TMJ Radiographic Findings in Patients with Clicking of Joints

Karishma Desai, Jayanth Kumar*
Department of Oral Medicine and Radiology, Saveetha University, Chennai, India

ABSTRACT

INTRODUCTION
The temporomandibular joint is also called the mandibular joint. As the name suggests, it is an articulation between the temporal bone and the mandible. Pain in the TMJ region is a common finding. Disorders of the TMJ are recorded quite frequently in adults. Symptoms of such disorders include pain, clicking, jaw deviation, attrition and limited mouth opening. Difficulty in mastication was also reported as a sign of TMJ dysfunction. TMJ disorders refer to a cluster of conditions that are characterised by various symptoms as listed. The etiology of such disorders cannot be pinpointed but is more likely to be caused by a collection of factors. These may include occlusal overload, increased stress levels, bruxism and even increased levels of estrogen can lead to such TMDs

MATERIALS AND METHODS
This study was conducted in a University setting. The case records were collected using multiple criteria which included impacted third molars, OPGs etc. A total of 684 records were obtained. An approval from the Institutional Ethical Approval Board was obtained to assess the patient data records. All teeth that were impacted were considered. Exclusion criteria were mandibular impacted third molars, incomplete records, poor quality of the OPGs. The data was collected and tabulated using MS Excel and exported to SPSS for further statistical analysis.

RESULTS
All results were obtained in the form of charts and graphs. The TMJ findings were categorised as Flattening, Erosion, Osteophyte and Normal. These findings were recorded on both the left and right side of each OPG. An association was made between gender of the patient and the findings on the right side as well as the left side. A majority of 70 % of the population presented with clicking. The most commonly found TMJ characteristic was flattening of the condyle. It was seen in about 14 - 17 % of the population (including males, females, right and left side). This was followed by erosion and the osteophyte formation.

CONCLUSION
From the above results and discussion, it can be concluded that most of the people (70 %) belonging to the age group of 21 to 40 years experienced clicking. Clicking was found to be a more common finding among females. Osteophyte is a very rare finding in females when compared to males on both the right as well as left sides. On the other hand, flattening is more common in males than in females on both sides. The aim of the study to associate clicking and other characteristic features of the TMJ with gender was achieved.

KEYWORDS
Temporomandibular joint, Clicking, Innovative study, Condyle, Osteophyte, OPG

Corresponding Author:

Jayanth Kumar, Department of Oral Medicine and Radiology, Saveetha University, Chennai, India;
Email: doctorjayanth@gmail.com

How to Cite This Article:

Kumar J, Desai K. TMJ Radiographic Findings in Patients with Clicking of Joints. J Evid Based Med Healthc 2022;9(12):1-8.

Received: 08-Mar-2022;
Manuscript No: JEBMH-22-51075;
Editor assigned: 11-Mar-2022;
PreQC No. JEBMH-22-51075 (PQ);
Reviewed: 25-Mar-2022;
QC No. JEBMH-22-51075;
Revised: 30-Mar-2022;
Manuscript No. JEBMH-22-51075;
Published: 05-April-2022;
DOI: 10.18410/jebmh/2022/01.

INTRODUCTION

The temporomandibular joint is also called the mandibular joint. As the name suggests, it is an articulation between the temporal bone and the mandible.[1] The joint is bound superiorly by the temporal bone and inferiorly by the condyle of the mandible. A disc is present in between that is a biconcave structure and it aids in the opening and closing of the mouth.[2] The TMJ is more appropriately known as the craniomandibular joint. Jaw opening requires coordinated movements of all the muscles of mastication in a structured manner.[3] The process of the movement of the Temporomandibular joint is a complex one to be understood. Yet, it is these complex movements that facilitate easy, pain free and effective chewing and speaking.[4,5]

Pain in the TMJ region is a common finding. Disorders of the TMJ are recorded quite frequently in adults. Symptoms of such disorders include pain, clicking, jaw deviation, attrition and limited mouth opening.[6] Difficulty in mastication was also reported as a sign of TMJ dysfunction.[7] It is also characterized by headaches, neck stiffness and pain in the neck.[8] TMJ disorders refer to a cluster of conditions that are characterised by various symptoms as listed. The etiology of such disorders cannot be pinpointed but is more likely to be caused by a collection of factors. These may include occlusal overload, increased stress levels, bruxism and even increased levels of estrogen can lead to such TMDs.[9,10] There are various imaging modalities to picture the temporomandibular joint. The frequently used methods are through an MRI (Magnetic Resonance Imaging), CBCT (Cone Beam Computed Tomography), CT (Computed Tomography) and conventional radiography (OPG-Orthopantomogram).[11] With advanced imaging techniques, it has become easier to identify abnormalities and disorders. A more detailed evaluation of the joint can be made by using different modalities.[12] Internal derangements of the TMJ causes changes in occlusion, which can be observed through various methods. These disorders can be corrected using surgical or non-surgical methods.[13]

Previously our team had 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.

