

# Association of Age and Gender Distribution in Patients Undergoing Endodontic Treatment in Maxillary First Molar

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## Abstract

Root canal treatment is the treatment sequence for the infected pulp of a tooth which is intended to result in the elimination of infection and the protection of the decontaminated tooth from future microbial invasion. The pulp tissue is a complex structure that comprises neural, vascular tissue, fiber, ground substances, interstitial fluid, fibroblast, and minor cellular components. The bacteria penetrate through the mineralized portion of the tooth in the form of caries releasing toxic products and subsequent invasion of pulp leading to tooth pain. The details of the 86,000 patient records were reviewed and analyzed, out of which 399 patients who had undergone root canal treatment between June 2019 to March 2020 were included in this study. The details like age, gender, tooth number and the surface of restorations were evaluated and entered in SPSS, version 23. The data were analyzed through a chi-square test. It was observed that, there is no significant association between age, gender distribution in maxillary first molar and the p-value was found to be >0.05 which is statistically not significant. Within the limitations, the left maxillary first molar had undergone more endodontic therapy than the right maxillary first molar and the males had a higher incidence of endodontic treatment than females.

## Keywords:

Endodontic therapy; Endodontic treatment; Maxillary molars; Root canal treatment; RCT

## Introduction

Root canal treatment is the treatment sequence for the infected pulp of a tooth which is intended to result in the elimination of infection and the protection of the decontaminated tooth from future microbial invasion.

The first and foremost purpose of dental treatment is to preserve the tooth, for which root canal therapy is the available and effective treatment procedure to preserve the teeth in the oral cavity. [1]

The studies have shown that patients reporting for root canal therapy came with the chief complaint of toothache and swellings. [2,3]

Studies conducted previously have delineated that maxillary molars were most commonly treated for endodontic procedures, followed by premolars. On the other hand, the least endodontically treated teeth were reported as mandibular incisors. [4]

The success of endodontic therapy depends upon the extent of caries, adequate cleaning and shaping, and proper obturation of the root canal. [5]

In spite of all procedural protocol if clinicians miss an additional root canal it could pose a great challenge and lead to failure of root canal treatment. [6]

In maxillary first permanent molars, the broad buccolingual dimension of the mesiobuccal root and associated concavities on its mesial and distal surface is consistent with the majority of the mesiobuccal roots having two canals while there is usually a single canal in each of the distobuccal and palatal roots. [7,8]

Maxillary molars are commonly encountered with additional MB2 canals and the incidence has been reported between 18% and 96.1%. [9-11]

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The incidence of two canals in the distobuccal root was recorded between 1.9%-4.3%. [12] Cleghorn et al in his review have also reported 99% incidence of more than one canal in the palatal root. [13]

In the long run, the success of the root canal treatment depends on the quality of the treatment done by the clinician and the patient's oral care. Previously our team has a rich experience in working on various research projects across multiple disciplines. [14-28] Now the growing trend in this area motivated us to pursue this project.

The aim of the study is to find the association of age and gender with patients undergoing endodontic treatment in maxillary molars.

## Materials and Methods

### Study settings

This study is a university setting, conducted at Saveetha Dental College. Root canal treated patients were included in this study. Approval was obtained from the Institutional Committee [IEC] and examiners were involved in this study.

### Sample collection

In this retrospective study, the details of the 86,000 patient records were reviewed and analyzed, Out of which 399 patients who had undergone root canal treatment between June 2019 to March 2020 were included in this study. Cross verification of data, was done by the presence of additional reviewers and by photographic evaluation. Simple random sampling was done to minimize sampling bias. It was generalized to the South Indian population.

### Data collection/tabulation

DIAS (Dental Information Archiving Software) records of all the patients who underwent root canal treatment in maxillary first molar were collected from initial to last in the chronological order. The data verification was done based on age, sex, and teeth. [16,26] The data was entered in the excel sheet in a methodical manner and was imported to SPSS. Incomplete and censored data were excluded from the study.

### Analysis

IBM SPSS 23.0 software was used for data analysis. Independent variables include age, gender, and dependent variables include teeth number. [16,26] Descriptive statistics include the frequency of distribution of age, sex, and teeth no, while inferential statistics include the chi-square test.

