

# CLASS IV DENTAL CARIES AND NEED FOR ROOT CANAL TREATMENT IN MAXILLARY ANTERIORS - A HOSPITAL BASED RETROSPECTIVE ANALYSIS.

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The aim of this study is to assess the number of RCT done in the maxillary anteriors among patients with Class IV caries. The study includes patients visiting the OP (out patients) of University in Chennai who were diagnosed with class IV caries on the maxillary anteriors and to find the number of root canal treatment done among those patients. The results were statistically analysed using SPSS software. Descriptive statistics and chi-square tests were done for gender and diagnosis of the tooth. Among a total of 197 patients diagnosed with class IV caries on the maxillary anteriors, 38.3% have undergone RCT while 61.7% of the patients did not undergo RCT. The incidence of RCT done in patients with Class IV caries was found to be low. This might be due to the aesthetic consideration of the patients and hence early treatment.

**KEYWORDS:** Irreversible pulpitis, RCT, Class IV caries, Maxillary anteriors.

## INTRODUCTION:

Dental caries is the localised destruction of dental hard tissues by acidic by-products from bacterial fermentation of dietary carbohydrates. Dental caries is a chronic disease that progresses slowly in most people. The disease can be seen in both crown and root portions of primary and permanent teeth. (Selwitz, Ismail and Pitts, 2007)

The majority of the industrialised countries have experienced a significant decrease in the prevalence of dental caries due to the improvement in living conditions, improved self care practices, effective use of fluorides, adaptation of healthy lifestyles and implementation of preventive oral care programs, while in developing countries, increasing level of caries and treatment need has been observed. (Selwitz, Ismail and Pitts, 2007; Oliveira, Sheiham and Bönecker, 2008)

Dental caries is a multifactorial disease; many factors like environmental, host and behavioral factors play a role in the initiation and progression of the lesion. (Shaffer *et al.*, 2013) Dental caries is one of the most common of all chronic diseases. The changing lifestyle and dietary patterns are markedly increasing the caries incidence. (Shrutha *et al.*, 2013) Low income, poor oral hygiene, mother's schooling, fluorosis, enamel defects, various measures of low socioeconomic status, low level of parental education and a cariogenic diet, all affect caries risk. (Casanova-Rosado *et al.*, 2005) (Basha and Swamy, 2012) The signs of the carious demineralisation are seen on the hard dental tissues, but the disease process is initiated within the bacterial biofilm that covers a tooth surface. Moreover, the very early changes in the enamel are not detected with traditional clinical and radiographic methods. Dental caries is a multifactorial disease, several factors play a role in the initiation and progression of the lesion including, environmental, host and behavioral factors. (Shaffer *et al.*, 2013) (Marsh and Martin, 1992) (Shaffer *et al.*, 2013) Root canal therapy and tooth extraction have been conventional treatment options for management of human mature teeth with irreversible pulpitis. (Asgary *et al.*, 2013) RCT is a common procedure in dentistry. The indications for RCT includes irreversible pulpitis and pulpal necrosis due to trauma or caries. (R, Rajakeerthi and Ms, 2019)

Now the growing trend in this area motivated us to pursue this project. Various aspects of endodontics and conservative dentistry over the past five years. Our team has extensive knowledge and research experience that has translate into high quality publications (Ramesh Kumar *et al.*, 2011; K M *et al.*, 2013; Packiri, Gurunathan and Selvarasu, 2017; Nambi *et al.*, 2018; Han *et al.*, 2019; Ponnankajamideen *et al.*, 2019; Li *et al.*, 2020; Mehta *et al.*, 2020; Paramasivam and Priyadharsini, 2020; Raj R, D and S, 2020). This study aims in finding the prevalence of class III caries among maxillary anteriors and the incidence of those anteriors with an infected pulp that underwent root canal therapy.

## MATERIALS AND METHODS -

**Study population:** A retrospective study was carried out among 197 patients who visited University in Chennai diagnosed with class IV caries on the maxillary anteriors. Among these, the prevalence of root canal treatment done was assessed. The data was collected from patients records between June 2019-March 2020. The data contains details of patients, intraoral photographs and treatment being done.

### Inclusion criteria:

- Patients with class IV caries without pulpal involvement
- Patients with class IV caries who underwent RCT
- Maxillary anteriors

### Exclusion criteria:

- Patients with periradicular disease
- Pulp necrosis
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**Sample size:** Sample size [N=197] is the total number of patients who visit University in Chennai with class IV caries. Their distribution according to gender and diagnosis were recorded.

