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# Knowledge, Attitudes and Practices regarding dental vibe injection-comfort system amongst undergraduates and house officers at the private dental institute

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**ABSTRACT**

**Objective:**

To assess the knowledge, attitudes and practices of final year dental students and house officers regarding the Dental Vibe Injection comfort system in reducing pain during local anesthesia administration

**Methods:**

A descriptive cross-sectional study was conducted involving House officers and final year dental students at LCMD, employing convenience sampling technique and sample size will be calculated via open-epi software that provide sample size of 137. However, data was collected via online Google forms comprising of a valid and reliable self-administered questionnaire with close ended questions.

**Results and conclusion**

More than half (56.4%) of the participants frequently encounter patient anxiety during LA, while a smaller group (35.0%) experienced it occasionally. Probably as a result of less clinical exposure, only 8.6% have not yet encountered this difficulty. Despite clinical limitations and difficulties, the majority (74.3%) acknowledge infection as a factor affecting LA efficacy. Only 22.1% of participants said that patient anxiety had no effect on their confidence, whereas the majority (77.9%) said that it did. The study shows how crucial it is to have a solid basis in dental education regarding patient communication, anxiety management, and the use of cutting-edge technologies.

**Key Words:**

Dental vibe comfort system, local anesthesia, awareness and attitude

## Introduction

Dental treatment is almost always associated with anxiety, with patients wary of needles and the dental drill. Over the years many techniques have been developed to make dentistry as anxiety free and painless as is possible. Many techniques have been invented to reduce the pain associated with needle insertion during Local Anesthesia administration (1). Apart from warming the anesthetic to inserting the needle at a certain angle to the mucosa, Dental literature contains several methods of painless needle insertion. Recent times have seen the entry of tactile distraction and tactile stimulatory products as well as computer controlled dental anesthesia administration devices into the dental market (2).

Davoudi et al, (2016) conducted a review that aims to the effects of cooling techniques, warming techniques, pH buffering and devices to alleviate pain and discomfort of local anaesthesia which concludes that using ice and computer controlled local anaesthetic delivery system seems more promising in alleviating discomfort and pain during local anaesthesia. Alanazi et al, (2019) determine the discomfort and fear related to maxillary local anaesthesia infiltration along with vibrating devices and external cold methods. Control intervention was done using 24mm 30 gauge needle and 2% lidocaine constituted external cold application and cases were of intervention of vibratory device(3) .study concluded that different method like cold application and vibratory devices can be used to reduce discomfort among children especially.

Local anesthesia is required for a painless dental procedure and serves as the foundation of pain management strategies. However, giving children a local anesthetic injection is one of the procedures that cause the most anxiety(4). Perception of pain during administration of local anesthesia, which compared the efficacy of various passive, active, and passive-active distraction strategies. During the administration of local anesthesia,

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the distraction methods examined all had similar effects on reducing pain perception(5).
Several methods have signified the role of alternative methods to reduce pain during local anesthesia and concomitantly diminishing dental fear and anxiety(6). However, the question arises, as to what extent `dental students are aware of the modern pain management devices, here in Karachi. This study will further aim to create awareness among the Pakistani dental community about the Dental Vibe Injection-Comfort system and its role in pain free dentistry(7).
Current era of advancement in healthcare fields demands the health care professionals to be up to date and aware of newer tech-tools introduced. However, the emergences of pain free dentistry introduced devices that are least invasive and come with diminish pain so is the advent of dental vibe comfort system(8,9). Nevertheless, its application is not been practiced widely due to lack of knowledge and awareness. Current study will evaluate the knowledge amongst graduates and undergraduates regarding this to bridge the gap of information.

## Objective

The aim of the study is to assess the knowledge and awareness regarding dental vibes comfort system in reducing pain during local anesthesia administration amongst dental graduates and undergraduates.

## Methodology

The study follows descriptive Cross-sectional Survey design whilst the participants include house officers and final year dental students in private and public sector dental institutes. It took 4 months after the approval from IRB. A total of 137 subjects were recruited as per generated sample size from online software that is Open epi with CI of 95% following convenience sampling technique. A structured close-ended questionnaire was designed and checked for validity with pilot run of 15 questionnaires was conducted where questions with values higher than 0.7 were retained and rest were revised and excluded accordingly. A total of 17 items were included in an online google form-based survey where apart from demographics, knowledge and perception regarding painless anesthesia techniques were assessed and to what extent students and graduates know about latest techniques and devices that are being used worldwide.

