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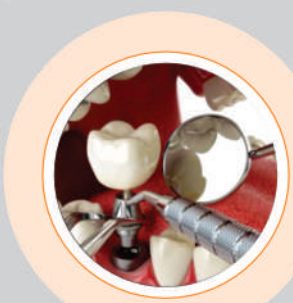


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Journal of MaxilloFacial Science and Research (JMFSR, ISSN 2348-9030) is the official publication of the PMS College of Dental Science and Research. The journal started with the aim of providing our students and faculty a platform to showcase their research projects and interesting clinical cases. We also accept articles from outside the institution on topics related to all the dental specialities and related sciences. Authors are encouraged to submit research papers, case reports (new / interesting / rare cases/ cases with clinical significance and interdisciplinary cases), and short communications. Special effort is made to ensure rapid publication. Articles written in English alone will be accepted provided they have not been and will not be published elsewhere. The editor and or its publisher cannot be held responsible for errors or for any consequences arising from the use of the information contained in this journal. The appearance of advertising or product information in the various sections in the journal does not constitute an endorsement or approval by the journal and or its publisher of the quality or value of the said product or of claims made for it by its manufacturer.

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A VISION FULFILLED

The grace of God Almighty is best reflected in parents with integrity and children who strive hard to realize their dreams. The late Sri P. M. Shahul Hameed B.A (1920-1995) gave his children the best gift in life, quality education, at a time when few realized the wonders that education could work in the lives of men and women. The PMS College of Dental Science and Research is a monument to the memory of that great soul. College was established in 2002 under the able guidance of Dr. P.S. Thaha, a visionary with over three decades of experience in dental education and patient care in India and abroad. This college is the first self- financing dental institution in Kerala State, the first to achieve the ISO 9001-2000 certification and NAAC accreditation among dental colleges in Kerala. In addition to undergraduate and postgraduate courses, college is currently conducting PhD programs in six different specialities of dentistry recognized by Kerala University of Health Sciences .The college provides an excellent environment for students as well as faculty in developing knowledge, clinical skills and attaining academic excellence. PMS college has been granted the prestigious 2(f) Status by University Grants Commission.

BEYOND PIXELS: HARNESSING AI FOR THE FUTURE OF DENTAL RADIOLOGY

Dental radiography is essential for diagnosis and treatment planning in dentistry. From early intraoral films to advanced cone-beam computed tomography (CBCT), imaging has steadily enhanced our understanding of oral and maxillofacial structures. Artificial intelligence (AI) is the ability of a machine to mimic human behaviour and intelligence to carry out particular tasks[1]. AI is increasingly being integrated into various medical fields, offering significant advancements in diagnostics, treatment planning, and patient management. Today, AI is taking us beyond pixels-transforming static images into intelligent, data-driven insights.

One of the most promising AI technologies used in dental radiology is based on convolutional neural networks (CNNs).[2] They have demonstrated accuracy comparable to that of experts in detecting caries, periodontal bone loss, and periapical pathology. AI has also been applied to measure alveolar bone levels and evaluate bone quality for implant planning[3].

AI's impact extends to workflow efficiency. AI applications in dental radiology include image analysis and processing, automated detection of dental anomalies, diagnosis and classification of dental diseases, automated image segmentation and reconstruction, landmark detection, and report generation.[1] These innovations promise faster, more consistent, and more accessible radiology services with radiation dose reduction.[1]

Artificial intelligence fundamentally operates by learning from the data it collects; the larger and more diverse the dataset, the more accurate its predictions become. While big data has fueled AI's growth, human intuition still holds an irreplaceable edge. Nonetheless, the potential of AI in dental radiology is vast. With advances in data acquisition and stronger collaboration among dental professionals, AI is poised to deliver unprecedented diagnostic accuracy, enabling earlier detection of oral diseases and more efficient treatment planning.[1-3]

The implementation of AI must be guided by regulatory frameworks and robust privacy protections. Equally essential is the active involvement of radiologists, who should remain integrated in the feedback loop-validating outputs and addressing errors to ensure continuous system improvement.

AI promises to enhance diagnostic abilities as well as provide individualized patient care and effective practice management as it develops further.

REFERENCES

1. Putra RH, Doi C, Yoda N, et al. Current applications and development of artificial intelligence for digital dental radiography. Dentomaxillofac Radiol 2022;51:20210197.
2. Negi S, Mathur A, Tripathy S, et al. Artificial intelligence in dental caries diagnosis and detection: an umbrella review. Clin Exp Dent Res 2024;10:e70004.
3. Kolarkodi SH, Alotaibi KZ. Artificial intelligence in diagnosis of oral diseases: a systematic review. J Contemp Dent Pract 2023;24:61–68.

Dr. Aswathy K. Vijayan
Issue Editor

Dental Anxiety and Its Impact on Oral Health Care Seeking Behavior Among Adults in Kerala: A Cross-Sectional Study

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ABSTRACT

Background

Oral health is often neglected in public health initiatives, especially in low and middle-income countries like India, despite its critical role in overall wellbeing. In Kerala, untreated dental caries and periodontal diseases remain highly prevalent, with evidence suggesting that dental anxiety contributes significantly to the delay or avoidance of oral health care seeking behavior.

Objective

To assess the relationship between dental anxiety and oral health care seeking behavior among adults in Kerala, India.

Methodology

This cross-sectional study included 237 adults aged 18–45 years from Kerala, using a structured, self-administered questionnaire comprising three sections: demographics, the Modified Dental Anxiety Scale, and an oral health care seeking behavior proforma. The mean dental anxiety score was used to categorize participants into high and low anxiety groups. Data was analyzed using SPSS trial version 25; associations between anxiety and health-seeking behaviors were assessed using the Chi-square test and Pearson correlation.

Results

Among participants, 57.6% were male, and the mean age was 38.8 ± 14.5 years. The mean MDAS score was 8.6 (range: 5–16), with 51.1% classified as having low dental anxiety. While 91.8% had visited a dentist at least once, 65.1% visited the dentist only when experiencing pain, indicating primarily reactive health-seeking behavior. High anxiety was linked to greater avoidance of care (25% reported often or sometimes avoiding dental visits due to fear). A moderate positive correlation(r=0.6) was observed between dental anxiety and delayed care seeking, though it did not reach statistical significance.

Conclusion

Dental anxiety is prevalent and moderately associated with delays in seeking oral health care in Kerala. Multifaceted, context-specific interventions targeting psychological barriers are essential to improve preventive dental attendance and oral health outcomes.

Keywords: Oral health care seeking, behaviour, dental anxiety, dental treatment

INTRODUCTION

Though oral health is an integral component of overall wellbeing, it is often neglected in clinical practice as well as in public health policies particularly in low and middle income countries like India.[1] Despite a relatively strong public health system in Kerala, the state continues to face a significant burden of untreated dental caries and periodontal diseases primarily due to delayed or irregular oral health seeking behavior.[2] Studies have shown that the prevalence of dental caries among children in Kerala range from 37% to 69% while periodontal

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diseases among adults are also widespread, but unreported due to poor utilization of dental services.[3]

Even in this digital era, primary level oral health care access in rural areas is still a challenge, highlighting the existing widespread urban-rural disparities. Community level studies have shown people often seek dental treatment only when pain becomes severe, indicating poor preventive behavior.[4] Studies all over the world have shown that psychological barriers especially dental anxiety play a key role in care avoidance.[4-7]

Dental anxiety is defined as an emotional reaction to dental treatment ranging from uneasiness to severe fear or phobia. It is recognized as a major public health problem affecting 20-50 % of adults globally.[8] Various studies have proven that previous painful experiences are significantly associated with higher anxiety scores.[9,10] A study from South India also found that nearly 50% of participants delayed dental visits due to fear and those with higher anxiety had significantly more decayed or missing teeth.[10] This sheds light on the relationship of dental anxiety with dental health.

This study aims to assess the relationship between dental anxiety and oral health seeking behavior in a population sample from Kerala, using a structured questionnaire including Modified Dental Anxiety Scale (MDAS) and oral health care seeking behavior proforma. Hence this study intends to provide insights into how psychological factors impact utilization of dental services. Understanding this dynamic is essential for designing community specific interventions targeting on reducing anxiety related delays and improving dental attendance in both urban and rural areas.

METHODOLOGY

This cross-sectional study was conducted among adults aged between 18-45 years in Kerala, the southernmost part of India. Data collection was done using a questionnaire, designed using Kobo toolbox. The questionnaire comprised of three sections. The first section involved 5 questions on the demographic characteristics of the participants. The second section dealt with five items on MDAS for assessing dental anxiety and the third section comprised of a proforma for oral health care seeking behavior. The proforma was designed after a thorough literature search and consultation with experts. The oral health care seeking behavior proforma had 12 questions reflecting on the dental visits, reasons for the last visit, accessibility to dental services, expenses incurred during dental visits, and the favorable factors for dental visits. MDAS is a brief self-administered questionnaire comprising of 5 questions with a minimum score of 5 and maximum of 25. The psychometric property of this scale favors its routine use in dental practice and can be easily compared across major demographic characteristics of age and gender.

Sample size for this study was obtained using Cochran's sample size estimation formula where proportion of people who sought care from dentist was found to be 68%, with a relative precision of 10%, and standard normal variate at 95% CI. The minimum sample size was found to be 192, rounded off to 200. The sampling strategy employed was convenient sampling, as the online questionnaire was administered to only those whose contact details were readily available. Reminders were sent at

an interval of 2 weeks. Those who failed to respond even after 6 repeated reminders were excluded from the study. Further, incomplete questionnaires were also excluded.

All the ethical principles were followed in the study. The participants were given the right to voluntary participation. They were free to withdraw from the study at any point. Confidentiality was given and they were assured that their identity will not be revealed in any publication or dissemination related to this study.

Data obtained in Kobo tool box was downloaded and imported to Microsoft excel and analyzed using SPSS (Statistical Product and Service Solution, IBM statistics, Chicago, trial version 25.) The quantitative variables were expressed as mean and standard deviation. The qualitative variables were expressed in proportions. The anxiety graded high, and low was compared with the oral health care seeking behavior using Chi-square test. The anxiety scores were correlated with oral health care seeking behavior scores using Pearson correlation test.

RESULTS

Two hundred and thirty-seven responded to all questions on the MDAS scale and questions regarding oral health care seeking behavior.

The study population included all individuals aged above 18 years who expressed their consent in being a part of this study. The mean age of the study participants was found to be 38.81±14.46. A slight predilection to male gender was seen in this study, with males constituting 57.6%. As color of the ration card indicates the socioeconomic status of individual in Kerala, we included that variable and 50% were having white ration card. 63.6% of our study participants were married.

DENTAL ANXIETY LEVEL

The mean dental anxiety score was found to be 8.6. Minimum anxiety score was 5 and maximum 16. Median was 7. Any score above median is considered as high anxiety. Low level of anxiety was shown by 121(51.1%) of individuals. The individual responses to items in MDAS are shown in Table1

Table 1: Individual responses to items in MDAS

Scale items	Very anxious	Fairly anxious	Slightly anxious	Not anxious
Visit to dentist tomorrow	10 (4.5)	19 (8.6)	73 (33.2)	118 (53.6)
Having your teeth examined	10 (4.5)	33 (14.9)	59 (26.7)	119 (53.8)
Having a tooth drilled	48 (21.9)	39 (17.8)	71 (32.4)	61 (27.9)
Getting local anaesthetic injection in your gums	45 (20.5)	47 (21.5)	62 (28.3)	65 (29.7)
Waiting in the dentist's waiting room	8 (3.04)	29 (11.03)	113 (42.97)	113 (42.97)

Oral health care seeking behaviour

Oral health care seeking behavior was assessed through 12 items. 91.8% of the study participants have visited the dentist at least once in their lifetime. 20.1% visited the dentist once a year, 10% once in 6 months and a large majority of study participants (65.1%) visited dentist only when they experienced pain. Sixty-seven (25%) of the study participants said that they have often or sometimes avoided going to dentist due to fear of dental procedures and

environment. The various reasons for visiting the dentist included pain due to decay (40.1%), routine checkup (21.9%), malodor (18.2%), gingival issues (4.8%), hypersensitivity(4.1%), food lodgement (4.1%), and other reasons(5%).

Only 19% sought oral health care from Government dental care centers. Accessible dental health care services(within 5 Kms from their place of stay) was available to 62.1%. Even after seeking help from dental health care facility, 37.1% were not relieved from dental pain or other suffering. Only 12.3% had spent more than 5000 rupees during their last dental visit. 54.6% immediately visited the dentist when dental pain occurred, while 23.4% waited for the pain to go away. 17.1% informed the parents or guardians regarding the pain but they delayed dental visit. When 37.5% were encouraged by parents or guardians to visit dentist, 40.5% did not receive any encouragement on dental visit.