Our team has extensive knowledge and research experience that has translate into high quality publications.[29-47]

This research was chosen to analyse the TMJ changes like flattening, erosion and osteophyte formation along with clicking of joints. An association is drawn between distally tipped maxillary third molars and clicking of the TMJ. It is very essential to collect proper records and diagnostic radiographs to carry out a study. This study was done to understand and correlate the findings on the OPG with the clicking sounds in patients. Various parameters like flattening, erosion and osteophyte were considered and associated. The main aim of this study was to assess the radiographic findings of the TMJ from the OPGs and correlate with the different parameters discussed.

MATERIALS AND METHODS

This study was conducted in a University setting. The case records were collected using multiple criteria which included impacted third molars, OPGs etc. A total of 684 records were obtained. An approval from the Institutional Ethical Approval Board was obtained to assess the patient data records. All teeth that were impacted were considered. Exclusion criteria were mandibular impacted third molars, incomplete records, poor quality of the OPGs. The data was collected and tabulated using MS Excel software. From this it was exported to SPSS software version 23, Chicago. Descriptive statistics was done to determine the frequency percentage of age, gender and changes of TMJ (flattening, erosion, osteophyte). Chi - Square testing was done to find the association between gender and changes of the TMJ on either side. The level of significance was set at 0.05(p value). The results obtained were displayed as graphs.

RESULTS AND DISCUSSION

The results obtained were displayed as graphs. Figure 1 shows the gender of the population under study. Out of all records considered, 44 % were females and 56 % were males. Figure 2 discusses the age of the population under study out of which 80 % of the population belonged to the age group of 21 to 50.

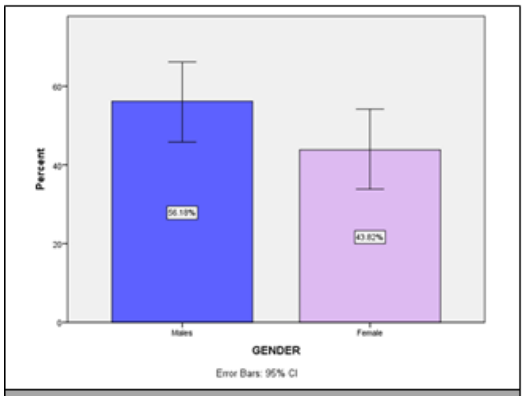

Figure 1. Bar chart showing the gender of the population under study. Males are represented by orange (56%) and females are represented by light blue (44%).

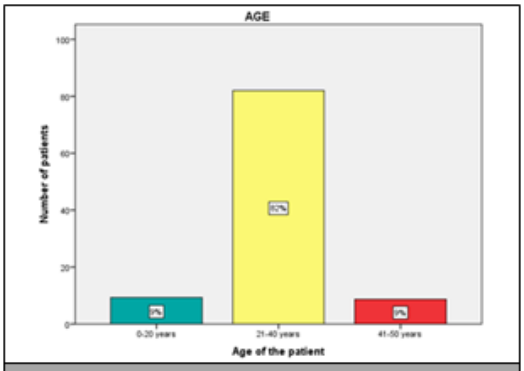

Figure 2. Bargraph showing the age of the people involved in the study. 9% of the people belonged to the age group of 0-20 years (green); 80% belonged to the age group of 21-40(yellow) and 5% of the population belonged to the age group of 41-50 (red). The X axis represents the age of the patient and the Y axis represents the number of patients.

The TMJ findings were categorised as Flattening, Erosion, Osteophyte and Normal. These findings were recorded on both the left and right side of each OPG. An association was made between the gender of the patient and the findings on the right side. This data is depicted in Figure 3. In males, 23 % of the total population had a normal TMJ on the right side. Flattening of TMJ was observed in 17 % of males and Erosion was seen in 4 % of the males. Osteophyte was seen in only 6% of the males. In females, 22 % of the population had normal TMJ on the right side and 7 % showed a flattening of the condyle. Erosion was seen in 9 % of the females and Osteophyte was seen in only 1 % of the females.