**Ethical approval:** Ethical clearance was obtained from the Institutional Ethical Committee and Scientific Review Board [SRB] of University in Chennai.

**Data analysis:** The data collected were entered in an Excel sheet and subjected to statistical analysis using SPSS software. Descriptive statistics was done i.e frequency and cross tabulation. A chi square test was done between gender and diagnosis of the tooth. Independent variables are gender while dependent variables are diagnosis of the tooth. The level of significance was  $p < 0.05$ .

## RESULTS AND DISCUSSION:

It was found that male distribution was predominant with 76.14% of cases whereas females were only about 23.86% [Figure 1]. The prevalence of class IV caries in maxillary anteriors without pulpal involvement was found to be 61.42%, whereas maxillary anteriors with class IV caries that had pulpal involvement and had undergone RCT was only 38.58% of the cases [Figure 2]. Figure 3 shows the association between gender and diagnosis among the population. It was found that Class IV caries in maxillary anteriors that have not undergone RCT was highly prevalent among males (43.15%) than females (32.99%) and Class IV caries in maxillary anteriors that have undergone RCT was found to be higher in males (18.27%) than females (5.58%). chi-square test shows high significance ( $p$  value = 0.014).

The present study was conducted to evaluate the prevalence of maxillary anteriors with Class IV caries without pulp involvement and with pulp involvement that underwent root canal therapy. The results of this study shows a higher percentage of Class IV caries without pulp involvement in maxillary anteriors. There is no previous literature that shows the association between Class IV caries and root canal therapy. However, the prevalence of Class IV caries have been evaluated.

A study by Mustafa Demirci *et al.*, shows that the prevalence of proximal caries on incisors, canines, premolars and occlusal fissures in molars was the highest in both sexes. However, it does not mention the percentage of Class III and Class IV caries. (Demirci, Tuncer and Yucekur, 2010) A similar study by Talabani RM *et al.*, shows that Class IV caries were prevalent among 95 [1.2%] of the study population. (Talabani, Al-Zahawi and Ibrahim, 2015) A study done

among a population of Nepal shows that the prevalence of Class IV caries to be 8.75%.(Bhagat and Shrestha, 2014) The limitation of this study is the limited population and specific geographic location. The future scope of the study is to be done among a larger population and the prognosis should be considered.Our institution is passionate about high quality evidence based research and has excelled in various fields (Sathivel *et al.*, 2008; Panda *et al.*, 2014; Govindaraju, Neelakantan and Gutmann, 2017; Johnson *et al.*, 2020; Saraswathi *et al.*, 2020) (Kumar *et al.*, 2006; Devi and Gnanavel, 2014; Varghese *et al.*, 2015; Sivamurthy and Sundari, 2016; Chen *et al.*, 2019). We hope this study adds to this rich legacy.

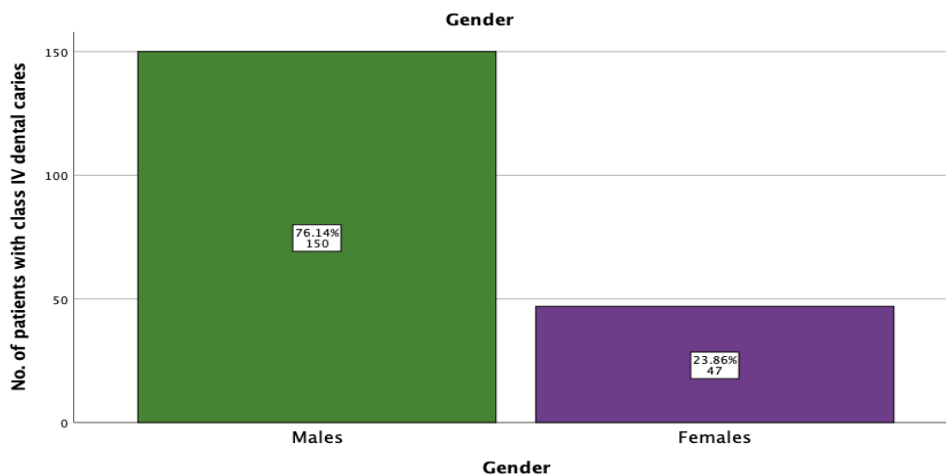


Figure 1: Shows the gender distribution among the study population. X axis corresponds to the gender and Y axis corresponds to the number of patients class IV dental caries. Males (green) were higher in number with a percentage of 76.14% when compared to females (purple) with a percentage of 23.86%.