30.1% reported that friendly dental staff will make the dental visit less scary. Other reported reasons for making the dental visit less scary were pain free procedure (8.1), providing prior information about what will happen in the clinic (7.9), and music or entertainment during the procedure (1.9%). Others were not at all scared of the dental procedures.

69.5% reported that better explanations, and reassurance from staff will make them feel more comfortable in the clinic. Table 2 shows a few responses of individual items from oral health care seeking behavior proforma.

Table 2: A few important responses of individuals regarding Oral health care seeking behavior

Oral health care seeking items	N(%)
Ever visited dentist	247(91.8)
Visiting the dentist only when in pain	175(65.1)
Often avoided the dentist because of fear	67(25)
Never avoided the dentist as I was afraid	160(59.5)
Last visit- pain due to decay alone	108(40.1)
Last visit- routine check up	59(21.9)
Sought care from private dental care centres	214(79.6)
>5 km distance to the dental clinic	102(37.9)
Very much relieved after sought dental care	167(62.1)
Expenditure in the range of 1000-5000 during last dental visit	103(38.3)
Immediately visiting dentist when tooth pain occurs	147(54.6)
Waiting for the pain to go away on its own	63(23.4)
Not encouraged by anyone to visit the dentist	109(40.5)
Encouraged by parents or guardians	101(37.5)

Relationship between anxiety and oral health care seeking behavior

A moderate positive correlation (r=0.6) was seen with anxiety score and oral health care non-seeking score using Pearson correlation, but not statistically significant. Further the study could not show any significant association of anxiety with sociodemographic factors or oral health care seeking behavior.

DISCUSSION

The rationale for this study stems from the persistent issue of poor dental care utilization in Kerala, a pattern mirrored across much of India and other low- and middle-income countries. Societal and psychological factors, particularly dental anxiety, are well-documented causes of treatment avoidance, resulting in the exacerbation of diseases that could

otherwise be prevented or managed at earlier stages. Kerala reports high rates of dental caries (projected between 37% and 69% among children) and periodontal disease among adults.[11] Fear-driven avoidance is often overlooked in public health strategies. Therefore, elucidating the relationship between dental anxiety and health-seeking behavior addresses a gap, with potential for targeted intervention design

A significant proportion (91.8%) reported at least one lifetime dental visit, but 65.1% sought care only after experiencing pain, a clear indicator of reactive rather than preventive health care seeking.

The mean dental anxiety score was 8.6, with 51.1% classified as having low anxiety and the rest moderate or high. High anxiety strongly influenced avoidance behavior: 25% had often or sometimes avoided dental care due to fear. Only 19% utilized government dental services, despite generally easier access in Kerala. Reduced utilization of government health care services in this study can be attributed to the accessibility to private dental care services and affordability as more than 50% of the study participants belong to above poverty line. Moderately positive correlation (r=0.6) was identified between anxiety scores and delayed health care seeking, though not statistically significant in this sample. Psychological factors (such as reassurance by dental staff) and clinical environment were important in making visits less intimidating.

Several studies from South India and other regions have validated the high prevalence of dental anxiety as a barrier to routine dental attendance. An epidemiological study among young Indian adults found that 85% were anxious about dental treatment and that higher anxiety was tightly linked to irregular dental visits and avoidance.[12] Globally, the prevalence of dental anxiety ranges from 10-50% in adults, with women commonly reporting higher levels than men.[13]

In line with the present study, the most anxiety- provoking dental situations are "drilling" and receiving an "injection," consistent across diverse populations. Many Indian studies find that dental anxiety leads to a pattern of symptomatic attendance (pain- driven visits), which correlates with poorer oral health outcomes and increased disease burden.[11,13-17] A Kerala-specific study similarly identified anxiety as associated with higher rates of caries, more missing teeth, and less preventive care, highlighting a consistent pattern across multiple populations in the state.[16]

Systematic reviews estimate the global prevalence of severe dental anxiety in adults at 3-21%, with avoidance of necessary dental care a consistent outcome.[16.17] Consistency is observed in the types of anxieties (fear of local anesthesia, drilling) and the resultant health-seeking delays.[17] Despite slight regional variations, the relationship between psychological barriers and oral health service utilization is well-documented internationally, supporting the validity of this study's findings.

The study used a validated, psychometrically robust tool (MDAS) to assess anxiety, permitting comparability with another research. Inclusion of a diverse adult sample with both genders and a range of ages increased the external validity. The design incorporated both quantitative and qualitative methodology through open ended questions, allowing for comprehensive analysis of both behavioral patterns and their determinants. By

specifically studying the Kerala population, the data provides regional specificity, which supports tailoring interventions for more effective public health impact.

Limitations of the study include being a cross-sectional study, causal relationships between anxiety and dental attendance cannot be directly established; the observed moderate correlation does not signify directionality or temporality.

Reliance on self-reported data and convenient sampling introduces potential for recall, reporting, and selection biases; non-responders and those more fearful may be underrepresented. Exclusion of individuals unreachable after repeated reminders and incomplete questionnaires might have led to sampling bias, potentially underestimating the effect of anxiety in the most fearful subgroups. Lack of statistical significance in the association between anxiety and oral health seeking may reflect small sample size, inadequate representation of people of all ages and socioeconomic status, and limited power. The sample was drawn from those with internet access and willingness to participate, limiting generalizability to less-connected rural populations.

CONCLUSION

This study contributes local evidence to the global understanding of dental anxiety as a critical factor hindering timely oral health care seeking. Despite some methodological limitations, the findings support a growing consensus that multifaceted, contextually relevant approaches are essential to reduce anxiety, encourage preventive dental visits, and ultimately improve oral health outcomes in Kerala and similar settings. The urgent need for intervention research and health policy change is vividly highlighted by these results.

WAY FORWARD

Future research should focus on longitudinal and interventional designs, which could better elucidate causal pathways and evaluate the effectiveness of strategies aimed at reducing dental anxiety. Broader, randomly selected community- based samples, including participants from underrepresented, lower-income, and rural areas are required to improve external validity. Qualitative investigations are needed to further explore the subtleties of psychological barriers, including socio-cultural beliefs and familial influences, which emerged as influential factors in this study. Development and rigorous assessment of targeted behavioral interventions (such as desensitization, patient education, staff training, and clinical environment modifications), especially those that are scalable in the public health context are essential. Integration of mental health awareness and motivational enhancement techniques into routine dental care, supported by public health campaigns to normalize preventive dental attendance should be implemented. Policy advocacy for better integration of psychological assessment into routine dental check-ups and expanding access to dental services in underserved areas is also recommended.

REFERENCES

1. World Health Organization. Oral health . Geneva: World Health Organization; 2025 [cited 2025 Aug 8]. Available from: https://www.who.int/health-topics/oral-health
2. Das UM, Vadakkekuttical RJ, Kanakkath H, Shankunni SP. Dental health awareness, attitude, and dental health-care seeking practices as risk indicators for the prevalence of periodontal disease among 15-17-year-old school children

in Kozhikode district, Kerala, India. J Indian Soc Periodontology. 2017;21(2):144-151.

3. Ramanarayanan V, Janakiram C, Joseph J, Krishnakumar K. Oral health care system analysis: A case study from India. J Fam Med Prim Care. 2020;9(4):1950-1957.
4. National Institute of Dental and Craniofacial Research. Effect of oral health on the community, overall well-being, and the economy.: Oral Health in America: Advances and Challenges. Bethesda (MD): NIDCR; 2021 [cited 2025 Aug 8]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK578297/
5. Saheer A, Majid SA, Raajendran J, Chithra P, Chandran T, Mathew RA. Effect of dental anxiety on oral health among first-time dental visitors: A hospital-based study. J Pharm Bioallied Sci. 2022;14(Suppl 1):S394-S398.
6. Winkler CH, Bjelopavlovic M, Lehmann KM, Petrowski K, Irmscher L, Berth H. Impact of dental anxiety on dental care routine and oral-health-related quality of life in a German adult population: A cross-sectional study. J Clin Med. 2023;12(16):5291-5296.
7. Supriya, Ahsan A, Singh R. Insights about dental anxiety and oral health behaviors: Dentist's perspective in a qualitative study. J Indian Assoc Public Health Dent. 2025;23(1):26-30.
8. Armfield JM. Towards a better understanding of dental anxiety and fear: Cognitions vs. experiences. Eur J Oral Sci. 2010;118(3):259-264.
9. Kakkar M, Wahi A, Thakkar R, Vohra I, Shukla AK. Prevalence of dental anxiety in 10-14-year-old children and its implications. J Dent Anesth Pain Med. 2016;16(3):199-202.
10. Appukuttan D, Subramanian S, Tadepalli A, Damodaran LK. Dental anxiety among adults: An epidemiological study in South India. North Am J Med Sci. 2015;7(1):13-18.
11. Sidharthan S, Ramanarayanan V, Karuveettil V, Ravindran GC. Utilization of dental health services and its associated factors among adult population in Ernakulam district, Kerala, India: A mixed-method analysis. J Oral Bio Craniofacial Res. 2024;14(2):133-142.
12. Javaid SF, Hashim IJ, Hashim MJ, Stip E, Samad MA, Ahbabi AA. Epidemiology of anxiety disorders: Global burden and sociodemographic associations. Middle East Curr Psychiatry. 2023;30(1):44-49.
13. Singh A, Rathore M, Dubey B. Assessment of dental anxiety in a young population of a North Indian city: Lucknow. Cureus. 2024;16(11): e72977-72982.
14. Singh I, Bhat N, Kaur R, Thakur K, Nandan H, Bhardwaj N. Evaluation of factors related to dental anxiety in a North Indian population: A questionnaire study. Int J Community Med Public Health. 2020;7(6):2230-2232.
15. Parvathy K, Aleesha J, Josey M, Liza G, Vineet RV, Sinju P. Effect of dental anxiety on dental caries status among patients visiting a dental college in Kerala: A cross-sectional study. J Dent Sci Res. 2022;1(1):1-6.
16. Kisely S, Sawyer E, Siskind D, Lalloo R. The oral health of people with anxiety and depressive disorders: A systematic review and meta-analysis. J Affect Disorder. 2016;200:119-132.
17. Aardal V, Evensen KB, Willumsen T, Hervik Bull V. The complexity of dental anxiety and its association with oral health-related quality of life: An exploratory study. Eur J Oral Sci. 2023;131(1):e12907-12910.

Association between blue light exposure, sleep quality, and mental stress among dental students: a cross-sectional study

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ABSTRACT

Background

Excessive smartphone usage exposes individuals to blue light, which disrupts melatonin production, impairs sleep quality, and contributes to stress. Dental students, who already face high academic and clinical demands, may be particularly vulnerable to these effects.

Objective

To assess the association between blue light exposure from digital devices, sleep quality, and mental stress among dental students.

Methodology

A cross-sectional study was conducted among 100 dental students using a self-administered questionnaire. Data collected included demographic details, daily screen time, night-time device use, Pittsburgh Sleep Quality Index (PSQI) scores, and Perceived Stress Scale-10 (PSS-10) scores. Participants were categorized based on screen time (<2 hours, 2–4 hours, 4–6 hours, >6 hours) and presence or absence of night-time device use. Chi-square tests were applied to examine associations between screen time, night-time use, sleep quality, and stress levels, with $p < 0.05$ considered statistically significant.

Results

Among the participants, 72% reported poor sleep quality (PSQI >5) and 82% reported high stress levels (PSS-10 ≥20). Poor sleep was more prevalent with higher screen time, but the association was not statistically significant ($p = 0.277$). Night-time device use showed a slightly higher prevalence of poor sleep but was not significantly associated ($p = 0.983$). Similarly, longer daily screen time and night-time use were associated with a higher proportion of high stress, but these associations were not statistically significant ($p = 0.749$ and $p = 0.114$, respectively).

Conclusion

Although trends suggested that higher screen time and night-time device use were linked with poor sleep and high stress, no statistically significant associations were observed. Further longitudinal studies with larger samples are recommended to clarify these relationships.