## Results and Discussion

Out of 399 patients, 185 of them are females and 214 patients were males. Different age groups of patients undergoing endodontic treatment in the maxillary first molar highest number of people were recorded between 18-30 years 42.9%, followed by 31-40 years 31.1%. On analyzing the association

between age and tooth number, there is no significant difference seen ( $p$ -value $>0.05$ ) [Table 1]. However, among 18-30 years of patients had undergone maximum RCT in maxillary right molar [Figure 1]. [16] The relationship between gender and endodontic treatment is depicted in [Table 2, Figure 2]. The graph shows an inclination in males compared to females. The males had 63.13% treated while females were recorded with 54.57%. However, we can contemplate that the  $p$ -value is 0.512 which is statistically not significant ( $p$ -value $>0.05$ ).

The maxillary first permanent molar is the earliest permanent teeth to erupt in the oral cavity along with the maxillary and mandibular incisors. Due to its long term existence in the oral cavity compared to other teeth and its placement at the posterior position makes it more vulnerable to caries susceptibility.

In this study, it is observed that there is no significant association between age and gender in the patients who underwent endodontic treatment in the maxillary first molar ( $p$ -value $>0.05$ ). Also, it is observed that the left maxillary first molar had undergone maximum endodontic treatment compared to the right maxillary first molar.

Most of the patients who reported for endodontic therapy were males but this seems to be in contrast to the study reported by Umanah et al. where the higher incidence of females was recorded compared to males. [1] He had stated that females are more concerned about their breath and oral care compared to males. The highest incidence of endodontic treatment was recorded between 18-30 years of age. Studies of Farrell and Burke have also shown the maximum number of cases of endodontic treatment was done between twenty-one to thirty years of age group. [29] In this study we have concentrated purely on maxillary first molar teeth undergoing root canal therapy, this is because maxillary teeth are in agreement with the study of Scavo et al. [30] and Al Negrish et al. [31] They both have reviewed 55.69% and 77.7% of RCT performed on maxillary incisors are more frequently root canal treated than maxillary molars. [32]

Ridell et al. have suggested that frequent involvement of RCT in mandibular molars due to its early eruption and high susceptibility to caries compared to other teeth. [13] In an order of susceptibility to caries incidence in teeth mandibular 2<sup>nd</sup> molar most susceptible, followed by maxillary and mandibular 2<sup>nd</sup> premolars, maxillary and mandibular 1<sup>st</sup> premolar, maxillary central and lateral incisors, maxillary and mandibular canines with mandibular central and lateral incisors being least susceptible teeth. [33,34] The maxillary and mandibular incisors undergoing root canal treatment are more commonly attributed to trauma and this is seen more commonly in the 2<sup>nd</sup> and 3<sup>rd</sup> decade of life. [35]

The *in-vitro* studies conducted at our university were, [36-38] the *in vivo* studies include, [39-41] the molecular study, [42] the reviews and systematic reviews published are, [43-46] the surveys conducted [47,48] and the clinical trial conducted on root canal irrigants were. [49,50] Currently, we are analyzing the

retrospective studies, in this study we have evaluated the root canal treatment done maxillary first molar.

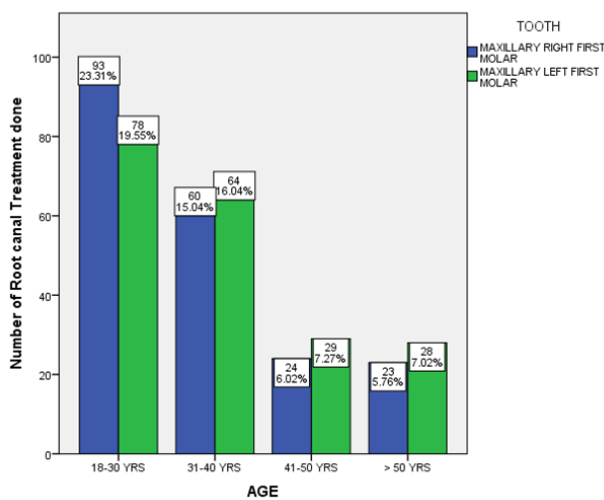
Weine et al. in 1969 had noted that the highest number of root canal failures occurred in the maxillary first molar due to MB root. On further investigation, it was found that the chances of the additional canal were at a higher incidence in MB root. [51] Cleghorn et al., found that the incidence of two canals in the MB root was 56.8% and of one canal was 43.1%. The incidence of two canals in the MB root was higher in laboratory studies (60.5%) compared to clinical studies (54.7%). Palatal root showed rare variation, and the results