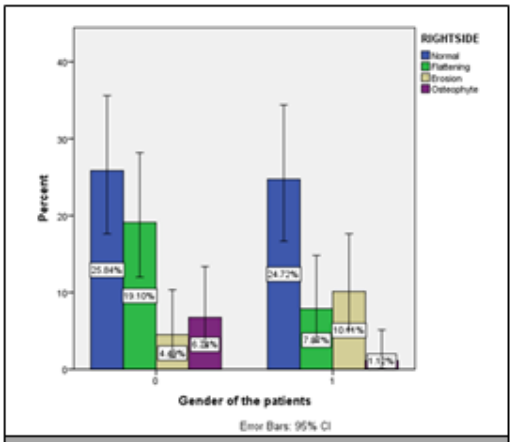

Figure 3. Barchart depicting a comparison between gender and TMJ findings on the right side. Blue represents Normal TMJ, Green represents flattening of condyle, Brown represents erosion and Purple represents Osteophyte.

Another association was made between gender of the patient and the TMJ findings on the left side. This is depicted in Figure 4. Among the males, 25 % showed a normal TMJ on the left side, 14 % showed flattening of the condyle, 6 % showed erosion and only 5 % showed osteophyte formation. In the females, on the left side, 24 % showed a normal TMJ. Flattening was seen in 6 % of the females and erosion was seen in 8 %. Osteophyte formation was seen in only 1 % of the females.

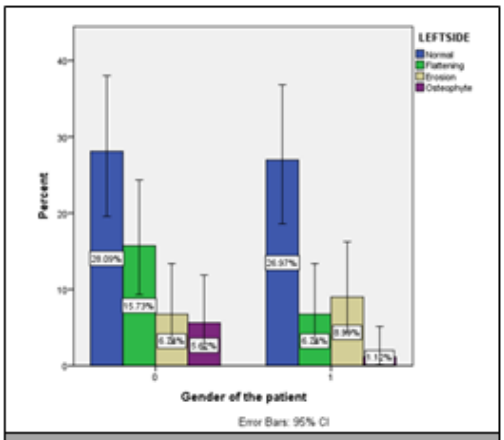

Figure 4. Bar chart showing the comparison between gender and TMJ findings on the Left side. Light blue represents Normal TMJ, Orange represents flattening of condyle, Yellow represents erosion and Dark blue represents Osteophyte formation.

(Figure 5) depicts the comparison between age and clicking of the TMJ. Out of the people belonging to the age group 1 (0 - 20 years), 12 % presented with clicking while only 1 % did not. In age group 2 (21 - 40 years), 25 % did not have clicking while a majority of 46 % of the population presented with

clicking. In age group 3 (41 and above), only 4 % presented with clicking.

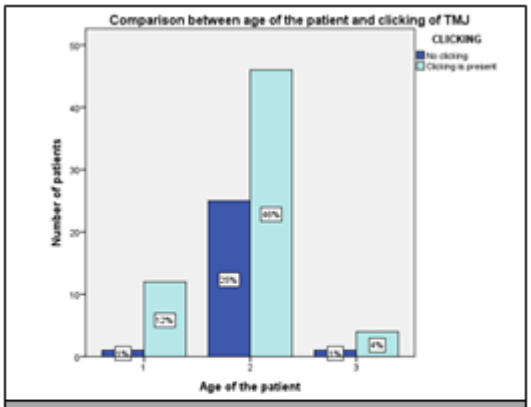

Figure 5. Bar chart showing a comparison between age of the patient and presence of clicking of TMJ. Dark blue indicated absence of clicking and Light blue indicated presence of clicking. Age was grouped as 1 (0-20 years), 2 (21-40 years) and 3 (41 and above).

From the above data we can understand that clicking is a very common finding in people belonging to the age group of 21 to 40 years of age. On considering the overall population, it was found that 70 % experienced clicking while only 30 % did not; this data is depicted in Figure 6.

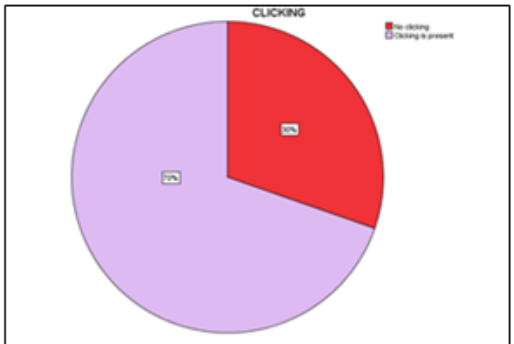

Figure 6. Pie chart showing the presence/absence of clicking in the overall population under study. Purple shows percentage of population with clicking (70%) and Red shows the percentage of the population that did not experience clicking (30%).