Keywords

Blue light exposure, screen time, sleep quality, mental stress

INTRODUCTION

The rapid advancement of mobile technology has profoundly reshaped contemporary life, with smartphones becoming indispensable tools for education, communication, social engagement, and entertainment.[1] Among various demographic groups, young adults are the most avid users, relying on smartphones for both academic and personal purposes.[2] However, the widespread and often unregulated use of these devices has given rise to an

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emerging public health issue: smartphone addiction. This condition is marked by compulsive, excessive smartphone usage that disrupts daily activities and contributes to psychological, physiological, and social impairments—effects that frequently go unnoticed until significant health consequences surface.[1]

Beyond its cognitive and mental health implications, excessive smartphone use has been associated with visual strain, postural issues, and notably, sleep disturbances. Most electronic devices emit blue light, a short-wavelength, high-energy visible light which can suppress melatonin production and disrupt the body's circadian rhythm. Melatonin plays a crucial role in regulating sleep, and its suppression can result in delayed sleep onset and poor sleep quality. Sleep itself is essential for maintaining physical health, emotional regulation, and cognitive function.[3]

Stress, another critical variable in this context, is a complex and subjective response to perceived challenges or threats. Chronic emotional stress has been linked to anxiety, depression, and various physiological disorders, and is also known to negatively affect sleep quality.[4] Conversely, sleep deprivation can exacerbate stress levels and impair academic performance, creating a cyclical interaction between these factors.[2,5]

Although prior research has explored the interrelationship between blue light exposure, sleep quality, and psychological stress, limited studies have specifically examined this triad among dental students, a group known for experiencing high academic and clinical demands. This study aims to address this gap by investigating the association between blue light exposure, sleep quality, and stress levels among dental students in Kerala.

METHODOLOGY

This cross-sectional observational study was conducted among dental students enrolled in various dental colleges across Kerala. The study population included students from all academic years, aged between 18 and 25 years. A total sample size of 100 participants was selected using a convenience sampling technique. Given the homogeneous nature of the study population (dental students of similar age group and academic environment), a sample size of 100 provides adequate representation without risking overestimation or underestimation of effects. Inclusion criteria required participants to be regular users of digital devices such as smartphones, tablets, or laptops, and willing to provide informed consent. Students with diagnosed psychiatric or sleep disorders, those on sleep medications, or those engaged in night shifts or irregular work schedules were excluded from the study.

Data were collected using a structured, self- administered questionnaire delivered through a google form. Blue light exposure was assessed by questions related to average daily screen time, device usage before bedtime, and the use of blue light filters or night mode features. Sleep quality was measured using the standardized Pittsburgh Sleep Quality Index (PSQI), while mental stress levels were evaluated using the Perceived Stress Scale (PSS-10).[6,7]

Statistical analysis was carried out using SPSS version 25. Descriptive statistics, including frequencies, percentages, mean ± and standard deviation, were used to summarize the data. Inferential statistics included the Chi-square test to assess associations between categorical variables. A p-value of less than 0.05 was considered statistically significant.

Participation was voluntary, and all participants provided informed consent. Anonymity and confidentiality were strictly maintained, and participants were informed of their right to withdraw from the study at any stage without any consequences.

RESULT

The study included 100 students from various dental colleges in Kerala. All participants completed the questionnaire in full, resulting in a 100% response rate with no missing data.

Table 1 shows the distribution of participants based on their daily time spent on digital devices. The majority of students (42%) reported using digital devices for 4–6 hours per day. This was followed by 33% of participants who used devices for 2–4 hours daily. These findings suggest that a significant number of dental students engage in moderate to high levels of screen time on a daily basis, indicating the potential for associated health risks such as poor sleep quality and elevated stress levels.

Table 1: Time spend on digital device per day

Time spend per day	Frequency	Percentage
<2 hours	5	5%
2-4 hours	33	33%
4-6 hours	42	42%
>6 hours	20	20%

It was found that 78% of the respondents primarily used smartphones as their main digital device. When asked about the activity they spent the most time on, 59% reported using their devices mainly for social media, while only 20% indicated that studying was their primary activity. This highlights a predominant use of smartphones for non-academic purposes among the students.

The most common visual symptom due to blue screen light exposure after prolonged use was found to be headache for 28% of the participants. 31% reported to have no visual symptoms. Many reported combinations of symptoms, among which digital eyestrain was prevalent.

The most common postural symptom due to blue screen light exposure after prolonged use was reported as neck pain for 30% and backpain for 8% of the participants. 48% reported that they did not experience any postural symptoms, while the rest complained about a combination of symptoms.

According to table 2, majority (82%) of participants admitted to use their device just before sleeping, a factor likely affecting sleep quality.

Table 2: Use of device at night just before sleeping

Use of device at night just before sleeping	Frequency	Percentage
Yes	82	82
No	18	18

The participants were also asked about their awareness of blue screen light effect, to which 73% were aware which is relatively high but not necessarily associated with behavior change. When enquired whether the participants have heard about the 20-20-20 rule, only 34% knew about this eye care rule. 63% used filters or night mode, indicating some level of proactive protection.

Table 3, shows 82% had high stress levels on perceived stress scale (PSS) whereas only 18% reported moderate stress.

Table 3: Perceived Stress Scale

PSS	Frequency	Percentage
Moderate stress	18	18
High stress	82	82

Based on Pittsburgh sleep quality index (PSQI), 68%

had poor sleep quality, while only 32% reported to have good sleep as given in Table 4.

Table 4: Pittsburgh sleep quality index

PSQI	Frequency	Percentage
Good quality sleep	32	32
Poor quality sleep	68	68

Table 5 shows association between daily digital device usage time and sleep quality. While the results indicated that the proportion of students reporting poor sleep quality increased with higher screen time, the association was not statistically significant, as determined by the Chi-square test.

Table 5: Association between daily digital device usage time and sleep quality

Time spend per day	PSQI		Total	p value
	Good Quality Sleep	Poor Quality Sleep		
<2 hours	0	5	5	0.147
2-4 hours	14	19	33	
4-6 hours	14	28	42	
>6 hours	4	16	20	
Total	32	68	100	

Table 6 shows the association between night-time digital device use and sleep quality. Contrary to common assumptions that night-time usage negatively affects sleep, the Chi-square test revealed no statistically significant association between the timing of device use and sleep quality.

Table 6: Association between night-time digital device use and sleep quality

Use of device at night just before sleeping	PSQI		Total	p value
	Good Quality Sleep	Poor Quality Sleep		
Yes	27	55	82	0.672
No	5	13	18	
Total	32	68	100	

Table 7 shows the association between daily digital device usage time and stress level. While the results indicated slight variations in the proportion of students reporting high stress across different durations of daily device use, the association was not statistically significant, as determined by the Chi-square test.

Table 7: Association between daily digital device usage time and stress level

Time spend per day	PSS		Total	p value
	Moderate Stress	High Stress		
<2 hours	1	4	5	0.749
2-4 hours	6	27	33	
4-6 hours	9	33	42	
>6 hours	2	18	20	
Total	18	82	100	

Table 8 shows the association between night-time digital device use and stress level. Although the majority of students with high stress reported using devices at night just before sleeping, chi-square test revealed that this difference was not statistically significant.

Table 8: Association between night-time digital device use and stress level

Use of device at night just before sleeping	PSS		Total	p value
	Moderate Stress	High Stress		
Yes	17	65	82	0.114
No	1	17	18	
Total	18	82	100	

Table 9 shows the association between perceived stress levels and sleep quality. Poor sleep was more frequently reported among participants experiencing higher levels of stress; however, the association did not show statistical significance, as indicated by the Chi-square test.

Table 9: Association between perceived stress levels and sleep quality

PSS	PSQI		Total	p value
	Good Quality Sleep	Poor Quality Sleep		
Moderate Stress	8	10	18	0.211
High Stress	24	58	82	
Total	32	68	100	

Though none of the associations were statistically significant, there are clinically relevant patterns-high screen time, night use, and stress are all more prevalent among those with poor sleep quality.

DISCUSSION

This cross-sectional study examined the association between blue-light exposure from digital device use, sleep quality (PSQI), and perceived stress (PSS-10) among 100 dental students in Kerala. The findings revealed high daily screen use, widespread night-time device use, poor sleep quality, and elevated stress levels, although none of the associations between these factors reached statistical significance in Chi-square testing. Despite the lack of statistical significance, several clinically relevant patterns emerged that align with prior research.

A substantial proportion of participants (62%) reported using digital devices for more than 4 hours per day, with smartphones being the most common device (78%). Social media was the predominant activity (59%), surpassing academic use. These results are consistent with Rashid A et al, who found an average daily screen time of 6.3 ± 1.9 hours among university students, with 72% using their smartphones within 1 hour before bedtime.[1] In our study, 82% of participants reported night-time device use, and 68% had poor sleep quality. However, neither night-time device use (p = 0.672) nor daily usage duration (p = 0.147) was significantly associated with poor sleep quality. Similar findings were observed by Natarajan A et al, where poor sleep quality was present in 49.8% of dental students, and by Shad R et al, where 62.6% of undergraduates reported poor sleep quality.[2,8]

High perceived stress levels were prevalent in our study, with 82% scoring in the high-stress range on the PSS. Poor sleep was more common among high-stress participants, but the association was not statistically significant (p = 0.211). This pattern contrasts with findings by Triastuti NJ et al who reported lower stress prevalence (23–24%) among medical and health sciences students.[4] Our results are, however, consistent with Vidovic S et al, who documented poor sleep quality among medical students and identified depression and anxiety as predictors of PSQI scores, suggesting that negative emotions may mediate the sleep–stress relationship.[5]

Physical health complaints were also prominent. Headache (28%) was the most common visual symptom, followed by blurred vision and eye strain, while neck pain (30%) and back pain were frequent postural complaints. These are consistent with findings from Qasim MS et al, who linked prolonged device use with digital eye strain and musculoskeletal discomfort, often associated with suboptimal postures such as lying in bed or craning the neck.[9] Although 73% of participants were aware of blue-light effects and 63% used night mode or filters, continued reports of visual and sleep problems suggest that awareness does not always translate into effective behavioural change. Only 34% had heard of the 20-20-20 rule, an easy

preventive strategy for eye strain.

Physiologically, blue-light exposure in the evening suppresses melatonin and delays circadian rhythms (Silvani MI et al.), which may explain the higher proportion of poor sleepers among heavy device users.[3] Behaviourally, extended evening use can displace sleep time and increase cognitive or emotional arousal, while elevated stress itself may drive late-night device use — creating a bidirectional relationship that a cross-sectional design cannot disentangle. The lack of statistical significance in our study may be due to the relatively small sample size, high prevalence of exposure variables (limiting between-group contrasts), and self-reported measures of device use, which are prone to recall bias.

Despite these limitations, the high co-occurrence of prolonged screen time, night-time use, poor sleep, and high stress underscores the importance of preventive interventions. Educational strategies promoting sleep hygiene, limiting device use before bedtime, and ergonomic practices could help reduce both physical and psychological strain. Future studies with larger, more diverse samples, objective measures of screen time and sleep, and adjustment for confounders are warranted to clarify the causal pathways linking blue-light exposure, sleep quality, and stress among students.

STRENGTHS AND LIMITATIONS

Strengths include use of validated instruments (PSQI, PSS-10), complete data from all recruited participants (100% response), and focus on a population (dental students) with high academic and clinical demands. Limitations include convenience sampling, cross-sectional design (no causal inference), reliance on self-report for screen time and device behaviors, limited sample size that reduces power to detect modest associations.

Implications and recommendations

Despite lack of statistical significance, the clinical pattern - high prevalence of poor sleep and stress alongside substantial device use - warrants attention. Interventions that may benefit students include promoting sleep hygiene (regular sleep schedules, limiting device use 30–60 minutes before bedtime), education about blue-light effects and the 20-20-20 rule, encouraging use of night mode or blue-light filters where appropriate, and institutional strategies to reduce academic stress. Future studies should use larger, probability-sampled cohorts and longitudinal designs to examine temporal relationships and causality.

CONCLUSION

This study adds to growing evidence that high screen time, prevalent night-time device use, poor sleep quality, and elevated stress frequently co-exist among dental students. While statistical tests in this sample did not show significant associations, the observed patterns are consistent with prior literature and have important clinical and educational implications. Targeted sleep education and stress-reduction strategies merit consideration in this population.

REFERENCES

1. Rashid A, Omer SM, Ali N, Raheel A, Waheed A, Nazir N, et al. Association between smartphone addiction and sleep disturbances among university students: A cross-sectional study. J Popul Ther Clin Pharmacol. 2025; 32 (6): 801-11.
2. Natarajan A, Kanagamuthu R, Reddy M,

Sindhuja A. Assessment of influence of screen time on quality of sleep among dental students. Physiology Section. 2023; 6: 1-4.