were reported from 14 studies comprising 2576 teeth. In the palatal root, the prevalence values of a single canal and single foramina were 99% and 98.8%, respectively. [13] Our institution is passionate about high quality evidence based research and has excelled in various fields. [52-58] We hope this study adds to this rich legacy.

The limitations of the study include the limited sample size and time frame. The future scope of the study is to extend the data collection into a wider range of population and to analyze the frequency of endodontic treatments and its distribution based on age, other tooth numbers.

**Table 1: Association between age groups and the root canal treatment done in maxillary molars. In the age groups of 18-30 years (42.9%) patients underwent more root canal treatment in maxillary molar when compared to other groups, where Pearson Square test shows no significant difference p-value=0.493 (p>0.05).**

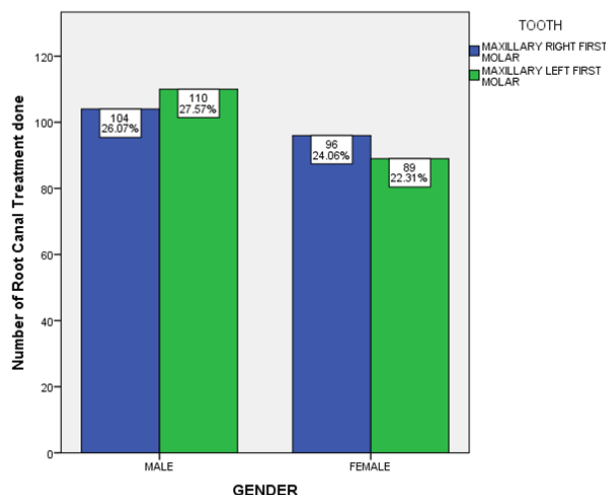
Age	Tooth		Total	Chi square value	p value
	Maxillary right first molar	Maxillary left first molar			
18-30 yrs	93	78	171	2.404	.493
31-40 yrs	60	64	124		
41-50 yrs	24	29	53		
>50 yrs	23	28	51		
Total	200	199	399		



**Figure 1:** Bar graph depicting the association between distribution of age and number of Root canals done in permanent maxillary first molar. X axis: Age; Y axis: No. of root canal done in maxillary first molar. Root canal treatments done in Maxillary right first molar (Blue) and maxillary left first molar (Green) in 18-30 years followed by 31-40 years. On analyzing the association between age and tooth number, Pearson chi square p value=0.493 (p>0.05) implying no significant difference.

**Table 2: Association between gender and the maxillary molars. Male patients had more root canal treatment compared to female patients. However, the Pearson chi square p value=0.512, (p>0.05) implying no significant difference.**

Gender	Tooth		Total	Chi square Value	P value
	Maxillary right first molar	Maxillary left first molar			
Male	104	110	214	.431	.512
Female	96	89	185		
Total	200	199	399		



**Figure 2:** Bar graph shows the distribution of Gender and the number of root canals done in Maxillary molars. X axis: Gender; Y axis: no. of root canal done in maxillary first molar. Root canal treatments done in maxillary right first molar (Blue) and maxillary left first molar (Green) were more in male patients compared to female patients. However, the Pearson chi square p value=0.512, ( $p>0.05$ ) implying no significant difference.

## Conclusion

From this study, it is evident that male patients have undergone maximum endodontic procedures compared to females and the highest number of procedures is recorded between the 18-30 years age group of patients. This represents the lack of awareness and negligence of oral health care among young age group people. Regular follow-ups aid in assessing oral health and should be done at least on a yearly basis to monitor any changes.

## Author Contributions

All the authors contributed equally to the research.