## Results

This study was carried out from 140 participants which showed that the majority of participants (47.1%) were in their BDS final year, followed by house officers (32.9%) and 3rd-year students (20.0%). More than half (56.4%) of the participants frequently encounter patient anxiety during LA, while a smaller group (35.0%) experienced it occasionally. Probably as a result of less clinical exposure, only 8.6% have not yet encountered this difficulty. Despite clinical limitations and difficulties, the majority (74.3%) acknowledge infection as a factor affecting LA efficacy. Only 22.1% of participants said that patient anxiety had no effect on their confidence, whereas the majority (77.9%) said that it did. The overwhelming majority (88.6%) take a proactive stance by using techniques to lessen discomfort and anxiety. Almost all participants (92.9%) believe that explaining the procedure helps reduce patient anxiety, indicating the importance of communication in improving patient comfort. Furthermore, 82.1% agree that needle phobia significantly heightens patient anxiety and reluctance toward treatment. While 25.0% have heard of the Dental vibe injection system, only 25.0% understand its mode of action, with 48.6% identifying its vibratory mechanism correctly. This indicates limited awareness and training regarding such innovative tools. Nearly half (48.6%) agree that vibratory sensations can close the pain gate, reducing injection pain, aligning with the theoretical basis of vibratory techniques like Dental vibe as shown in Table 1.Pain reduction is one of the major purpose for administering local anesthesia among patients (62%) followed by procedural preparation (20%) shown in Figure 1.

Table 1:Frequency of KAP regarding Dental Vibe injection among undergraduates and graduates

| **Characteristics** | | **N** | **%** |
|---|---|---|---|
| Level of study | 3rd year student | 28 | 20.0 |
| | final year student | 66 | 47.1 |
| | house officers | 46 | 32.9 |
| Facing patient anxiety during LA | not yet | 12 | 8.6 |
| | sometime | 49 | 35.0 |
| | yes | 79 | 56.4 |
| Does infection affect LA efficacy | No | 6 | 4.3 |
| | sometimes | 30 | 21.4 |
| | Yes | 104 | 74.3 |
| does patient anxiety affects your confidence | no | 31 | 22.1 |
| | yes sometime | 109 | 77.9 |

| | | | |
|---|---|---|---|
| do you use different methods to reduce pain and anxiety | No | 16 | 11.4 |
| | Yes | 124 | 88.6 |
| Techniques that you employ to reduce needle pain during local anesthesia administration | distraction and reassurance technique | 79 | 56.4 |
| | local pressure technique | 31 | 22.1 |
| | precooling technique | 3 | 2.1 |
| | slow rate administration | 27 | 19.3 |
| do you explain procedure to patient to reduce anxiety | it does not help | 6 | 4.3 |
| | No | 4 | 2.9 |
| | yes | 130 | 92.9 |
| do you think that topical anesthesia reduces needle pain | No | 9 | 6.4 |
| | sometime | 51 | 36.4 |
| | Yes | 80 | 57.1 |
| do you think needle phobia makes patient more anxious and reluctant towards dental treatment | Maybe | 16 | 11.4 |
| | No | 9 | 6.4 |
| | Yes | 115 | 82.1 |
| would you want to venture more in advance techniques of administering local anesthesia | Maybe | 15 | 10.7 |
| | No | 17 | 12.1 |
| | Yes | 108 | 77.1 |
| have you ever come across the term dental vibe injection system | No | 105 | 75.0 |
| | yes | 35 | 25.0 |
| if yes than, do you have any idea about mode of action of dental vibe injection | No | 90 | 64.3 |
| | Yes | 35 | 25.0 |
| | N/A | 15 | 10.7 |
| if yes, then please select the option that demonstrate the mode of action of dental vibe injection system | Don't know | 3 | 2.1 |
| | it is based on computer assisted injection system | 24 | 17.1 |
| | it is based on tactile mechanism | 6 | 4.3 |
| | it is based on vibratory mechanism of action | 68 | 48.6 |
| do you agree with the statement that vibratory the sensation of vibration reaches the brain first, and this results in closure of the pain gate to the sensation of the pain of injection | Maybe | 59 | 42.1 |
| | No | 13 | 9.3 |
| | Yes | 68 | 48.6 |