3. Silvani MI, Werder R, Perret C. The influence of blue light on sleep, performance and wellbeing in young adults: A systematic review. Front Physiol. 2022; 13: 943108.
4. Triastuti NJ, Helgavania T. The correlation between stress, social media usage, sleep quality, and insomnia among university students: A cross-sectional study. J Med Chem Sci. 2024; 7(6): 839-50.
5. Vidovic S, Rakic N, Krastek S, Pesikan A, Degmecic D, Zibar L, et al. Sleep quality and mental health among medical students: A cross-sectional study. J Clin Med. 2025; 14(7): 2274.
6. Shahid A, Wilkinson K, Marcu S, Shapiro CM. Pittsburgh sleep quality index (PSQI). In: STOP, THAT and one hundred other sleep scales. Springer; 2012. p.279-84. doi:10.1007/978-1-4419-9893-4.
7. Roberti JW, Harrington LN, Storch EA. Further psychometric support for the 10-item version of the perceived stress scale. J Coll Couns. 2006; 9(2): 135-47.
8. Shad R, Thawani R, Goel A. Burnout and sleep quality: A cross-sectional questionnaire-based study of medical and non-medical students in India. Cureus. 2015; 7(10): e361.
9. Qasim MS, Ali Q, et al. Effects of electronic devices on vision in students age group 18-25. Ann Med Health Sci Res. 2021; 11: 1572-7.

A Comparative analysis of Cone-Beam Computed Tomography and Orthopantomography As Radiological Predictors In Assessing The Proximity Of Impacted Mandibular Third Molar Roots To The Mandibular Canal: A Pilot Study

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ABSTRACT

Background

Inferior alveolar nerve (IAN) damage is a serious complication of mandibular third molar removal surgeries. The anatomic proximity of third molar to IAN is evaluated globally using Orthopantomogram, a 2D imaging modality. The use of Cone Beam Computed Tomography offers a 3D image of the third molar and surrounding structures including the Inferior Alveolar Nerve Canal. This study aims to compare the diagnostic effectiveness of the two imaging modalities in assessing Inferior Alveolar Nerve Canal relationship to mandibular third molar.

Materials and Methods

A pilot study involving 20 patients was conducted at the Department of Oral Medicine and Radiology, PMS College of Dental Science and Research. Investigators trained to interpret radiological images from Orthopantomogram, and Cone Beam Computed Tomography compared their interpretations with those of an expert. A high inter-rater reliability was confirmed with a kappa statistic of 0.98. Data were retrospectively collected from 20 cases. Orthopantomogram, and Cone Beam Computed Tomography images were thoroughly analysed and classified according to the selected criteria.

Results

The results revealed no significant association between the result diagnosed by Orthopantomogram and Cone Beam Computed Tomography (p value of 0.9).It was also seen that there was bias towards gender in diagnosis by Orthopantomogram and this was absent in case of diagnosis by Cone Beam Computed Tomography.

Conclusion

Cone Beam Computed Tomography images offer an excellent three dimensional view of the third molar relationship with surrounding anatomic structures including inferior alveolar nerve and its cortication status. The clarity associated with such an image is crucial in planning treatment and executing an uneventful third molar surgery, surpassing the increased risk of Inferior Alveolar Nerve damage present while following a two dimensional image and its predictor signs. Low-Dose Cone Beam Computed Tomography has recently emerged as a promising successor to conventional Orthopantomogram.

Keywords: Orthopantomogram, Cone Beam Computed Tomography, Impacted teeth, Inferior Alveolar Nerve Canal.

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INTRODUCTION

The removal of lower third molars is one of the most common surgical procedures in routine dental practice.[1] and is indicated for various therapeutic and prophylactic measures. One of the most severe complications of third molar removal is injury to the inferior alveolar nerve (IAN), which can result in permanent neurosensory disturbances, occurring in approximately 0.4 to 8% of cases.[2] It is very important to capture a clear radiographic image in the third molar and mandibular canal area which is crucial for diagnosing root abnormalities such as resorption, ankylosis, and Hypercementosis. It also reveals any tooth-related pathologies and the relationship of the teeth to nearby vital and surrounding structures. This plays an important role for treatment planning and whether the tooth has to be removed or not. [3]

In lower third molar surgery, radiological assessment typically begins with conventional two-dimensional orthopantomography (OPG), a low-radiation imaging method that is commonly adequate for evaluating tooth position and surrounding anatomical structures; however, its limitations become apparent in complex cases or when detailed three-dimensional visualization is needed, especialy in the presence of radiographic risk indicators or predictor signs. [4]

As compared to OPG, CBCT images clearly display bone and tooth structures in cross-sectional views, along with their spatial relationships. It also enables visualization of the bucco-lingual orientation of overlapping hard tissues and the precise number and morphology of the roots. [5]

Our study is a comparative analysis of the diagnostic capabilities of OPG and CBCT which warrants a better understanding of using and prescribing these imaging modalities by dentists worldwide and result in better treatment planning and patient comfort. A demographic challenge in this regard is the lack of research among South Indian population, which the study also aims to address. The radiological indicators that suggest risk of Inferior alveolar nerve damage include darkening of roots, interruption of white lines, deflection of IAC, deflection of root, narrowing of roots.[6] The classification for CBCT takes into account the position, proximity and cortication status of IAC relative to the root apex of mandibular third molar. [7]

MATERIALS AND METHODS

A retrospective study involving 20 patients was conducted in the outpatient department (OPD) of the Department of Oral Medicine and Radiology at PMS College of Dental Science and Research. The subjects were selected by grouping all patients who had both OPG and CBCT records available from January 2025 to May 2025, which totalled 51 patients. After obtaining prior approval from the relevant authorities at PMS College of Dental Science and Research, data were retrospectively collected from the records of these 51 patients from the OPD. Among these patients, 20 patients who exhibited radiologic predictor signs on OPG were selected for the study. The investigators received training to interpret radiological images obtained from OPG and CBCT. To evaluate inter-rater reliability, the interpretations were compared with those of two field experts. The kappa statistic used for this assessment was 0.98 (P=0.02), indicating a high level of agreement between the investigators and experts' interpretations of the OPG and CBCT images. The collected Digital OPG and CBCT images were then analysed and compared, with the findings thoroughly documented.

The proximity of the IAC to the third molar was assessed using the classification for digital OPG and the classification for CBCT. [6,7] The study excluded data from patients whose radiographic images had deformities or artefacts on CBCT, incomplete root formation, open apices, resorption or calcification, and those from foreign ethnic backgrounds. Only data from patients with fully developed mandibular third molars were included in the study.To achieve maximum accuracy and minimum errors among the diagnoses using the two different imaging modalities under our investigation, same tooth of the same patient was studied for, analysed and documented.

STATISTICAL ANALYSIS

The data obtained were analysed using the Statistical Packages for Social Sciences (IBM SPSS Statistics, SPSS South Asia Pvt Ltd., Bagalore, for Windows, Version 20.0). Categorical variables were expressed as frequency (percentage). Results were analysed with the Chi-Square test to determine the significance of association between the variables under study. For all statistical interpretations, $p < 0.05$ was considered the threshold for statistical significance.

RESULTS

Table 1 shows the distribution of subjects by gender. Out of a total of 20 subjects, 11 are females (55%) and 9 are males (45%).

Table 1: **Distribution according to gender**

Gender	Frequency (%)
Male	9 (45%)
Female	11(55%)

Table 2 outlines the relationship between gender and the radiological classification of third molars using OPG. The classifications are A, B, C, E, F, G. For males the distribution is 2 in A, 1 in B, 1 in C, 1 in E, 0 in F and 4 in G, totalling 9 cases. For females the distribution is 7 in A, 1 in B, 1 in C, 0 in E, 2 in F and 0 in G, totalling 11 cases. Overall, the classifications across all subjects are 9 in A, 2 in B, 2 in C, 1 in E, 2 in F, 4 in G, totalling 20 cases. The Chi-Square test result showed a statistically significant relationship between gender and the classification by OPG, with a Chi-Square value of 23.19($p = 0.001$).

Table 2 : **Classification by OPG**

Gender	Darkening of roots (A)	Deflection of root (B)	Deflection of canal (C)	Bifid Apex (E)	Narrowing of root (F)	Interruption of white lines (G)	Total
Male	2	1	1	1	0	4	9
Female	7	1	1	0	2	0	11
Total	9	2	2	1	2	4	20
							X^2 23.19

Table 3 outlines the relationship between gender and the radiological classification using CBCT. Among males, the distribution is 2 in 1b, 1 in 2b, 2 in 3a, 1 in 3b, 1 in 4a, 2 in 4b, totalling 9 cases. Among females, the distribution is 1 in 1b, 1 in 2b, 3 in 3a, 1 in 3b, 1 in 4a, 4 in 4b, totalling 11 cases. The overall distribution across all subjects is 3 in 1b, 2 in 2b, 5 in 3a, 2 in 3b, 2 in 4a and 6 in 4b, totalling 20 subjects. The Chi-Square test result shows no significant difference in classification of third molar relationship to IAN using CBCT among genders, with a Chi-Square value of 2.008 ($p = 0.05$).

Table 3: **Classification for CBCT**

Gender	1b	2b	3a	3b	4a	4b
Male	2	1	2	1	1	2
Female	1	1	3	1	1	4
Total	3	2	5	2	2	6
						X^2 2.008

Fig 1.1 OPG Darkening of root

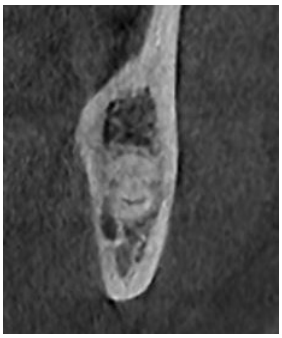

Fig 1.2 CBCT Absence of cortication

In Figure 1.1, the OPG shows radiologic sign of darkening of roots (A) and in Figure 1.2, coronal section in CBCT of same tooth shows a lingually located IAC with no cortication (4b). Table 4 compares the classification of third molar relationship to IAC using OPG to that using CBCT. Out of 8 subjects showing darkening of roots (A) on OPG, 5 showed presence of cortication of IAC and 3 showed absence of cortication of IAC on CBCT. Out of 2 subjects showing deflection of root (B) on OPG, 2 showed presence of cortication of IAC on CBCT. Out of 2 subjects showing deflection of canal (C) on OPG, 2 showed absence of cortication of IAC on CBCT. Out of 1 subject showing bifid root apex (E) on OPG, 1 showed presence of cortication of IAC on CBCT. Out of 2 subjects showing narrowing of roots (F) on OPG, 1 showed presence of cortication of IAC and 1 showed absence of cortication of IAC on CBCT. Out of 5 subjects showing interruption of white lines (G) on OPG, 3 showed presence of cortication of IAC and 2 showed absence of cortication of IAC on CBCT. The Chi-Square test result showed no significant association between the radiological signs on OPG and presence or absence of cortication of IAC as found using CBCT, with a p value of 0.9.

Table 4 : **Classification by CBCT based on Cortication**

Radiological Signs	Presence of cortication	Absence of cortication
Darkening	5	3
Deflection of Canal	0	2
Interruption of white lines	3	2
Narrowing of root	1	1
Bifid apex	1	0
Deflection of root	2	0
Total	12	8
		χ^2 6.44

DISCUSSION

The peripheral branches of the trigeminal nerve, including the IAN are susceptible to injury from the surgical removal of third molars. These injuries can be devastating for patients because of their effects on speech, mastication, swallowing, and social interactions. It can have varying outcomes ranging from mild hypoesthesia to complete paresthesia and neuropathic responses resulting in chronic pain syndromes.[8] An accurate radiographic diagnosis is essential to evaluate all of the possible problems related to a third-molar extraction and enable the oral surgeon to make a more accurate diagnosis. [9] In the ever evolving world of oral radiology, the assessment of third molar proximity to IAN can be approached from a newer perspective of 3D imaging over the conventional 2D images widely used globally.

In the present study, association between diagnosis of third molar proximity to IAC using OPG and CBCT was studied. The results of the study indicate that there is significant difference in classification of third molar relationship to IAC using OPG among genders and the same teeth classified using CBCT show no significant association among genders. The comparison between classifications using OPG to that using CBCT showed no significant association between both. According to Kaori et al., cases exhibiting the absence of cortication and a dumbbell–shaped IAC should be recognised as presenting a high risk of IAN injury during mandibular third molar surgery.[10] In this study, out of the 20 subjects showing radiologic predictor signs on OPG, 8 showed absence of cortication and 12 showed presence of cortication, pointing to difference in diagnosis between the two imaging modalities while consolidating superiority of CBCT imaging over conventional OPG images.

An important limitation pertaining to this study is the sample size, which might underestimate the prevalence of radiological signs being investigated and their relationship with CBCT classifications. Interestingly, a study by David et al. has concluded that there was no correlation between the radiologic predictor signs on OPG and the incidence of paraesthesia of IAN following third molar odontec tomy. Out of 32 cases showing radiologic predictor signs on OPG, only 5 cases exhibited post-operative paraesthesia of IAN whereas out of 48 cases not showing any radiologic predictor signs on OPG, 10 cases showed paraesthesia of same nerve. [11] Contradictorily, a recent study by Joshi et al. concluded a significant relationship between OPG and CBCT classifications of third molar relationship to IAC, with a p-value <0.05.[12] The lack of comparative analysis between the imaging modalities among South Indian population adds to the doubt of reliability of radiologic predictor signs in treatment planning in South Indian population.