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## Conflict of Interest

Nil

## References

1. Umanah A, Osagbemi B, Arigbede A. Pattern of demand for endodontic treatment by adult patients in port-harcourt, South-South Nigeria. *J West Afr Coll Surg.* 2012;2(3):12–23.
2. Baidaa M, Zeidan BDSMS, Mohammed K, Gholam BDSMS, Firas Saddam OBDSMS. Evaluation of endodontic treatment in three specialized private clinics in Baghdad (retrospective study). *Mustansiria Dental Journal.* 2011;8(3):233–6.
3. Boykin MJ, Gilbert GH, Tilashalski KR, Shelton BJ. Incidence of endodontic treatment: A 48-month prospective study. *J Endod.* 2003;29(12):806–9.

4. Omitola OG, Osagbemi B, Akadiri OA. Spectrum of diseases and pattern of referral at the Oral Diagnosis Clinic of a tertiary dental center. *Niger Dent J.* 2011;19(2):66–70.
5. Sherwani OAK, Kapoor B, Sharma R, Mishra SK. Endodontic management of maxillary first molar with atypical canal morphology: Report of three cases. *Contemp Clin Dent.* 2016;7(4):550–4.
6. Tripathi R. Prevalence of additional canals in maxillary first molar in a Nepalese population: A clinical study. *Am J Biomed Sci.* 2019;1(1):29–31.
7. Ash. Wheeler's dental anatomy, physiology and occlusion (8th Edition). Elsevier (A division of reed Elsevier India Pvt. limited); 2003.523.
8. Malagnino V, Gallotini L, Passariello P. Some unusual clinical cases on root anatomy of permanent maxillary molars. *J Endod.* 1997;23(2):127–8.
9. Buhrey L, Barrows M, Begole E, Wenckus C. Effect of magnification on locating the mb2 canal in maxillary molars. *J Endod.* 2002; 28(4):324–7.
10. Gulabivala K, Opananon A, Ng YL, Alavi A. Root and canal morphology of Thai mandibular molars. *Int Endod J.* 2002;35(1): 56–62.
11. Alavi AM, Opananon A, Ng YL, Gulabivala K. Root and canal morphology of Thai maxillary molars. *Int Endod J.* 2002;35(1): 478–85.
12. Thomas RP, Moule AJ, Bryant R. Root canal morphology of maxillary permanent first molar teeth at various ages. *Int Endod J.* 1993; 26(1):257–67.
13. Cleghorn BM, Christie WH, Dong CCS. Root and root canal morphology of the human permanent maxillary first molar: A literature review. *J Endod.* 2006;32(9):813–21.
14. Ponnulakshmi R, Shyamaladevi B, Vijayalakshmi P, Selvaraj J. In silico and in vivo analysis to identify the antidiabetic activity of beta sitosterol in adipose tissue of high fat diet and sucrose induced type-2 diabetic experimental rats. *Toxicol Mech Methods.* 2019;29(4):276–90.
15. Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial. *Clin Oral Investig.* 2020;24(9):3275–80.
16. Subramaniam N, Muthukrishnan A. Oral mucositis and microbial colonization in oral cancer patients undergoing radiotherapy and chemotherapy: A prospective analysis in a tertiary care dental hospital. *J Investig Clin Dent.* 2019;10(4):e12454.
17. Girija ASS, Shankar EM, Larsson M. Could SARS-CoV-2-Induced hyperinflammation magnify the severity of coronavirus disease (covid-19) leading to acute respiratory distress syndrome? *Front Immunol.* 2020;27(11):1206.
18. Dinesh S, Kumaran P, Mohanamurugan S, Vijay R, Singaravelu DL, Vinod A, et al. Influence of wood dust fillers on the mechanical, thermal, water absorption and biodegradation characteristics of jute fiber epoxy composites. *J Polym Res.* 2020;27(1).
19. Thanikodi S, Singaravelu DKDevarajan C, Venkatraman V, Rathinavelu V. Teaching learning optimization and neural network for the effective prediction of heat transfer rates in tube heat exchangers. *Therm Sci.* 2020;24(1B):575–81.
20. Murugan MA, Jayaseelan V, Jayabalakrishnan D, Maridurai T, Kumar SS, Ramesh G, et al. Low velocity impact and mechanical behaviour of shot blasted SiC wire-mesh and silane-treated aloevera/hemp/flax-reinforced SiC whisker modified epoxy resin composites. *Silicon Chem.* 2020;12(8):1847–56.