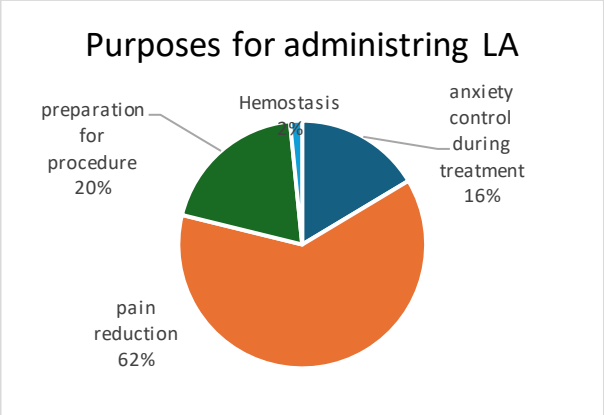


Figure 1:Different purposes for administering local anesthesia among patients

Significant associations as shown in table 2 suggest that clinical exposure and experience influence many aspects of LA practice, including understanding complications, patient management strategies, and innovative tools. However, consistent gaps across all levels in knowledge of advanced technologies like the Dental Vibe system highlight the need for targeted educational interventions. Figure 2 showed that only 25% of students and house officers are aware of Dental vibe term.

Table 2:Association of graduate and undergraduates with dental vibe injection system

| | Characteristics | $X^2$ | p-value |
|---|---|---|---|
| **Level of study** | Purpose of administrating LA | 38.6[a] | <0.001* |
| | Facing patient anxiety during LA | 11.7[a] | 0.015* |
| | Does infection affect LA efficacy | 9.3[a] | 0.035* |
| | Does patient anxiety affects your confidence | 14.3 | 0.001* |
| | Do you use different methods to reduce pain and anxiety | 8.3 | 0.015* |
| | Techniques that you employ to reduce needle pain during local anesthesia administration | 24.3[a] | <0.001* |

| | | | |
|---|---|---|---|
| | do you explain procedure to patient to reduce anxiety | 13.2[a] | 0.001* |
| | do you think that topical anesthesia reduces needle pain | 7.2[a] | 0.114 |
| | do you think needle phobia makes patient more anxious and reluctant towards dental treatment | 7.5[a] | 0.096 |
| | would you want to venture more in advance techniques of administering local anesthesia | 8.5[a] | 0.064 |
| | have you ever come across the term dental vibe injection system | 0.44 | 0.81 |
| | if yes than, do you have any idea about mode of action of dental vibe injection | 5.2[a] | 0.261 |
| | if yes, then please select the option that demonstrate the mode of action of dental vibe injection system | 23.2[a] | 0.002* |
| | do you agree with the statement that vibratory the sensation of vibration reaches the brain first, and this results in closure of the pain gate to the sensation of the pain of injection | 13.7[a] | 0.006* |
| [a] Fisher exact test applied | | | |
| [b] level of significance at or below 5% | | | |

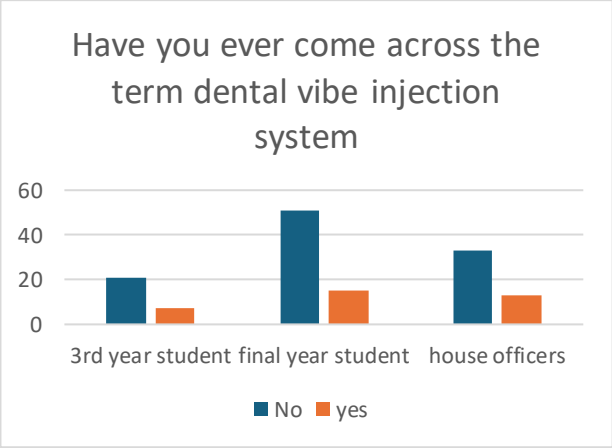


*Figure 2: Frequency of knowledge regarding the term dentalvibe among dental undergraduate and graduates*

**Discussion**

The results of this study shed important light on undergraduate students' and house officers' knowledge, attitudes, and practices (KAP) about the Dental Vibe injection-comfort system at Liaquat College of Medicine and Dentistry. The study emphasizes a number of important facets of dental treatment, namely the use of cutting-edge pain-reduction procedures, patient anxiety, and the administration of local anesthesia (LA) (10).