An important consideration for clinicians when prescribing CBCT for diagnosing the third molar relationship to IAC is the radiation dose. Low-dose protocols for CBCT imaging seem to have potential in oral and maxillofacial surgery. Dose reduction is usually achieved by mAs reduction, use of partial rotations, reduced number of projections, and larger voxel sizes, but seldom by kV reduction.[13] Despite the lower radiation dose, low-dose and ultra-low-dose CBCT scanners can still produce high-quality images with a similar resolution and contrast as traditional scanners. [14] The ultra-low-dose CBCT protocol and the Low Dose CBCT protocol, ejects a dose (dap 69 and 87 mGycm2) which is lower than that of panoramic views (Dap 88 mGycm2).[15]

The accuracy of CBCT and its three-dimensional (3D) representation of anatomic structures and pathologies make it a necessary diagnostic tool for surgical treatment procedures in the maxillofacial region.

CONCLUSION

The study investigates disparity among diagnosis of third molar proximity to IAC using two different imaging modalities; OPG and CBCT. OPG is the widely used primary diagnostic tool for third molar surgeries. The study highlights variability in its diagnoses among genders, which CBCT does not show. CBCT offers superior 3D imaging and provides accurate details about the spatial relationship of third molar to IAC, not relying on predictor signs on a 2D image. A CBCT image is comparatively more useful for a dentist attempting surgical third molar removal, as it helps to assess and analyse the risk of IAN damage more clearly and accurately.

REFERENCES

1. M. Jafarian, A. Etebarian; Reasons for Extraction of Permanent Teeth in General Dental Practices in Tehran, Iran. Med Princ Pract 1 March 2013; 22 (3): 239–244.
2. Sinha P, Pai A; Assessment of proximity of impacted mandibular third molar roots to the mandibular canal using intra oral periapical radiography and cone-beam computerized tomography: A comparative study. Int Dented J Adv Res. 2015;1:1-5.
3. Talib Jiboon, Atheer, Alhamdani, Faaiz Y., Hussein Ali, Nagham, Radiographic Examination before Dental Extraction from Dentists' Perspective, International Journal of Dentistry. 2023:4970981.
4. Al-Haj Husain, A., Stadlinger, B., Winklhofer, S., Bosshard, F. A., Schmidt, V., & Valdec, S.Imaging in Third Molar Surgery: A Clinical Update. Journal of Clinical Medicine.2023; 12(24):7688.
5. Leung, Y. Y., Hung, K. F., Li, D. T. S., & Yeung, A. W. K.Application of Cone Beam Computed Tomography in Risk Assessment of Lower Third Molar Surgery. Diagnostics.2023;13(5):919.
6. J.P. Rood, B.A.A. Nooraldeen Shehab, The radiological prediction of inferior alveolar nerve injury during third molar surgery, British Journal of Oral and Maxillofacial Surgery.1990;28(1):20-25.
7. Maglione M, Costantinides F, Bazzocchi G. Classification of impacted mandibular third molars on cone-beam CT images. J Clin Exp Dent 2015;7:224–31.
8. Eliav, E. Gracely, R.H.Sensory changes in the territory of the lingual and inferior alveolar nerves following lower third molar extraction-Pain. 1998; 77:191-199
9. Giuseppe monaco, marco montevecchi, giulio alessandri bonetti, maria rosaria antonella gatto, lugi checchi, Reliability of panoramic radiography in evaluating the topographic relationship between the mandibular canal and impacted third molars,The Journal of the American Dental Association.2004;135(3):312-318.
10. Kaori Shiratori, Kenji Nakamori, Megumi Ueda, Tomoko Sonoda, Hironari Dehari,

    Assessment of the Shape of the Inferior Alveolar Canal as a Marker for Increased Risk of Injury to the Inferior Alveolar Nerve at Third Molar Surgery:A Prospective Study, Journal of Oral and Maxillofacial Surgery.2013,71(12) :2012-2019.
11. David B. Kamadjaja, Djodi Asmara, and Gita Khairana, .The correlation between Rood and Shehab's radiographic features and the incidence of inferior alveolar nerve paraesthesia following odontectomy of lower third molars. Dental Journal .2016;49(2), :1978-3728.
12. Joshi, Jigar; Dudhia, Bhavin[1]; Mehta, Dhaval[2]; Thaker, Niral[2]; Patel, Hitesh[2]. Comparative Analysis of Impacted Mandibular Third Molar Root Proximity to the Mandibular Canal using Orthopan tomography and Cone-beam Computed Tomography Imaging Modalities: A Pilot Study. Advances in Human Biology.2025; 15(1): 113-117.
13. Yeung, A.W.K., Jacobs, R. & Bornstein, M.M. Novel low-dose protocols using cone beam computed tomography in dental medicine:a review

focusing on indications, limitations, and future possibilities. Clin Oral Invest .2019; 23:2573-2581.

14. Friot-Giroux, L.; Peyrin, F.; Maxim, V. Iterative tomographic reconstruction with TV prior for low-dose C.B.C.T. dental imaging. Phys. Med. Biol. 2022;67(20).

15. Ruetters, M.; Gehrig, H.; Kronsteiner, D.; Doll, S.; Kim, T.S.; Lux, C.J.; Sen, S. Low-dose C.B.C.T. imaging of alveolar buccal bone adjacent to mandibular anterior teeth-A pilot study. Clin. Oral Investig. 2022;26: 4173–4182.

In-Office Teeth Whitening - A Case Report

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ABSTRACT

Tooth discoloration is a common aesthetic concern, often resulting in reduced self-confidence. In-office teeth whitening is a conservative and effective method to improve dental aesthetics. This Article presents an extreme case of discolouration that is managed using in-office teeth whitening performed with 37.5% hydrogen peroxide, achieving significant aesthetic improvement with minimal postoperative sensitivity.

Keywords: Tooth bleaching, Aesthetic dentistry, Hydrogen peroxide, In-office teeth whitening, Smile enhancement.

INTRODUCTION

Aesthetic dentistry plays a vital role in enhancing the appearance of a patient's smile. Teeth color is one of the most critical factors in dental aesthetics. Discolored teeth often affect patient confidence.[1] Discoloration may be extrinsic, caused by dietary factors and smoking, or intrinsic, associated with aging, fluorosis, or trauma.[2] Aesthetic dentistry emphasizes minimally invasive procedures, and teeth whitening remains the most conservative approach when compared to veneers or crowns.[3] Teeth whitening is a non-invasive method used to improve and lighten teeth shade and restore aesthetics.[2] Among the various methods available, in-office and in-house teeth whitening provides rapid results under professional supervision.[3]

CASE REPORT

A 23-year-old male patient reported to the department of aesthetic dentistry with the chief complaint of extreme case of discolored anterior teeth and requested aesthetic improvement using in-office teeth whitening method. Clinical examination revealed generalized yellowish discoloration with no carious lesions or major restorations.

PRE-OPERATIVE PROCEDURE

- Complete medical and dental history recording.
- Clinical examination to rule out caries, cracks, or extensive restorations.
- Shade selection with a classical shade guide was recorded as A4
- Pre-procedural scaling and polishing to remove extrinsic stains.
- Informed consent obtained after discussing risks, benefits, and expected outcomes.
- Soft tissue protection with cheek retractors and gingival barrier application.
- Googles for eye protection.

Fig 1. Pre operative picture taken after oral prophylaxis and polishing

PROCEDURE

- Cheek retractor was placed and proper isolation of tissues were done using cotton rolls.
- Application of light-cured gingival barrier to protect gingiva.

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- Placement of **37.5% hydrogen peroxide teeth whitening gel** (pola office plus) on the labial surfaces of maxillary and mandibular anterior teeth.
- Gel activated on curing with curing light and maintained for 8 minutes per cycle, repeated three times in a single session.
- As the patient was not having any sensitivity and another cycle of 8 minutes was performed for the correction of this extreme discoloration.
- Gel removed thoroughly with cotton and area rinsed with water.
- Post-operative fluoride gel applied to reduce sensitivity.

Fig 2. Picture taken immediately after Teeth Whitening procedure

COMPOSITION OF TEETH WHITENING AGENT

In-office teeth whitening typically employs hydrogen peroxide (25–40%) or carbamide peroxide (35–40%) as the active ingredient. These agents release oxygen free radicals that break down large pigmented molecules into smaller, less pigmented ones, resulting in a lighter teeth shade.

RESULTS

Postoperative shade improvement was noted from A4 to A2. The patient reported only mild sensitivity that subsided within 24 hours. Aesthetic satisfaction was achieved, and the patient was advised to avoid staining foods and beverages for the next 5 days.

DISCUSSION

Teeth Whitening is a minimally invasive aesthetic treatment modality that can provide significant improvement in dental appearance. In-office teeth whitening provides quick results compared to at- home techniques, though relapse can occur depending on diet and lifestyle.[1] Compared to prosthetic or restorative aesthetic treatments, teeth whitening preserves natural teeth structure[1]. While sensitivity remains the most common side effect, it is usually temporary. Contraindications such as cracks, cervical abrasion, or pregnancy must always be considered. However, the longevity of results depends on patient habits, oral hygiene, and diet. In-office teeth whitening is ideal for patients requiring immediate results but should be carefully selected considering indications and contraindications.[2] In the present patient, desired result was achieved by repeated cycles of gel application and extending the time of activating the gel.

CONCLUSION

In-office teeth whitening is a safe and effective treatment to enhance dental esthetics. It provides rapid results with high patient satisfaction while being conservative and non-invasive. Long-term follow-up and periodic maintenance are essential for sustained results.

REFERENCES

1. Joiner A. The bleaching of teeth: A review of the literature. J Dent. 2006;34(7):412–419.
2. Haywood VB. Current status of nightguard vital bleaching. *Compendium of Continuing Education in Dentistry*. 2000;21(1 Suppl):S10–S17.
3. Rosenstiel SF, Land MF, Fujimoto J. Contemporary Fixed Prosthodontics. 5th ed. St. Louis: Mosby; 2016.

Until the end : Fortuitous Cuddling Molars-A Case Report

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ABSTRACT

Background

Kissing molar is a rare occurrence first reported by Van Hoff in 1973. Kissing molars or 'rosette' formation is defined as impacted molars which have occlusal surfaces contacting each other with a single follicular space and roots pointing in opposite direction.

This is a case report of patients reported with a chief complaint of missing teeth in upper and lower front and back tooth region for the last 6 years. An incidental finding of kissing molars was found after radiographic investigation. Unilateral and bilateral kissing molars involving impacted third and fourth mandibular molar was found after correlation with clinical and radiological findings.

Keywords

Kissing Molar, Cuddling molars, Rosette formation, Polysaccharidoses, Gulses classification

INTRODUCTION

The single or multiple impacted teeth in permanent dentition is a usual finding in the oral cavity. Impacted molar teeth can be found in the maxillary or in the mandibular arch. The most common impacted teeth in permanent dentition are the mandibular third molars, followed by the second molars.[1] The incidence of first permanent molar impaction in the mandibular region is even rare[1]. But two mandibular molars with occlusal surfaces facing each other is extremely rare.[2] The term "kissing molars" or "rosette formation" is synonymous to impacted mandibular molars, and is defined as teeth which have occlusal surfaces contacting each other in a single follicular space and roots pointing in opposite directions. It was Van Hoff, 1973, who coined the term kissing molars[2]. Literature states differences in opinion between unusual impaction and kissing molars.[3] A new name for kissing molars was cuddling molars. Molars are classified as kissing molars if they are in contact with each other. The etiology of kissing molars is still unknown, it could be hypothesized that the resorption of the bone by the expansion of a cystic formation might be due to high incidence of an associated cystic formation around kissing molars, resulting in bone loss along the mesial root of the impacted third molar and causing movement and tipping of the associated molar.[3,4] The prevalence of Kissing molars is not evident in the India population. The presence of kissing molars imposes clinical implications on the subject. Kissing molars may weaken the mandibular bone. In case of road traffic accidents, sports injuries, fighting, and falling, the fracture line likely goes through the impacted teeth in the angle of the mandible.[5,6,7] This risk of fracture may also be evident in relation to extraction of these teeth. Due to the rarity of the phenomenon, scientific evidence on this is not available. It is concluded that in this first study published to date on the prevalence of this phenomenon at the population level, the prevalence of kissing molars in the population was

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very small.[5,8] For the sake of comparison, supernumerary teeth in third molar region are slightly more common than kissing molars. As seen in literature most diagnosis of Kissing molars was made after routine imaging[9] Our case was also an incidental finding during the radiological examination made for further diagnosis and treatment planning.