A study done by Comert, et al. 2015 showed that out of the total population, 94 % showed erosion of the TMJ and 92 % showed flattening of the condyle. This is contrasting to the results obtained in this study where only a minimum 6 - 9 % of the population showed erosion of the TMJ and only 14-17 % of the population showed flattening of the condyle. A study done by Kyung et al showed similar results as obtained in this study.[48] A study done by Shetty et al. 2014 showed that the most common change in the TMJ seen on an OPG was erosion followed by flattening and osteophyte. These changes were more commonly found in females than in males. In our study, flattening of condyle was the most common finding followed by erosion and osteophyte.[49] Another study done by Pontual et al. 2014, showed that there was no significant difference in the changes on the left and right side, contrasting to this, our study has obtained significant differences of TMJ on the right as well as left side.[50] A study done by Mathew et al, showed that radiographic changes of the TMJ significantly increased with an increase in age. This study also showed that 81.6 % showed radiographic changes with respect to condylar morphology. The most common finding was flattening of the condyle which is in relation to our current study, wherein flattening was most commonly found (14 - 17 %).[51]

Our institution is passionate about high quality evidence based research and has excelled in various fields.[52-62]

CONCLUSION

From the above results and discussion, it can be concluded that most of the people (70 %) belonging to the age group of 21 to 40 years experienced clicking. Clicking was found to be a more common finding among females. Osteophyte is a very rare finding in females when compared to males on both the right as well as left sides. On the other hand, flattening is more common in males than in females on both sides. In conclusion we can state that some clinical findings of TMJ are positively associated with radiographic changes.

REFERENCES

1. Alomar X. Anatomy of the Temporomandibular Joint. Semin Ultrasound CT MR 2007;28(3):170–183.
2. Katzberg RW. Temporomandibular joint imaging. Radiology 1989;170(2):297–307.
3. Piette E. Anatomy of the human temporomandibular joint An updated comprehensive review. Acta Stomatol Belg 1993;90(2):103–127.
4. Hooks TR. Temporomandibular Joint Physical Rehabilitation of the Injured Athlete. 2012; 282–305.
5. Rawlani S, Rawlani S. Anatomy of Temporomandibular Joint Manual of Temporomandibular Joint. 2016; 15–15.
6. Oyetola EO, Adesina OM, Oluwadaisi A, et al. Temporomandibular Joint Pain Clinical Presentations and Response to