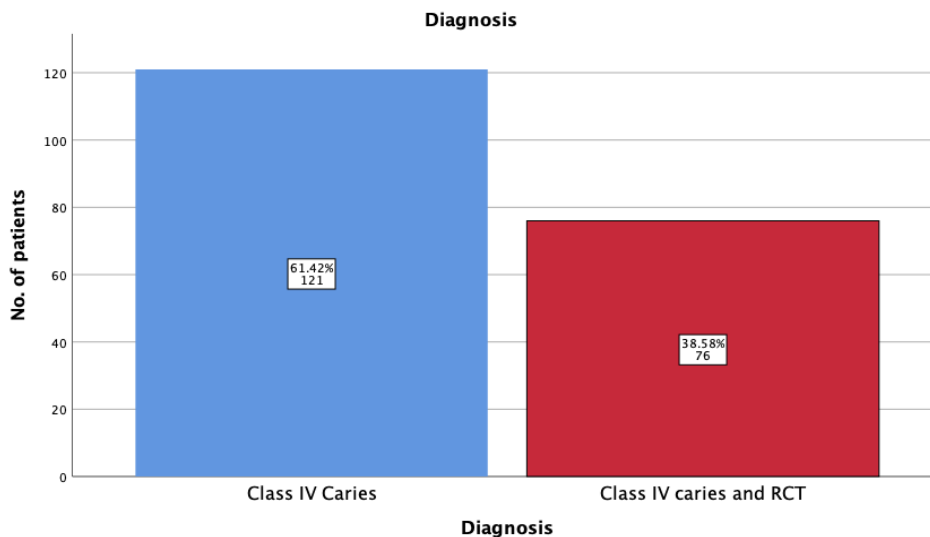


Figure 2: Bar chart shows the comparison between no. of patients with normal class IV dental caries and number of patients with Class IV dental caries that had undergone root canal treatment (RCT). X axis corresponds to the diagnosis of patients with class IV caries and Y axis corresponds to the number of patients. Number of patients with class IV caries that had not undergone (blue) were higher with a percentage of 61.42% when compared to the number of patients with class III caries that had undergone RCT (red) with a percentage of 38.58%.

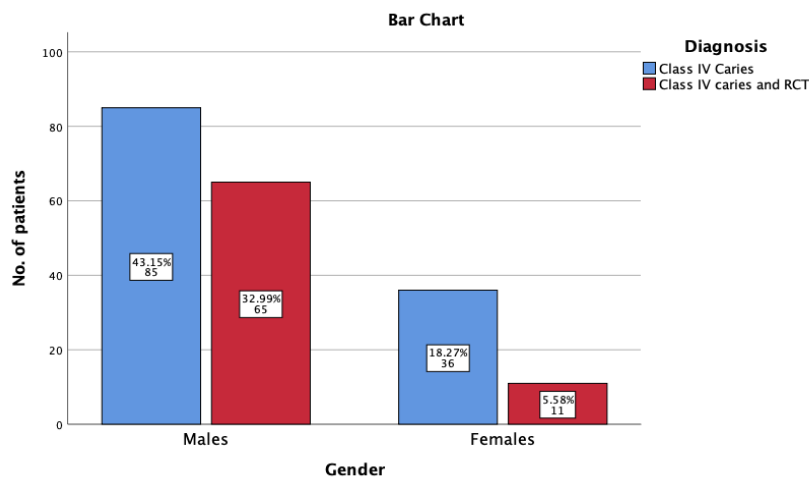


Figure 3: Bar chart shows the association between gender and diagnosis. X axis corresponds to the gender and Y axis corresponds to the number of patients. In both males and females, no. of patients with class IV caries that had not undergone RCT (blue) (43.15% and 18.27% respectively) was higher when compared to no. of patients with class IV caries that had undergone RCT (red) (32.99% and 5.58% respectively). The difference was statistically significant (chi-square value - 5.998, p value - 0.014 (< 0.05)).