CASE REPORT

A 52-year-old female patient reported with a chief complaint of missing teeth in upper and lower front and back tooth region since 6 years. Patient reported of a history of fall from height before 6 years and avulsion of teeth after the trama. The patient was a denture wearer and complained of loose denture. Patient reported of a medical history of hypertension and is under medication for the same for the past 7 years. On clinical examination, missing teeth were1 1,12,13,14,18,21,22,23,31,34,41,44,47,48. Grade II mobility was noted for 15, 16, 17, 32, 33, 35, 42, and 43. Class III recessions was present in relation to 32, 42, and 43. A panoramic radiograph was advised for evaluation of bone support and providing a prognosis for the teeth present. Panoramic radiographs are routinely utilized for evaluation and treatment planning. Panoramic radiograph Figure 1 showed that there was generalized bone loss, dilacerations with relation to 23, supra-eruption was noted in relation to 16, 26. Radiographically a kissing molar was given as the diagnosis. For the differential diagnosis odontome was considered. the kissing molar consisting of a third and fourth molar in left side of the mandible with occlusal surfaces contacting each other and roots in opposite direction, this was considered since the first premolar and first molar was extracted. Kissing molars were found as an accidental finding.

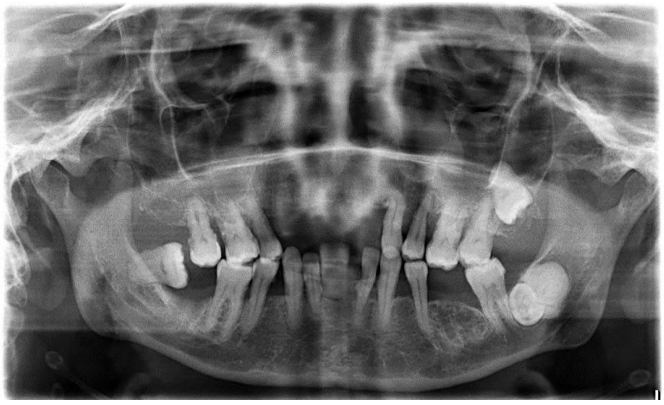

Figure 1: Panoramic radiograph showing kissing molars.

DISCUSSION

Kissing molars most commonly occurs along with permanent molars, most cases are seen in mandibular second and third molar.[11,30] An impacted fourth molar is rarely seen. In this case, the third and fourth molar was impacted. Gulses et al[6,12, 14 15] classification of kissing molars states Class I-with rosetting of first and second lower molars, Class II with rosetting of second and third lower molars, and Class III two with rosetting of lower third and fourth molars. This case can be considered as class III based on the classification of Gulses et al[6].Cai Wen et al classified kissing molars by the teeth's impacted direction, complete vertical direction (Type A), tilted direction (Type B) and complete horizontal direction (Type C).[8] New classification was suggested by Silva et al taking into consideration the previous classifications and adding the unilateral and bilateral presence of kissing molars CLASS I – first and second molars, CLASS II- second and third molars, CLASS III- third and fourth molars, taking dental follicle into considerations -A- no dilation - occlusal contact., B - with dilatation, lastly the location 1- unilateral 2- bilateral. [13, 17, 30]

The aetiology of kissing molars remains to be unknown. Multiple resetting of molars or bi-

lateral kissing molars had been associated with mucopolysaccharidoses.[2,6,20] It is a inherited metabolic disorder. It may be related to this phenomenon. However, it has not been clear yet.

Nakamura et al reported multiple resetting of molars in their 2 out of 4 patients with Mucopolysaccharidoses[5,22,25] in the present case the patient reported without any medical history of syndromes associated.

According to a survey done during the year 2000 and 2001 the occurrence of kissing molars in population most cases were reported between the age 18-48 years as 53% of subjects were younger than 30 years and 47% were 30 years or older. [7, 26, 28,31] A difference in this scenario was noted here the patient was aged 52 years. According to studies there is no gender predilection. Yanik et al reported a prevalence rate of kissing molar of 0.06% in large sample size of 6,570 Turkish individuals, without significant difference between men and women. [8,18,22,31] But a review done by Siliva et al stated a slight predilection for women approximately 57% greater than men 43%, but it could not be taken into consideration due to low case numbers.[30]

The evaluation of location in the study done by research society and development included 21% bilateral cases and 54% unilateral cases, and 24% were not specified. Among the percentage of unilateral cases, there was a predilection of 65% on the right mandible and 35% on the left. [9,20]

Most cases of kissing molars are asymptomatic and patients are unaware. A symptomatic case of kissing molar described by McIntyre in 1997, on left side of mandible, in 19-year old female development of trismus and dry socket after surgery was seen. The author emphasised on the importance of having an efficient surgical assessment and treatment plan prior to procedure and the need to inform the patient about the possibilities of post-surgical complications. [10,21,30]

Siliva et al stated presence of lesions associated with teeth was reported in 40% (15) cases, being diagnosed as alterations in the dental follicle or inflammatory tissue in seven cases, and Dentigerous Cyst in eight cases, reinforcing the importance of performing histopathological examination. [10,17, 19, 30].

Radiology plays in an important role in identification of kissing molars various radiographs can be used for identification of position and depth in the mandible. The approximation of kissing molars to mandibular canal can be assessed with radiographs. CBCT could show the close proximity of the tooth with each other, to the mandibular nerve and its effects on adjacent structures.[10,21,30].

The treatment of choice in most cases was the surgical, with exodontia (89%) of the teeth involved. [15,18, 19, 30] Detailed planning is essential to avoid trans and postoperative complications . The degree of difficulty should be assessed through details such as the location and depth of the teeth involved, the position and shape of the roots, the relationship of the teeth to the ascending branch, mandibular body and lower alveolar nerve canal, where radiology plays an important role. [2,21,23,30] The association of surgical treatment with orthodontics was reported in one of the four cases presented by Güven et al., an associated impaction of the first and second lower molars (Class I) and opted for exodontia only of the second molar with orthodontics in the first and third molars of the region. [22,30]

Postoperative complications are influenced ac-

cording to the degree of difficulty due to tooth positioning, with alveolar osteitis, infection, bleeding, paresthesia, severe pain or edema, and more rarely mandibular fracture and iatrogenic displacements to adjacent anatomical regions being commonly reported in the literature.

CONCLUSION

In dental practice, clinicians encounter various types of impactions of teeth. Kissing molars is another impaction type of teeth. The impacted teeth may cause several complications which influence the quality life of the patient. On suspicious cases, CBCT and histopathological evaluation are necessary tools to figure out the risks. A physician should know sufficient information about kissing molars and its risk factors to determine whether the teeth to be extracted or followed.

REFERENCE

1. Aslam-Pervez B, Dobson TL. Bilateral kissing molars: a case report. Eur J Oral Maxillofac Surg 2022;6:98-101. DOI: 10.23736/S2532-3466.21.00274-5

2. T, Dr & Naik, Dr & R, Dr & Rai, Dr. (2020). Multiple Impaction in Mandible: A Case Report of Kissing Molars. South Asian Research Journal of Oral and Dental Sciences. 02. 14-20. 10.36346/sarjods.2020.v02i02.001

3. Arjona-Amo, Manuel & Torres-Carranza, Eusebio & Batista Cruzado, Antonio & Serrera-Figallo, Ma & Crespo-Torres, Santos & Belmonte-Caro, Rodolfo & Albisu- Andrade, Claudio & Torres-Lagares, Daniel & Gutierrez-Perez, JL. (2015). Kissing molars extraction: Case series and review of the literature. Journal of Clinical and Experimental Dentistry. 8. 10.4317/jced.52741.

4. Menditti, Dardo & Laino, Luigi & Cicciù, Marco & Mezzogiorno, Antonio & Perillo, Letizia & Menditti, Marco & Cervino, Gabriele & Lo Muzio, Lorenzo & Baldi, Alfonso. (2015). Kissing molars: Report of three cases and new prospective on aetiopathogenetic theories. International journal of clinical and experimental pathology. 8. 15708-15718.

5. Lao A, Bi S, Cheng H, Lai T, Huang S, Zhao S. A combination of kissing molars, maxillary bilateral supernumerary teeth and macrodontia: a rare case report. BMC Oral Health. 2020 Apr 16;20(1):112. doi: 10.1186/s12903-020-01092-9. PMID: 32299406; PMCID: PMC7164340.

6. Simsek, Hasan & Özkan, Gökhan. (2016). Kissing Molars: Report of a Case and Review of the Literature. Research & Reviews: Journal of Dental Sciences. 4. 134-5.

7. Gonzalez-Perez LM, Infante-Cossio P, Sanchez-Sanchez M, Valdivieso-del-Pueblo C, Robles-Garcia M (2015) Kissing Molars: A Report of Three Cases and Literature Review. Int J Oral Dent Health 1:012. 10.23937/2469-5734/1510012

8. Wen C, Jiang R, Zhang ZQ, Lei B, Yan YZ, Zhong YQ, Tang L. Vertical direction impaction of kissing molars: A case report. World J Clin Cases. 2022 Apr 26;10(12):3959-3965. doi: 10.12998/wjcc.v10.i12.3959. PMID: 35647150; PMCID: PMC9100717.

9. Anish N, Vivek V, Thomas S, Daniel VA, Thomas J, Ranimol P. Till Surgery do us Part: Unexpected Bilateral Kissing Molars. Clin Pract. 2015 Feb 2;5(1):688. doi: 10.4081/cp.2015.688. PMID: 25918627; PMCID: PMC4387339

10. Singha R, Bhowmik B, Sarkar S, Banerjee I, Maity S, Maji A, Association of kissing odontome and molar - A case report. J Dent Spec 2017;5(1):90-93

11. Bakyalakshmi, K. & Manoharan, G.V. & P riya, J.. (2016). A rare case of non-syndromic bilateral

condylar hypoplasia with kissing molars. Journal of Oral Medicine, Oral Surgery, Oral Pathology and Oral Radiology. 2. 74. 10.5958/2395-6194.2016.00020.5.

12. Singh1 G, *, Daga2 D, Vignesh3 U, Agrawal4 R, Unusual location of molars called as kissing molars: A case report. Int J Oral Health Dent 2018;4(1):49-51

13. Ventä I, Vehkalahti MM, Suominen AL. Occurrence of kissing molars in a population. Journal of Dental and Maxillofacial Research. 2019 Feb 23;2(1).

14. Van Hoof RF. Four kissing molars. Oral Surg Oral Med Oral Pathol. 1973 Feb;35(2):284. doi: 10.1016/0030-4220(73)90297-1. PMID: 4513074.

15. Agarwal, Anmol & Mittal, Gaurav & Uppada, Uday. (2019). Cuddling Teeth: A New Terminology. Annals of Maxillofacial Surgery. 9. 53. 10.4103/ams.ams_254_18.

16. . *Kazutaka Kimura, Noriko Sunada, Yukiko Ono , Tomoko Fujii , Masahiro Watanabe , Tsukasa Sakamoto and Toshihiko Takenobu. A case of bilateral class II kissing molars J Osaka Dent Univ 2023; 57 (1): 217−222.

17. Zerener, Tamer, Bayar, Gurkan Rasit, Altug, Hasan Ayberk, Kiran, Serkan, Extremely Rare Form of Impaction Bilateral Kissing Molars: Report of a Case and Review of the Literature, Case Reports in Dentistry, 2016, 2560792, 5

pages, 2016. https://doi.org/10.1155/2016/2560792

18. Ghosh, Rumela & Gogineni, Subhas & Castelino, Renita & Nair, Mithula & Rao, Kumuda & Bhat, Supriya & Banerjee, Baishwanar. (2017). Kissing molars: A rare case report. European Journal of Therapeutics. 23. 42-44. 10.5152/EurJTher.2017.09120.

19. Gulses A, Varol A, Sencimen M, Dumlu A. A study of impacted love: kissing molars. Oral Health Dent Manag. 2012;11(4):185-8. PMID: 23208595.

20. Dasnadi, Shahistha & Mascarenhas, Rohan & Shetty, Sandeep & Husain, Akhter. (2013). Kissing molars: An unusual unexpected impaction. Archives of Medicine and Health Sciences. 1. 52. 10.4103/2321-4848.113570.

21. Guruprasad, Yadavalli & Singh, Dinesh. (2013). Kissing molars – a rare entity. Journal of Pharmaceutical and Biomedical Sciences. 31. 1245-1246

22. Shah, Jigna[1]; Goel, Shweta."kissing molars"- a case report. Journal of Indian Academy of Oral Medicine and Radiology 19(1):p 293-295,2007.