Conservative Treatments in a Nigerian Tertiary Hospital. J Int Soc Prev Community Dent 2017;7(3):98–103.
7. Cömert Kiliç S, Kiliç N, Sümbüllü MA. Temporomandibular joint osteoarthritis cone beam computed tomography findings clinical features and correlations. Int J Oral Maxillofac Surg 2015;44(10):1268–1274.
8. Wolford LM, Reiche-Fischel O, Mehra P. Changes in temporomandibular joint dysfunction after orthognathic surgery. J Oral Maxillofac Surg. 2003 Jun;61(6):655–660.
9. Chisnoiu AM, Picos AM, Popa S, et al. Factors involved in the etiology of temporomandibular disorders - a literature review. Clujul Med 2015;88(4):473–478.
10. Temporomandibular Joint Disorders.
11. Talmaceanu D, Lenghel LM, Bolog N, et al. Imaging modalities for temporomandibular joint disorders an update. Clujul medical 2018;91(3):280 – 287.
12. Larheim TA. Current trends in temporomandibular joint imaging. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1995;80(5):555–576.
13. Dujoncquoy JP, Ferri J, Raoul G, et al. Temporomandibular joint dysfunction and orthognathic surgery a retrospective study. Head Face Med 2010;6(1):2-7.
14. Govindaraju L, Gurunathan D. Effectiveness of Chewable Tooth Brush in Children-A Prospective Clinical Study. J Clin Diagn Res 2017;11(3):ZC31–ZC34.
15. Christabel A, Anantanarayanan P, Subash P et al. Comparison of pterygomaxillary dysjunction with tuberosity separation in isolated Le Fort I osteotomies a prospective multi-centre triple-blind randomized controlled trial. Int J Oral Maxillofac Surg 2016;45(2):180–185.
16. Soh CL, Narayanan V. Quality of life assessment in patients with dentofacial deformity undergoing orthognathic surgery--a systematic review. Int J Oral Maxillofac Surg 2013; 42(8):974–980.
17. Mehta M, Tewari D, Gupta G, et al. Oligonucleotide therapy an emerging focus area for drug delivery in chronic inflammatory respiratory diseases. Chem Biol Interact 2019;308:206–215.
18. 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 – 121.
19. Campeau PM, Kasperaviciute D, Lu JT et al. The genetic basis of DOORS syndrome: an exome-sequencing study. Lancet Neurol 2014;13(1):44 – 58.
20. Kumar S, Sneha S. Knowledge and awareness regarding antibiotic prophylaxis for infective endocarditis among undergraduate dental students. Asian J Pharm Clin Res 2016;26;154.
21. Christabel SL. Prevalence of type of Frenal Attachment and morphology of frenum in children Chennai Tamil Nadu. World J Dent 2015;6(4):203 – 207.
22. Kumar S, Rahman R. Knowledge awareness and practices regarding biomedical waste management among undergraduate dental students. Asian J Pharm Clin Res 2017;10(8):341.
23. Sridharan G, Ramani P, Patankar S. Serum metabolomics in oral leukoplakia and oral squamous cell carcinoma. J Cancer Res Ther 2017;13(3):556–561.
24. Ramesh A, Varghese SS, Doraiswamy JN et al. Herbs as an antioxidant arsenal for periodontal diseases. J Intercult Ethnopharmacol 2016;5(1):92–96.
25. Thamaraiselvan M, Elavarasu S, Thangakumaran S, et al. Comparative clinical evaluation of coronally advanced flap with or without platelet rich fibrin membrane in the treatment of isolated gingival recession. J Indian Soc Periodontol 2015;19(1):66–71.
26. Thangaraj SV, Shyamsundar V, Krishnamurthy A, et al. Molecular Portrait of Oral Tongue Squamous Cell Carcinoma Shown by Integrative Meta-Analysis of Expression Profiles with Validations. PLoS One 2016;11(6):e0156582.
27. Ponnulakshmi R, Shyamaladevi B, Vijayalakshmi P, et al. 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 – 290.
28. Ramakrishnan, Shukri MM. Fluoride fluoridated toothpaste efficacy and its safety in children review. Int J Pharm Res 2018;10(4):109-114.
29. Jayasree R, Kumar PS, Saravanan A, et al. Sequestration of toxic Pb(II) ions using ultrasonic modified agro waste Adsorption