## CONCLUSION:

This study shows a higher prevalence of maxillary anteriors with Class IV caries that had not undergone RCT when compared to maxillary anteriors with Class IV caries that underwent RCT. This can be due to the early diagnosis and treatment of the carious lesion as the patients tend to get it treated at the earlier stages due to the aesthetic concerns of Class IV caries on the maxillary anteriors. In both males and females, class III caries that had not undergone RCT were found to be significantly higher when compared to class III caries that had undergone RCT.

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**CONFLICT OF INTEREST:** Nil.

## REFERENCES:

1. Asgary, S. *et al.* (2013) 'One-year results of vital pulp therapy in permanent molars with irreversible pulpitis: an ongoing multicenter, randomized, non-inferiority clinical trial', *Clinical Oral Investigations*, pp. 431–439. doi:10.1007/s00784-012-0712-6.
2. Basha, S. and Swamy, H.S. (2012) 'Dental caries experience, tooth surface distribution and associated factors in 6- and 13- year- old school children from Davangere, India', *Journal of Clinical and Experimental Dentistry*, pp. e210–216. doi:10.4317/jced.50779.
3. Bhagat, T.K. and Shrestha, A. (2014) 'Prevalence of dental caries among public school children in the Eastern Nepal', *Journal of Chitwan Medical College*, pp. 30–32. doi:10.3126/jcmc.v4i1.10845.
4. Casanova-Rosado, A.J. *et al.* (2005) 'Dental caries and associated factors in Mexican schoolchildren aged 6–13 years', *Acta Odontologica Scandinavica*, pp. 245–251. doi:10.1080/00016350510019865.
5. Chen, F. *et al.* (2019) '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)', *Journal of photochemistry and photobiology. B, Biology*, 197, p. 111518.
6. Demirci, M., Tuncer, S. and Yuceokur, A.A. (2010) 'Prevalence of Caries on Individual Tooth Surfaces and its Distribution by Age and Gender in University Clinic Patients', *European Journal of Dentistry*, pp. 270–279. doi:10.1055/s-0039-1697839.
7. Devi, V.S. and Gnanavel, B.K. (2014) 'Properties of Concrete Manufactured Using Steel Slag', *Procedia Engineering*, 97, pp. 95–104.
8. Govindaraju, L., Neelakantan, P. and Gutmann, J.L. (2017) 'Effect of root canal irrigating solutions on the compressive strength of tricalcium silicate cements', *Clinical oral investigations*, 21(2), pp. 567–571.
9. Han, X. *et al.* (2019) 'Anticarcinogenic potential of gold nanoparticles synthesized from *Trichosanthes kirilowii* in colon cancer cells through the induction of apoptotic pathway', *Artificial cells, nanomedicine, and biotechnology*, 47(1), pp. 3577–3584.
10. Johnson, J. *et al.* (2020) 'Computational identification of MiRNA-7110 from pulmonary arterial hypertension (PAH) ESTs: a new microRNA that links diabetes and PAH', *Hypertension research: official journal of the Japanese Society of Hypertension*, 43(4), pp. 360–362.
11. K M, P. *et al.* (2013) 'Evaluation of Salivary Profile among Adult Type 2 Diabetes Mellitus Patients in South India', *Journal of clinical and diagnostic research: JCDR*, 7(8), pp. 1592–1595.
12. Kumar, M.S. *et al.* (2006) 'Expression of matrix metalloproteinases (MMP-8 and -9) in chronic periodontitis patients with and without