23. Kaneko, Keiko & Uchida, Keiichi & Inou, Toshiyuki & Nezu, Hideyuki & Mori, Hiroshi & Kitamura, Hiroyuki & Takaya, Tatsuo & Yoko, Yukiko & Okafuji, Norimasa. (2022). A Case Report of Kissing Molars Class III. Open Journal of Stomatology. 12. 321-325. 10.4236/ojst.2022.1210028.

24. McIntyre G. Kissing molars: an unexpected finding. Dent Update. 1997 ;24(9):373-4. PMID: 9534425

25. National Institute for Health and Welfare. Health 2000 in brief.

Available: https://thl.fi/en/web/thlfi-en/research- and-expertwork/projects-and- programmes/health- 2000–2011/health-2000-in-brief.

26. Sarna K, Murithi I, Opondo F, Guthua S. A unique presentation of bilateral kissing molars and three-rooted maxillary premolars: A case report and review of literature. Clin Case Rep. 2021; 9:e04679. https://doi.org/10.1002/ccr3.4679.

27. Barros, Sérgio & Janson, Guilherme & Chiqueto, Kelly & Ferreira, Eduardo & Rösing, Cassiano. (2018). Expanding torque possibilities: A skeletally anchored torqued cantilever for uprighting "kissing molars". American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics. 153. 588-598. 10.1016/j.ajodo.2017.12.006.

28. Krishnan B. Kissing molars. Br Dent J. 2008 Mar 22;204(6):281-2. doi: 10.1038/bdj.2008.216. PMID: 18356855.

29. vangelista Ícaro G, Soares ECS, Barbosa DAF, Carneiro Neto JN, Cetira Filho EL, Carvalho FSR, Silva PG de B, Costa FWG. Update on clinical, imaging, and therapeutic aspects of kissing molars: A systematic review. RSD [Internet]. 2021;10 [cited 2024;.30];10(6):e15910615506

30. Silva, William & Lemos, Cleidiel & Samara, Mesk & Rios, Barbara & Faverani, Leonardo & Pellizzer, Eduardo. (2020). Impacted teeth "kissing molars": systematic review. Research Society and Development. 9. e694997777. 10.33448/rsd-v9i9.7777.

31. Yanik S, Ayranci F, İşman Ö, Büyükçikrikci Ş, Aras MH. Study of kissing molars in Turkish population sample. Niger J Clin Pract. 2017 ;20(6):659-664. doi: 10.4103/1119-3077.183243. PMID: 28656918.

A Minimally Invasive Approach for Combined Soft and Hard Tissue Regeneration in Periodontal Therapy-A Case Report

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ABSTRACT

Gingival recession associated with intrabony defects requires both soft and hard-tissue regeneration for stable and esthetic outcomes. The Vestibular Incision Subperiosteal Tunnel Access technique offers a minimally invasive approach that preserves papillary architecture while enabling coronal advancement of gingival tissues and placement of regenerative materials. This case report describes the management of an intrabony defect in the maxillary anterior region using the Vestibular Incision Subperiosteal Tunnel Access technique combined with Sticky Bone using xenograft and Leukocyte - Platelet Rich Fibrin membrane. The approach provided an intact papillary complex, enhanced graft stability, and improved wound healing. Early postoperative evaluation demonstrated favorable soft-tissue healing, reduced probing depths, and improved tissue contour. The combined use of Platelet Rich Fibrin derivatives and xenograft within the Vestibular Incision Subperiosteal Tunnel Access technique framework represents a predictable minimally invasive option for periodontal regeneration in esthetically demanding areas. Long-term follow-up is required to confirm the stability of these results.

INTRODUCTION

Periodontal regeneration and gingival recession coverage continue to be critical goals in modern periodontal therapy, as both hard and soft-tissue deficiencies can compromise function, esthetics, and long-term stability of dentition. Conventional periodontal plastic surgical procedures, while effective in achieving root coverage, often fall short in simultaneously addressing underlying bone defects that contribute to recession progression and compro mised periodontal support. This necessitates surgical approaches that can predictably integrate both soft and hard tissue augmentation within a minimally invasive framework.

The Vestibular Incision Subperiosteal Tunnel Access (VISTA) technique, introduced by Zadeh in 2011, represents a paradigm shift in periodontal plastic surgery[1]. By creating a vestibular access incision and developing a subperiosteal tunnel, the technique enables coronal advancement of gingival tissues without incisions in the marginal gingiva or inter dental papillae. This preserves vascular supply, mini mizes trauma, and provides an ideal environment for simultaneous placement of regenerative biomaterials.

The incorporation of bone regeneration into the VISTA approach further enhances its regenerative potential by promoting new bone formation, improving tissue support, and stabilizing the overlying gingiva.[2,3] When combined with guided tissue regeneration principles and meticulous soft-tissue management, the VISTA technique offers dual benefits: predictable root coverage and regeneration of lost alveolar bone support.

This article highlights the application of the VISTA technique with xenograft-mediated bone regeneration

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for the management of gingival recession defects, emphasizing its biologic rationale, clinical advantages, and potential to achieve both functional and esthetic outcomes[4,5].

CASE REPORT

A 53 years old, systemically healthy female patient, reported to the department of periodontics, PMS College of Dental Science and Research with chief complaint of loose upper front tooth since 2 months. On clinical examination there was rolled round marginal gingiva, blunt interdental papilla with bleeding on probing in 21 region, midline diastema with papillary labial frenum and extruded 21 (Figure1a). The tooth was found to be vital according to Electric pulp testing. Intra oral periapical radiograph was taken in relation to 11-21 region, showing a vertical intra bony defect on mesial aspect of 21 (Figure 1b). Table 1 shows periodontal examination findings in relation to upper central incisors.

Table 1 – Periodontal examination findings

Tooth number	11	21
Pocket depth B	4 3 5	8 3 4
P	3 4 5	8 6 5
Recession depth B	0 0 0	4 3 3
P	0 0 0	0 0 0
Phenotype	Thin	Thin
Mobility		Grade 2

TREATMENT DONE

Treatment was planned according to EFPS3 guidelines[6]. In Step 1, professional mechanical plaque removal (PMPR) was performed to eliminate supragingival plaque and calculus deposits. Wire and composite splinting were carried out from tooth 11 to 22. Comprehensive oral hygiene instructions were provided, emphasizing proper brushing technique and interdental cleaning to maintain optimal plaque control. In Step 2, subgingival instrumentation was performed to remove subgingival deposits and disrupt the pathogenic biofilm. The patient was then recalled after four weeks for re-evaluation. On re-evaluation probing depth was 7 mm on the mesio buccal aspect,6 mm on the mesio palatal aspect, 5 mm in the mid and disto palatal aspect of 21 with bleeding on probing and recession depth was 4 mm on the mesio buccal aspect 21. Since the endpoints of periodontal therapy were not achieved, Step 3 of periodontal therapy was undertaken. Step 3, the surgical phase, aimed at achieving definitive periodontal regeneration, establishment of periodontal health and root coverage. Thus, a regenerative procedure with sticky bone (bonegraft + iPRF) and VISTA approach was planned to simultaneously achieve periodontal soft and hard tissue regeneration.

Figure 1: Preoperative Photographs a) Preoperative probing depth of left upper central incisor b) Intraoral periapical radiographs

PROCEDURE

Presurgical protocol

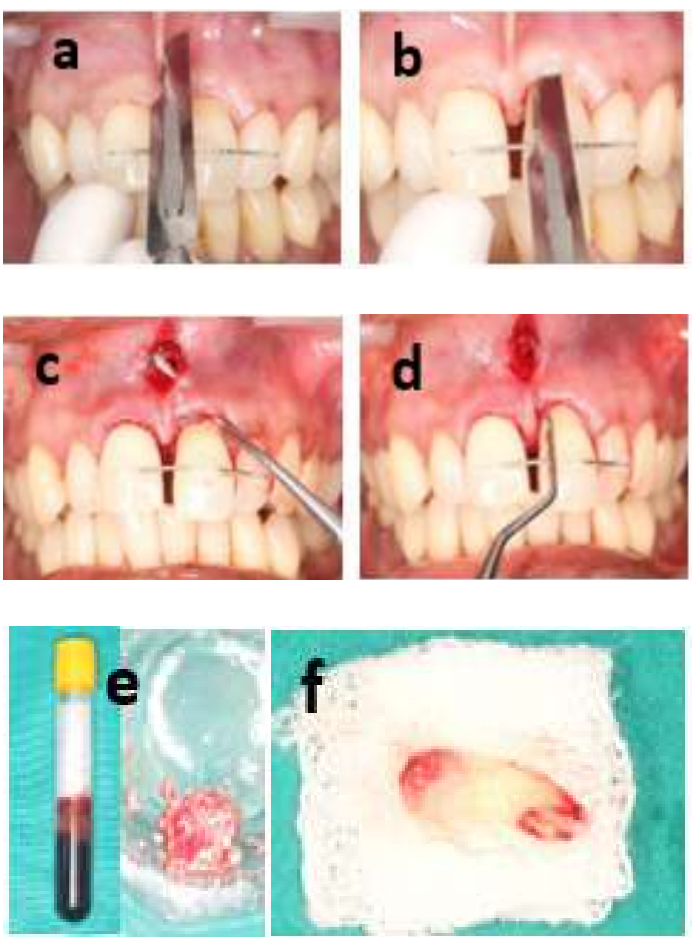
The treatment protocol was explained to the patient, and an informed consent was obtained.

Before performing the surgery, routine blood investigation was performed, and the values were within the physiological limits.

SURGICAL PROTOCOL

Incision

The surgical protocol employed was VISTA technique.[7] After obtainment of profound anaesthesia (2% Lignocaine Hydrochloride with 1:80,000 Adrenaline) a horizontal incision was placed on the maxillary labial frenum and intra-sulcular incision without involving the interdental papilla was given on 11 and 21 regions both buccally and palatally (Figure 2a). Then tunnelling was done using tunnelling knives (TKN 1 and 2) (Figure 2b). With adequate accessibility careful debridement was done using Hu Friedy gracey curettes no 1/2 and universal curettes 2R/2L (Figure 2c).



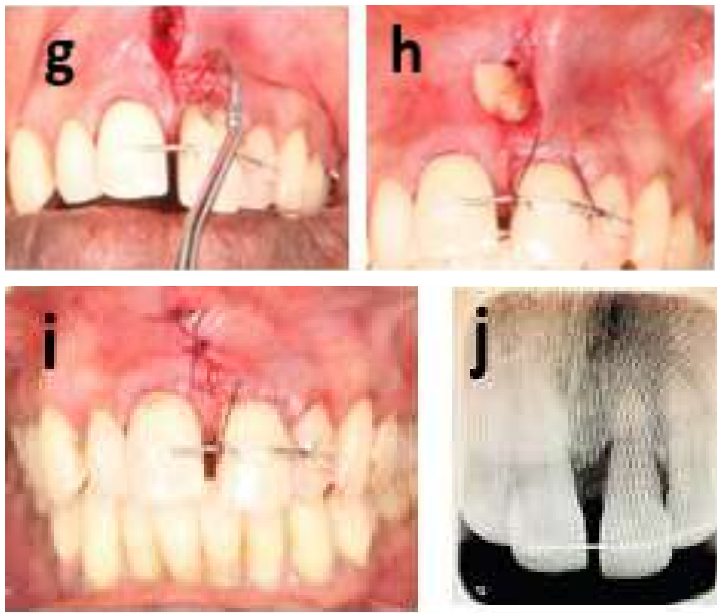


Figure 2: Operative photographs

a) Horizontal incision given through the frenum b) Crevicular incision given in the left central incisor c) Tunnel created through the frenum d) debridement done e) Sticky bone f) L-PRF membrane g) Sticky bone inserted through the frenum h) L PRF inserted through the frenum i)Suturing done using 5-0 vicryl j) Immediate postoperative Intraoral periapical radiograph

L- platelet Rich Fibrin (PRF) and Sticky bone preparation

With the help of a sterile syringe, 5 ml of autologous venous blood was collected in a sterile plastic tube without anticoagulant and centrifuged at 700 revolutions per minute for 3 minutes to obtain Injectable Platelet Rich Fibrin (i-PRF). i-PRF was aspirated and mixed thoroughly with the bone graft particles. The mixture was then left undisturbed for approximately 5-10 minutes to allow polymerization of the fibrin meshwork. This process resulted in the formation of a cohesive and moldable graft complex, termed "sticky bone," which provides stability to graft

particles, enhances handling, and releases growth factors gradually to promote angiogenesis and bone regeneration[8] (Figure 2d).