Final-year BDS students made up the largest percentage of participation (47.1%), followed by house officers (32.9%) and third-year students (20.0%). Effective patient management techniques are necessary in clinical settings, as evidenced by the fact that over half (56.4%) of respondents said they regularly experience patient anxiety during LA. Remarkably, 77.9% of participants stated that patient worry impairs their confidence during procedures, even though the majority (74.3%) acknowledged infection as a factor influencing LA efficacy(11).

Around 88.6% of participants actively use strategies to lessen pain and anxiety during LA administration, with distraction and reassuring approaches being the most popular (56.4%), despite some participants having little clinical exposure. Additionally, 92.9% of respondents concurred that describing procedures to patients greatly reduces their anxiety, highlighting the significance of communication in patient care(12). The need for specialized interventions in clinical training is further highlighted by the broad recognition of needle fear (82.1%) as a significant factor in patient reluctance.

The Dental Vibe injection-comfort system is still not well known; just 25% of participants knew what it was and an equal number realized how it worked. Of them, 48.6% were able to accurately identify the vibratory mechanism of the system, which is consistent with the pain-gating theory. Nonetheless, the low uptake and comprehension of cutting-edge technology such as the Dental Vibe system point to serious deficiencies in instruction and information sharing(13).

Significant correlations between clinical experience and several facets of LA practice, such as controlling patient anxiety, comprehending LA efficacy, and utilizing cutting-edge instruments, were found by statistical analysis. These results imply that greater clinical exposure enhances competence and confidence in patient care management during LA administration(14).

Jung et al, (2017) devised a review to dominant the mechanism of local anesthetic agent and newer techniques to reduce pain and discomfort during anesthesia. In that review article vibratory devices were discussed along with local anesthetic agent(15). Vibratory devices work on mechanism of gates control theory which constitutes the application of pressure and vibration simultaneously that result in neural gates closure and thus pain perception is reduced. Example of vibratory devices are dental vibe ,vibraject, accupal and syringe

microvibrator that were critiqued in the study to draw a conclusion(16).

A cross-sectional study by Hanberger et al, (2021) where the participants were children and adolescent with type 1 diabetes presented to Swedish pediatric diabetic center. In this study children and their parents completed a questionnaire regarding diabetic fear of local injections that were assessed via faces emotional coping scale, facial affective scale, facial effective scale and colored analogue scale(17). The study concludes that the painful needle related procedure among children and adolescent results in poor coping that demands the advent of injection techniques with less pain and discomfort, hence supporting the rationale of the mentioned study (18). An RCT split-mouth open-label was done by Josh et al, (2021). In this study, 50 subjects were chosen who had already scheduled extractions. 25 subjects were given 2% lidocaine gel along with an inferior alveolar nerve block and the other 24 were given dental vibe along with an inferior alveolar nerve block. Measurement of pain felt was recorded using the Visual Analogue Scale [VAS 0 – 10]. Pain recorded by dental vibe subjects was less than pain recorded by 2% lidocaine gel. The conclusion of this study was favoring the dental vibe application and its effectiveness is in reducing pain as compared to 2% lidocaine (19,20).

Shilpapriya et al, (2015) designed a clinical study based on split mouth technique to investigate the effects of vibration stimuli on pain experienced during local anesthetic injections. In this study, 30 subjects were chosen after getting the consent of their parents(21). Subjects were between the ages 6-12 years of both genders, who also need extractions, 30 subjects were divided into two groups of fifteen children received Procaine topical anesthetic gel prior to administration of local anesthesia injection, whereas other 15 received Dental vibe(22). The Universal pain assessment tool was used to assess the pain for both the appointments during the administration of local anesthesia. The result showed that reported mean pain scores were significantly lower in children who had Dental vibe compared to the other group.

Similarly, Nanitsos et al, examined to find out the effects of vibration stimuli on pain experienced during local anesthetic injections via a preliminary study (23). The pain caused by the injection was assessed by visual analogue scale and McGill pain descriptors whilst results of this study were that injections with vibrations had a lower pain rating than injections without vibrations. A study conducted in 2021 by Benavides et al, which was designed to compare the effectiveness of DentalVibe alongside 2% lidocaine gel in reduction of pain felt during the local anesthetic injection administration in adults(24). However, these studies strongly suggest the implementation of alternative anesthesia techniques and their knowledge should be incorporated in undergraduate level to ensure the implementation of evidence based dental practice with newer technologies (25).