21. Vadivel JK, Govindarajan M, Somasundaram E, Muthukrishnan A. Mast cell expression in oral lichen planus: A systematic review. *J Investig Clin Dent*. 2019;10(4):e12457.
22. Chen F, Tang Y, Sun Y, Veeraraghavan VP, Mohan SK, Cui C. 6-shogaol, a active constituents of ginger prevents UVB radiation mediated inflammation and oxidative stress through modulating NrF2 signaling in human epidermal keratinocytes (HaCaT cells). *J Photochem Photobiol B*. 2019;197:111518.
23. Manickam A, Devarasan E, Manogaran G, Priyan MK, Varatharajan R, Hsu C-H, et al. Score level based latent fingerprint enhancement and matching using SIFT feature. *Multimed Tools Appl*. 2019;78(3):3065–85.
24. Wu F, Zhu J, Li G, Wang J, Veeraraghavan VP, Krishna Mohan S, et al. Biologically synthesized green gold nanoparticles from induce growth-inhibitory effect on melanoma cells (B16). *Artif Cells Nanomed Biotechnol*. 2019;47(1):3297–305.
25. Ma Y, Karunakaran T, Veeraraghavan VP, Mohan SK, Li S. Sesame inhibits cell proliferation and induces apoptosis through inhibition of STAT-3 translocation in thyroid cancer cell lines (FTC-133). *Biotechnol Bioprocess Eng*. 2019;24(4):646–52.
26. Ponnaniakamideen M, Rajeshkumar S, Vanaja M, Annadurai G. In vivo type 2 diabetes and wound-healing effects of antioxidant gold nanoparticles synthesized using the insulin plant *Chamaecostus cuspidatus* in albino rats. *Can J Diabetes*. 2019;43(2):82–9.e6.
27. Vairavel M, Devaraj E, Shanmugam R. An eco-friendly synthesis of *Enterococcus* sp.-mediated gold nanoparticle induces cytotoxicity in human colorectal cancer cells. *Environ SciPollut Res Int*. 2020;27(8):8166–75.
28. Paramasivam A, Priyadharsini VJ, Raghunandhakumar S. N6-adenosine methylation (m6A): a promising new molecular target in hypertension and cardiovascular diseases. *Hypertens Res*. 2020;43(2):153–4.
29. Farrell TH, Burke FJ. Root canal treatment in the general dental service 1948-1987. *British Dental Journal*. 1989;166(1):203–8.
30. Scavo R, Lalis RM, Zmener O, DiPietro S, Grana D, Pameijer CH. Frequency and distribution of teeth requiring endodontic therapy in an Argentine population attending a specialty clinic in endodontics. *Int Dent J*. 2011; 61(1):257–60.
31. Al-Negrish ARS. Incidence and distribution of root canal treatment in the dentition among a Jordanian sub population. *Int Dent J*. 2002;52(3):125–9.
32. De Quadros I, Gomes BPFA, Zaia AA, Ferraz CCR, Souza-Filho FJ. Evaluation of endodontic treatments performed by students in a Brazilian Dental School. *J Dent Educ*. 2005;69(10):1161–70.
33. Ridell K, Sundin B, Matsson L. Endodontic treatment during childhood and adolescence. A survey of 19-year-olds living in the city of Malmö, Sweden. *Swed Dent J*. 2003;27(2):83–9.
34. Macek MD, Beltran-Aguilar ED, Lockwood SA, Malvitz DM. Updated comparison of the caries susceptibility of various morphological types of permanent teeth. *J Pub Health Dent*. 2003; 63(1): 174–82.
35. Hopcraft MS, Morgan MV. Pattern of dental caries experience on tooth surfaces in an adult population. *Community Dent Oral Epidemiol*. 2006;34(3):174–83.
36. Rajendran R, Kunjusankaran RN, Sandhya R, Anilkumar A, Santhosh R, Patil SR. comparative evaluation of remineralizing potential of a paste containing bioactive glass and a topical cream containing casein phosphopeptide-amorphous calcium phosphate: An in vitro study. *Pesbrasilemodontoclínica Int*. 2019;19(1):1–10.
37. Janani K, Palanivelu A, Sandhya R. Diagnostic accuracy of dental pulse oximeter with customized sensor holder, thermal test and electric pulp test for the evaluation of pulp vitality: An in vivo study. *Brazilian Dental Science*. 2020;23(1):8.