With the help of a sterile syringe, 5 ml of blood was drawn from the patient's antecubital vein and collected in a sterile glass test tube. The tube was carefully transferred to a centrifugation machine and immediately centrifuged at 3,000 revolutions per minute for 12 minutes at room temperature. After 12 minutes, three fractions were obtained from centrifuged blood: acellular plasma on the surface, a Platelet Rich Fibrin (PRF) clot formed in the middle part of the tube, and red blood cells at the bottom.[8] Using a sterile tweezer, the PRF clot was removed carefully from the tube. A sterilized scissor was used to gently detach the Red Blood Cell (RBC) layer from the PRF clot. (Figure 2e)

Sticky bone was introduced through the tunnel into the bone defect. PRF clot was placed over the graft and a sufficient fullness in the papillary tissues was obtained for self-holding the mucogingival tissue complex. (Figure 2f).

Suturing

Presuturing using horizontal mattress technique was done using 5-0 vicryl sutures. The marginal gingiva was coronally advanced and anchorage sutures were placed. Horizontal incision was sutured with direct interrupted suture. (Figure 2g). Periodontal pack was also given. Bone graft fill was evident in immediate post operative X ray (Figure 2h).

POST OPERATIVE INSTRUCTIONS

Amoxicillin 500mg thrice daily for 5 days, Ibuprofen 400 mg and Paracetamol 325 mg combination thrice on first day and on thereafter based on requirement for pain control and were prescribed. Patient was asked not to brush the area for at least 7 days post-surgically and asked to clean with cotton pellet dipped in chlorhexidine solution for prevention of plaque and calculus accumulation. Patient was recalled after 10 days for suture and pack removal. At the 10-day postoperative evaluation, healing was satisfactory, and complete root coverage was achieved.

Figure 3: a) Pre-operative view
b) Post operative view after 10 days

DISCUSSION:

PRF clots could have served as an adjunct to accelerate wound healing and reduce bacterial invasion.[10] The release of growth factors such as Platelet-Derived Growth Factor,Vascular Endothelial Growth Factor, and Transforming Growth Factor-beta from platelet rich fibrin promotes angiogenesis, fibroblast proliferation, and matrix synthesis, all of which are essential for periodontal regeneration.[11,12] Furthermore, the fibrin network provides a scaffold for cell migration, thereby enhancing both soft and hard tissue healing (4). The injectable form (i-PRF), when combined with a bone graft to form Sticky bone, improves graft handling, ensures space maintenance, and prolongs the release of growth factors, which collectively increase the regenerative potential.[13,14]

The tunnel flap approach resulted in intact papillary attachment, thereby improving esthetic outcome and reducing sequelae of post-surgical gingival recession. In contrast, conventional access flaps often risk papilla loss and compromise soft tissue esthetics in the anterior zone. The VISTA technique, first introduced

by Zadeh[7], offers a minimally invasive alternative by creating a vestibular access incision, which allows for coronal advancement of the marginal gingiva without vertical releasing incisions. This ensures preservation of interdental papilla and a tension-free closure of the surgical site.

Minimally invasive mucogingival tissue manipulation further aided in reducing flap dehiscence and promoting uneventful healing. Studies have shown that primary closure of the surgical site is one of the most important predictors for regenerative success[15]. In this case, the systematic use of incisions and anchorage suturing helped achieve stable wound closure, which favored clot stability and optimal healing conditions.

Additionally, the use of splinting prior to surgery stabilized the mobile tooth, which is an essential prerequisite for periodontal regeneration. Tooth mobility compromises wound stability and clot formation, leading to unpredictable regenerative outcomes.[2] The pre-surgical stabilization allowed for better healing conditions and improved prognosis of the treated tooth.

The choice of graft material also plays an important role. Xenograft provided osteoconductive properties, while i-PRF enriched the graft with biologically active molecules. The synergistic effect of these materials, together with the L-PRF membrane used as a biologic barrier, supported bone fill and soft tissue healing.[17,18]

The case report by Palombo et al[19] highlights the potential of combining mucogingival therapy with regenerative approaches to simultaneously manage gingival recession and associated intra-bony defects. The connective tissue graft wall technique served not only to achieve predictable root coverage but also to provide a biologically stable environment conducive to periodontal regeneration. The successful clinical outcomes observed the three-year follow-up, including soft-tissue stability and improved periodontal architecture, support the idea that soft-tissue grafts can play a dual role - as a root-coverage modality and as a biological scaffold for regeneration.

Overall, the success of this case can be attributed to the combined effect of:

1. Biological potential of PRF formulations, which promoted soft and hard tissue healing.
2. Minimally invasive VISTA approach, which preserved papillary architecture and optimized esthetics.
3. Stable graft placement with Sticky bone, which enhanced space maintenance and regenerative outcomes.
4. Tooth stabilization by splinting, which contributed to improved wound stability.

CONCLUSION

The present case demonstrates that the combination of Sticky bone (Xenograft + i-PRF) with the VISTA technique is an effective and minimally invasive approach for managing intrabony periodontal defects in the esthetic zone. This method preserved interdental papilla, enhanced graft stability, and promoted favorable healing with improved esthetic and functional outcomes. The integration of autologous platelet concentrates with regenerative surgical techniques can therefore serve as a predictable option in periodontal regeneration, especially in cases demanding both biologic and esthetic success. Long-term follow-up and radiographic assessment are required to evaluate the stability and predictability of the achieved clinical outcomes.

REFERENCES

1. Zadeh HH. Minimally invasive treatment of maxillary anterior gingival recession defects by vestibular incision subperiosteal tunnel access and platelet-derived growth factor-BB. Int J Periodontics Restorative Dent. 2011;31(6):653-60.
2. Cortellini P, Tonetti MS. Clinical concepts for regenerative therapy in intrabony defects. Periodontol 2000. 2015;68(1):282-307.
3. Aroca S, Molnár B, Windisch P, Gera I, Salvi GE, Nikolidakis D, et al. Treatment of multipleadjacent Miller class I and II gingival recessions with a modified coronally advanced flap and a xenogeneic collagen matrix: a randomized controlled clinical trial. J Clin Periodontol. 2013;40(1):82-9.
4. Schlegel KA, Fichtner G, Schultze-Mosgau S, Wiltfang J. Histologic findings in sinus augmentation with autogenous bone chips versus a bovine bone substitute. Int J Oral Maxillofac Implants. 2003;18(1):53-8.
5. Traini T, Valentini P, Iezzi G, Piattelli A. A histologic and histomorphometric evaluation of anorganic bovine bone retrieved 9 years after a sinus augmentation procedure. J Periodontol. 2007;78(5):955-61.
6. Sanz M, Herrera D, Kebschull M, Chapple I, Jepsen S, Berglundh T, Sculean A, Tonetti MS; EFP Workshop Participants and Methodological Consultants. Treatment of stage I–III periodontitis–The EFP S3 level clinical practice guideline. *J Clin Periodontol.* 2020 Jul;47 Suppl 22(S22):4-60. doi:10.1111/jcpe.13290.
7. Zadeh HH, Borzabadi-Farahani A, Fotovat M, Kim SH. Vestibular incision subperiosteal tunnel access (VISTA) for surgically facilitated orthodontic therapy (SFOT). Contemp Clin Dent. 2019;10(3):548-53.
8. Sareen V, KS, Saxena I, et al. Role of sticky bone in the management of various alveolar bone defects: a systematic review. Cureus. 2024;16(7):e63561.
9. Miron RJ, Fujioka-Kobayashi M, Sculean A, Zhang Y. Optimization of platelet-rich fibrin. Periodontol 2000. 2024;94(1):79-91.
10. Polak D, Wilensky A, Shapira L, Weiss EI, Houri-Haddad Y. Efficacy of platelet-rich fibrin in treating intrabony defects: a systematic review and meta-analysis. J Clin Periodontol. 2019;46(6):572-85.
11. Dohan Ehrenfest DM, Rasmusson L, Albrektsson T. Classification of platelet concentrates: from pure platelet-rich plasma (P-PRP) to leucocyte- and platelet-rich fibrin (L-PRF). Trends Biotechnol. 2009;27(3):158-67.
12. Kobayashi E, Flückiger L, Fujioka-Kobayashi M, Sawada K, Sculean A, Schaller B, et al. Comparative release of growth factors from PRP, PRF, and advanced-PRF. Clin Oral Investig. 2016;20(9):2353-60.
13. Choukroun J, Adda F, Schoeffler C, Vervelle A. PRF: an opportunity in perio-implantology. Implantodontie. 2001;42:55-62.
14. Sohn DS. Bone regeneration using the sticky bone technique. Implantology. 2013;17:54-64.
15. Miron RJ, Fujioka-Kobayashi M, Bishara M, Zhang

Y, Hernandez M, Choukroun J. Platelet-rich fibrin and soft tissue wound healing: a systematic review. Tissue Eng Part B Rev. 2017;23(1):83-99.

16. Lindhe J, Nyman S. The effect of progressive tooth mobility on destructive periodontitis in the dog. J Clin Periodontol. 1977;4(1):49-59.

17. Kim YK, Lee J, Um IW, Kim KW, Murata M, Akazawa T, et al. Tooth-derived bone graft material. J Korean Assoc Oral Maxillofac Surg. 2013;39(3): 103-11.

18. Castro AB, Meschi N, Temmerman A, Pinto N, Lambrechts P, Teughels W, et al. Regenerative potential of leucocyte- and platelet-rich fibrin. Part A: intra-bony defects, furcation defects and periodontal plastic surgery. A systematic review and meta-analysis. J Clin Periodontol. 2017;44(1):67-82

19. Palombo D. Simultaneous periodontal regeneration and root coverage by means of soft tissue grafting. Perio Clínica, No. 31: State of the Art Periodontal Regeneration; 2025.

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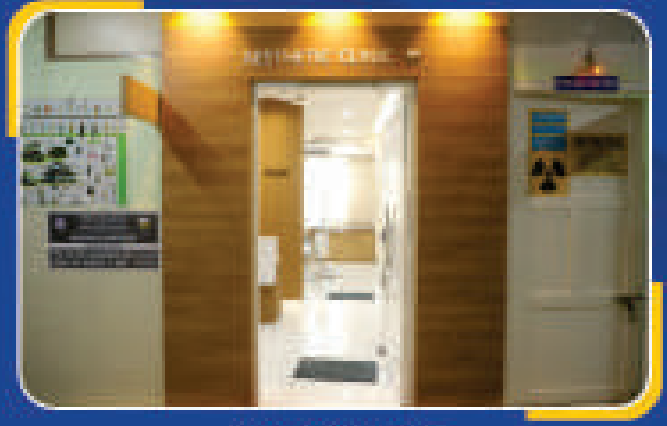

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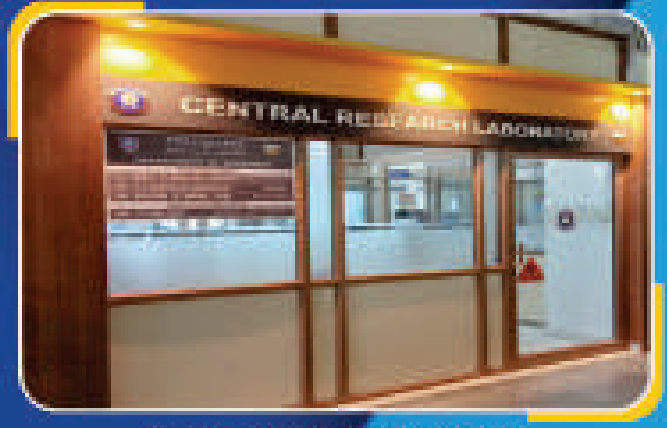

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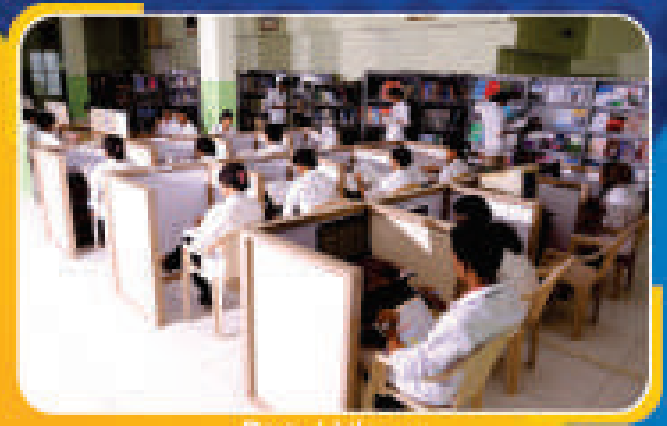

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