**Conclusion**

This study shows that although dental undergraduates and house officers generally take the initiative to help patients feel less anxious and uncomfortable during LA administration, there is a glaring lack of knowledge and instruction on more sophisticated methods, such as the Dental Vibe injection system. The findings emphasize how crucial it is to have a solid basis in dental education regarding patient communication, anxiety management, and the use of cutting-edge technologies.

**Recommendations**

In order to improve knowledge and comprehension of cutting-edge pain-reduction technologies like the Dental Vibe injection-comfort system, dental institutions are advised to adopt focused educational interventions, such as workshops, seminars, and training sessions, in light of the study's findings (26). More supervised clinical exposure can also assist house officers and students in gaining hands-on expertise in advanced approaches and patient anxiety management. To better prepare students for real-world situations, curriculum modifications should incorporate patient-centered care and place an emphasis on communication skills and anxiety control techniques. In order to prepare mentors to instruct students in the application of cutting-edge technology and evidence-based procedures in the administration of local anesthetic, faculty development programs had to be implemented (24). In order to improve patient care and comfort during dental treatments, awareness campaigns and research projects should be supported in order to learn more about the effectiveness of this equipment and acquaint students with their uses.

**References**

1. Madadian MA, Renton T. Local anaesthesia in dentistry–achieving effective painless injections. Dent Update. 2019;46(9):837–46.
2. Pahade A, Bajaj P, Shirbhate U, John HA. Recent Modalities in Pain Control and Local Anesthesia in Dentistry: A Narrative Review. Cureus. 2023;15(11).
3. Renton T. Optimal local anaesthesia for dentistry. In: Optimal Pain Management for the Dental Team. Springer; 2022. p. 101–21.
4. Adami LE, FREITAS O de, FIGUEIREDO FAT de, Ferreira MP, Macedo AP, COUTO RO do, et al. Needle-free anesthesia: clinical efficacy of a mucoadhesive patch for atraumatic anesthesia in dental procedures. Braz Oral Res. 2021;35:e131.
5. Bukhamseen NJ, Shabat MG, Alismail RI, Alshammari NJ, Alqarni AM, Almousa NR, et al. Advancements in Local Anesthesia Techniques in Dentistry: Management and Risk Communication from Traditional to Modern Technological Methods. Journal of International Crisis and Risk Communication Research. 2024;7(2):36–42.
6. Hamdy MN, Mohamed Esmail AEA, Abbas AN. Assessment of VibraJect and DentalVibe Comfort