mechanism and modelling study. Chemosphere 2021;285:131502.
30. Sivakumar A, Nalabothu P, Thanh HN, et al. A Comparison of Craniofacial Characteristics between Two Different Adult Populations with Class II Malocclusion-A Cross-Sectional Retrospective Study. Biology 2021;10(5):438.
31. Uma Maheswari TN, Nivedhitha MS, Ramani P. Expression profile of salivary micro RNA-21 and 31 in oral potentially malignant disorders. Braz Oral Res 2020;34:e002.
32. Avinash CKA, Tejasvi MLA, Maragathavalli G et al. Impact of ERCC1 gene polymorphisms on response to cisplatin based therapy in oral squamous cell carcinoma (OSCC) patients. Indian J Pathol Microbiol 2020;63(4):538.
33. Chaitanya NC, Muthukrishnan A, Rao KP, et al. Oral Mucositis Severity Assessment by Supplementation of High Dose Ascorbic Acid During Chemo and/or Radiotherapy of Oro-Pharyngeal Cancers--A Pilot Project. Indian J Pharm Educ Res 2018;52(3):532–539.
34. Gudipaneni RK, Alam MK, Patil SR, et al. Measurement of the Maximum Occlusal Bite Force and its Relation to the Caries Spectrum of First Permanent Molars in Early Permanent Dentition. J Clin Pediatr Dent 2020;44(6):423–128.
35. Chaturvedula BB, Muthukrishnan A, Bhuvaraghan A, et al. Dens invaginatus: a review and orthodontic implications. Br Dent J 2021;230(6):345–350.
36. Patil SR, Maragathavalli G, Ramesh DNS, et al. Assessment of Maximum Bite Force in Pre-Treatment and Post Treatment Patients of Oral Submucous Fibrosis A Prospective Clinical Study. J Hard Tissue Biol 2021;30(2):211–216.
37. Sharma P, Mehta M, Dhanjal DS, et al. Emerging trends in the novel drug delivery approaches for the treatment of lung cancer. Chem Biol Interact 2019;309:108720.
38. Perumalsamy H, Sankarapandian K, Veerappan K, et al. In silico and in vitro analysis of coumarin derivative induced anticancer effects by undergoing intrinsic pathway mediated apoptosis in human stomach cancer. Phytomedicine 2018;46:119–130.
39. Rajeshkumar S, Menon S, Venkat Kumar S, et al. Antibacterial and antioxidant potential of biosynthesized copper nanoparticles mediated through Cissus arnotiana plant extract. J Photochem Photobiol B 2019;197:111531.
40. Mehta M, Dhanjal DS, Paudel KR, et al. Cellular signalling pathways mediating the pathogenesis of chronic inflammatory respiratory diseases an update. Inflammopharmacology 2020;28(4):795–817.
41. Rajakumari R, Volova T, Oluwafemi OS, et al. Nano formulated proanthocyanidins as an effective wound healing component. Mater Sci Eng C Mater Biol Appl 2020;106:110056.
42. PradeepKumar AR, Shemesh H, Nivedhitha MS et al. Diagnosis of Vertical Root Fractures by Cone-beam Computed Tomography in Root-filled Teeth with Confirmation by Direct Visualization: A Systematic Review and Meta-Analysis. J Endod 2021;47(8):1198–1214.
43. Hannah R, Ramani P, Tilakaratne WM, et al. Critical appraisal of different triggering pathways for the pathobiology of pemphigus vulgaris-A review. Oral Dis 2021.
44. Ezhilarasan D, Lakshmi T, Subha M, et al. The ambiguous role of sirtuins in head and neck squamous cell carcinoma. Oral Dis 2022;28(3):559 - 567.
45. Sarode SC, Gondivkar S, Sarode GS et al. Hybrid oral potentially malignant disorder: A neglected fact in oral submucous fibrosis. Oral Oncol 2021;105390.
46. Kavarthapu A, Gurumoorthy K. Linking chronic periodontitis and oral cancer: A review. Oral Oncol 2021;105375.
47. Preethi KA, Lakshmanan G, Sekar D. Antagomir technology in the treatment of different types of cancer. Epigenomics 2021;13(7):481–484.
48. Nah KS. Condylar bony changes in patients with temporomandibular disorders: a CBCT study. Imaging Sci Dental. 2012 Dec 23;42(4):249–253.
49. Shetty US, Burde KN, Naikmasur VG, et al. Assessment of condylar changes in patients with temporomandibular joint pain using digital volumetric tomography. Radiol Res Pract 2014;106059.
50. Pontual ML dos A, dos Anjos Pontual ML, Freire JSL, et al. Evaluation of bone

changes in the temporomandibular joint using cone beam CT. Dentomaxillofacial Radiology. 2012;41(1):24–29.
51. Mathew AL, Sholapurkar AA, Pai KM. Condylar Changes and Its Association with Age, TMD, and Dentition Status: A Cross-Sectional Study. Int J Dent 2011;2011:413639.
52. Vijayashree Priyadharsini J. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. J Periodontol 2019;90(12): 1441–1448.
53. Pradeep Christopher 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.
54. Ramesh A, Varghese S, Jayakumar ND et al. Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - A case-control study. J Periodontol 2018; 89(10):1241–1248.
55. Ramadurai N, Gurunathan D, Samuel AV et al. Effectiveness of 2 % Articaine as an anesthetic agent in children: randomized controlled trial. Clin Oral Investig 2019;23(9):3543–3550.
56. Sridharan G, Ramani P, Patankar S et al. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. J Oral Pathol Med 2019;48(4):299 – 306.
57. 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.
58. Mathew MG, Samuel SR, Soni AJ et al. 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 - 3280.
59. Samuel SR. Can 5-year-olds sensibly self-report the impact of developmental enamel defects on their quality of life?. Int J Paediatr Dent 2021;31(2):285–286.
60. Hannah R, Ramani P, Ramanathan A et al. CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene. Oral Surg Oral Med Oral Pathol Oral Radiol 2020;130(3)306 – 312.
61. Chandrasekar R, Chandrasekhar S, Sundari KKS, et al. Development and validation of a formula for objective assessment of cervical vertebral bone age. Prog Orthod 2020;21(1):38.
62. Vijayashree Priyadharsini J, Smiline Girija AS, Paramasivam A. In silico analysis of virulence genes in an emerging dental pathogen A. baumannii and related species. Arch Oral Biol 2018; 94:93–98.