ahmad M, Noor A, Noreen R, Sajid M, Jamil M, Javaid M. Comparison of 0.5 mg dexamethasone and placebo used as premedication for success of inferior alveolar nerve block. Pak Oral Dent J. 2021 Sep 29;41(3):148-51.
29. Javaid MM, Tariq MA, Sajid M, Uraneb S, Zia Q, Umer MF, Abbasi MM. Impact of Socioeconomic Status and Duration of HIV/AIDS on Scarcity of Vitamin-D among

HIV Infected Patients. Pak J Public Health. 2023 Jun 30;13(2):84-7. https://doi.org/10.32413/pjph.v13i2.1184

30. Hassan M, Batool I, Mujtaba H, Abid U, Javaid MM. Vitamin D levels have a potential role in predicting the disease severity in COVID-19 positive pediatric patients. Biomedica. 2023 Dec 3;39(1):33-7. https://doi.org/10.24911/BioMedica/5-880
31. Mansoor A, Mansoor E, Sana A, Javaid MM, Hussain K. Vaccination Status of Hepatitis-B Among Dental Patients Visiting a Public Health Sector of Islamabad. Ann Pak Inst Med Sci. 2023; 19(3):356-360. https://doi.org/10.48036/apims.v19i3.929
32. Ullah A, Pervez N, Javaid MM, Din SU, Liaqat S, Junaid M. Assessment of the Influence of Risk Factors on the Incidence of Oral Squamous Cell Carcinoma (OSCC) in the Northern Pakistani Population. Pak J Public Health. 2023 Jun 30;13(2):80-3. https://doi.org/10.32413/pjph.v13i2.1162