- diabetes mellitus', *Journal of periodontology*, 77(11), pp. 1803–1808.
13. Li, Z. *et al.* (2020) 'Apoptotic induction and anti-metastatic activity of eugenol encapsulated chitosan nanopolymer on rat glioma C6 cells via alleviating the MMP signaling pathway', *Journal of Photochemistry and Photobiology B: Biology*, p. 111773. doi:10.1016/j.jphotobiol.2019.111773.
  14. Marsh, P. and Martin, M. (1992) 'Oral Microbiology'. doi:10.1007/978-1-4615-7556-6.
  15. Mehta, M. *et al.* (2020) 'Cellular signalling pathways mediating the pathogenesis of chronic inflammatory respiratory diseases: an update', *Inflammopharmacology*, 28(4), pp. 795–817.
  16. Nambi, G. *et al.* (2018) 'Spinal manipulation plus laser therapy versus laser therapy alone in the treatment of chronic non-specific low back pain: a randomized controlled study', *European journal of physical and rehabilitation medicine*, 54(6), pp. 880–889.
  17. Oliveira, L.B., Sheiham, A. and Bönecker, M. (2008) 'Exploring the association of dental caries with social factors and nutritional status in Brazilian preschool children', *European Journal of Oral Sciences*, pp. 37–43. doi:10.1111/j.1600-0722.2007.00507.x.
  18. Packiri, S., Gurnathan, D. and Selvarasu, K. (2017) 'Management of Paediatric Oral Ranula: A Systematic Review', *Journal of clinical and diagnostic research: JCDR*, 11(9), pp. ZE06–ZE09.
  19. Panda, S. *et al.* (2014) 'Platelet rich fibrin and xenograft in treatment of intrabony defect', *Contemporary clinical dentistry*, 5(4), pp. 550–554.
  20. Paramasivam, A. and Priyadharsini, J.V. (2020) 'Novel insights into m6A modification in circular RNA and implications for immunity', *Cellular & Molecular Immunology*, pp. 668–669. doi:10.1038/s41423-020-0387-x.
  21. Ponnaiyandurai, M. *et al.* (2019) 'In Vivo Type 2 Diabetes and Wound-Healing Effects of Antioxidant Gold Nanoparticles Synthesized Using the Insulin Plant *Chamaecostus cuspidatus* in Albino Rats', *Canadian journal of diabetes*, 43(2), pp. 82–89.e6.
  22. Raj R, K., D, E. and S, R. (2020) 'β-Sitosterol-assisted silver nanoparticles activates Nrf2 and triggers mitochondrial apoptosis via oxidative stress in human hepatocellular cancer cell line', *Journal of biomedical materials research. Part A*, 108(9), pp. 1899–1908.
  23. Ramesh Kumar, K.R. *et al.* (2011) 'Depth of resin penetration into enamel with 3 types of enamel conditioning methods: a confocal microscopic study', *American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*, 140(4), pp. 479–485.
  24. R, R., Rajakeerthi, R. and Ms, N. (2019) 'Natural Product as the Storage medium for an avulsed tooth – A Systematic Review', *Cumhuriyet Dental Journal*, pp. 249–256. doi:10.7126/cumudj.525182.
  25. Saraswathi, I. *et al.* (2020) 'Impact of COVID-19 outbreak on the mental health status of undergraduate medical students in a COVID-19 treating medical college: a prospective longitudinal study', *PeerJ*, p. e10164. doi:10.7717/peerj.10164.
  26. Sathivel, A. *et al.* (2008) 'Anti-peroxidative and anti-hyperlipidemic nature of *Ulva lactuca* crude polysaccharide on D-galactosamine induced hepatitis in rats', *Food and chemical toxicology: an international journal published for the British Industrial Biological Research Association*, 46(10), pp. 3262–3267.
  27. Selwitz, R.H., Ismail, A.I. and Pitts, N.B. (2007) 'Dental caries', *The Lancet*, pp. 51–59. doi:10.1016/s0140-6736(07)60031-2.
  28. Shaffer, J.R. *et al.* (2013) 'GWAS of Dental Caries Patterns in the Permanent Dentition', *Journal of Dental Research*, pp. 38–44. doi:10.1177/0022034512463579.
  29. Shrutha, S.P. *et al.* (2013) 'Feeding Practices and Early Childhood Caries: A Cross-Sectional Study of Preschool Children in Kanpur District, India', *ISRN Dentistry*, pp. 1–6. doi:10.1155/2013/275193.
  30. Sivamurthy, G. and Sundari, S. (2016) 'Stress distribution patterns at mini-implant site during retraction and intrusion—a three-dimensional finite element study', *Progress in orthodontics*, 17(1), pp. 1–11.
  31. Talabani, R.M., Al-Zahawi, A. and Ibrahim, R.O. (2015) 'Prevalence And Distribution Of Dental Caries Experience According To GV Black Classification For Patient Attending To Dental School', *Journal of Oral Health and Community Dentistry*, pp. 60–63. doi:10.5005/johcd-9-2-60.
  32. Varghese, S.S. *et al.* (2015) 'Estimation of salivary tumor necrosis factor-alpha in chronic and aggressive periodontitis patients', *Contemporary clinical dentistry*, 6(Suppl 1), pp. S152–6.