38. Ramanathan S, Solete P. Cone-beam computed tomography evaluation of root canal preparation using various rotary instruments: An in vitro study. *J Contemp Dent Pract*. 2015;16(11):869–72.
39. Siddique R, Sureshababu NM, Somasundaram J, Jacob B, Selvam D. Qualitative and quantitative analysis of precipitate formation following interaction of chlorhexidine with sodium hypochlorite, neem, and tulsi. *J Conserv Dent*. 2019;22(1):40–7.
40. Nasim I, Hussainy S, Thomas T, Ranjan M. Clinical performance of resin-modified glass ionomer cement, flowable composite, and polyacid-modified resin composite in noncarious cervical lesions: One-year follow-up. *J Conserv Dent*. 2018; 21:510.
41. Nasim I, Nandakumar M. Comparative evaluation of grape seed and cranberry extracts in preventing enamel erosion: An optical emission spectrometric analysis. *J Conserv Dent*. 2018;21:516.
42. Teja KV, Ramesh S, Priya V. Regulation of matrix metalloproteinase-3 gene expression in inflammation: A molecular study. *J Conserv Dent*. 2018;21(6):592–6.
43. R R, Rajakeerthi R, Ms N. Natural Product as the Storage medium for an avulsed tooth – A Systematic Review. *Cumhuriyet Dental Journal*. 2019; 28(2):249–56.
44. Kumar D, Antony S. Calcified canal and negotiation-A review. *Res J Pharm Tech*. 2018;11(8):3727–30.
45. Ravinthar K, Jayalakshmi L. Recent advancements in laminates and veneers in dentistry. *Res J Pharm Tech*. 2018;11(2):785–7.
46. Noor S, Others. Chlorhexidine: Its properties and effects. *Res J Pharm Tech*. 2016;9(10):1755–60.
47. Jose J, Subbaiyan H. Different treatment modalities followed by dental practitioners for Ellis class 2 fracture—A questionnaire-based Survey. *Open Dent J*. 2020;14(59):59–65.
48. Manohar M, Sharma S. A survey of the knowledge, attitude, and awareness about the principal choice of intracanal medicaments among the general dental practitioners and nonendodontic specialists. *Indian J Dent Res*. 2018;29:716.
49. Teja KV, Ramesh S. Shape optimal and clean more. *Saudi Endod. J*. 2019;9(3):235.
50. Ramamoorthi S, Nivedhitha MS, Divyanand MJ. Comparative evaluation of postoperative pain after using endodontic needle and Endo Activator during root canal irrigation: A randomised controlled trial. *Aust Endod J*. 2015;41(2):78–87.
51. Weine FS, Healey HJ, Gerstein H, Evanson L. Canal configuration in the mesiobuccal root of the maxillary first molar and its endodontic significance. *Oral Surg Oral Med Oral Pathol*. 1969;28(3):419–25.
52. Vijayashree PJ. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J Periodontol*. 2019;90(12):1441–8.
53. Ezhilarasan D, Apoorva VS, Ashok Vardhan N. Syzygium cumini extract induced reactive oxygen species-mediated apoptosis in human oral squamous carcinoma cells. *J Oral Pathol Med*. 2019;48(2):115–21.
54. Ramesh A, Varghese S, Jayakumar ND, Malaiappan S. Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients—A case-control study. *J Periodontol*. 2018;89(10):1241–8.
55. Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of *Streptococcus mutans*, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary. *Clin Oral Investig* . 2020;24:3275–3280

56. Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. *J Oral Pathol Med.* 2019;48(4):299–306.
57. Pc J, Marimuthu T, Devadoss P. Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study. *Clin Implant Dent Relat Res.* 2018;20(4):531-534.
58. Ramadurai N, Gurunathan D, Samuel AV, Subramanian E, Rodrigues SJL. Effectiveness of 2% Articaine as an anesthetic agent in children: Randomized controlled trial. *Clin Oral Investig.* 2019;23(9):3543–50.