Systems Efficacy in Relieving of Pain Associated with Local Injection in Children. Al-Azhar Journal of Dental Science. 2022;25(2):203–10.
7. Aghababaie ST, Monteiro J, Stratigaki E, Ashley PF. Techniques for effective local anaesthetic administration for the paediatric patient. Br Dent J. 2020;229(12):779–85.
8. Veneva E, Cholakova R, Raycheva R, Belcheva A. Efficacy of vibrotactile device DentalVibe in reducing injection pain and anxiety during local anaesthesia in paediatric dental patients: a study protocol for a randomised controlled clinical trial. BMJ Open. 2019;9(7):e029460.
9. Putrino A, Abed MR, Marinelli E, Zaami S. Pain Relief in Dental Local Anaesthesia with Vibrational Devices: Much Ado about Nothing? A Scoping Review. J Clin Med. 2023;12(4):1448.
10. Veneva E, Belcheva A, Raycheva R. Vibrotactile devices, DentalVibe, and local anesthesia. In: Treatments, Mechanisms, and Adverse Reactions of Anesthetics and Analgesics. Elsevier; 2022. p. 583–8.
11. Gupta G, Gupta DK, Blaggan A. REDUCTION IN PAIN AND DISCOMFORT DURING LOCAL ANESTHESIA ADMINISTRATION WITH DENTALVIBE IN COMPARISON TO CONVENTIONAL TECHNIQUE FOR DENTAL PROCEDURES: Results from a Clinical Study. Guident. 2023;16(12).
12. Felemban O, Oghli AR, Alsaati II, Alattas LK, Olwi AM, Bagher SM. The effect of DentalVibe on pain and discomfort during local anesthesia in children: a randomized clinical trial. Quintessence Int (Berl). 2021;52(5).
13. Dak-Albab R, Al-Monaqel MB, Koshha R, Shakhashero H, Soudan R. A comparison between the effectiveness of vibration with Dentalvibe and benzocaine gel in relieving pain associated with mandibular injection: a randomized clinical trial. Anaesthesia, Pain & Intensive Care. 2019;43–9.
14. Comite SL, Rahaman S, Malkowiak M. Vibration Anesthesia During Invasive Procedures: A Meta-analysis. J Clin Aesthet Dermatol. 2024;17(10):29.
15. REDDY R, UPADYA VH, SEQUEIRA JP, CHANDRA J. A Randomised Split-Mouth Clinical Trial to Assess the Efficacy of Oroquiver: An Affordable Vibrotactile Device for Dental Injections. Journal of Clinical & Diagnostic Research. 2024;18(1).
16. Menni AC, Radhakrishna AN, Prasad MG. DentalVibe® versus lignocaine hydrochloride 2% gel in pain reduction during inferior alveolar nerve block in children. J Dent Anesth Pain Med. 2020;20(6):397.
17. Gangawane AA, Shah SB, Malankar TE, Mathur A, Ginde SS, Priyanka ML. Comparative evaluation of pain perception during conventional greater palatine injections versus the use of a novel barovibrotactile device-In vivo study. J Oral Biol Craniofac Res. 2022;12(5):542–6.
18. Tatiya N, Singh C, Surana P, Ukey A, Gupta PR, Blesson A. Evaluation of the Efficacy of a Customized Mucosal Vibrator in Alleviating Pain Perception Associated with Local Anesthesia Administration in Children Aged 6–10 Years. Int J Clin Pediatr Dent. 2024;17(4):404.
19. Joshi S, Bhate K, Kshirsagar K, Pawar V, Kakodkar P. DentalVibe reduces pain during the administration of local anesthetic injection in comparison to 2% lignocaine gel: results from a clinical study. J Dent Anesth Pain Med. 2021;21(1):41.
20. Mittal M, Kumar A, Chopra R, Kaur G, Sharma S. Vibrating toothbrush, ice, or topical anesthetic agent to reduce pain of local anesthetic injection in 5-to 12-year-old children undergoing dental procedures—a randomized controlled trial. Ain-Shams Journal of Anesthesiology. 2023;15(1).
21. Remi RV, Anantharaj A, Praveen P, Prathibha RS, Sudhir R. Advances in pediatric dentistry: new approaches to pain control and anxiety reduction in children-a narrative review. J Dent Anesth Pain Med. 2023;23(6):303.
22. Jain N, Juneja P, Masih U, Bhushan AKB, Bhaduaria US, Badjatya K. Efficacy of external cold and a vibrating device in reducing pain and anxiety during local anaesthesia. J Family Med Prim Care. 2021;10(11):4017–22.
23. Narimany R, Faghihian R, Jafarzadeh Samani M. Effectiveness of External Precooling and Vibration Induced by BUZZY on Pain and Anxiety During Inferior Alveolar Nerve Block Injection in Children. Int J Dent. 2024;2024(1):5515522.
24. Mohamed MA, Abuelniel G, Mohamed Yousry Y. Effectiveness of Vibration-Assisted Syringe Versus Conventional Syringe on Pain and Anxiety Perception During Local Anesthetic Injection in Children: Randomized Clinical Trial. Advanced Dental Journal. 2023;5(2):243–54.
25. Elicherla SR, Sahithi V, Saikiran K V, Nunna M, Challa RR, Nuvvula S. Local anesthesia in pediatric dentistry: A literature review on current alternative techniques and approaches. J South Asian Assoc Pediatr Dent. 2021;4(2):148–54.
26. Suohu T, Sharma S, Marwah N, Mishra P. A comparative evaluation of pain perception and comfort of a patient using conventional syringe and buzzy system. Int J Clin Pediatr Dent. 2020;13(1):27.

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Dr. Mahnoor: Correspondence, design, manuscript drafting and data collection
Dr. Syed Omar Ali Islam: Data acquisition and interpretation.
Dr. Usman Nadeem Siddiqui: Drafting the manuscript and reviewing it critically for intellectual content.
Dr. Afshan Qamar: Final approval of the version to be published and agreement to be accountable.