

Association of Gender and Filled Teeth based on DMFT Index- A Retrospective Analysis of Patient Records

Running title : Gender and filled teeth

SuhasManoharan

*Saveetha Dental College,
Saveetha institute of Medical and Technical sciences,
Saveetha University, Chennai, India
Mail Id: suhaas97@gmail.com*

L. Leelavathi

*Senior Lecturer,
Department of Public health dentistry
Saveetha Dental College,
Saveetha institute of Medical and Technical sciences
Saveetha University, Chennai, India
Mail id: leelavathi.sdc@saveetha.com*

Aravind Kumar. S

*Professor,
Department of Orthodontics,
Saveetha Dental College,
Saveetha institute of Medical and Technical sciences
Saveetha University, Chennai, India
Mail id: aravindkumar@saveetha.com*

Corresponding Author:

L. Leelavathi

*Senior Lecturer,
Department of Public health dentistry
Saveetha Dental College,
Saveetha institute of Medical and Technical sciences
Saveetha University, Chennai, India
Mail id: leelavathi.sdc@saveetha.com*

Article Info**Volume 83****Page Number: 2160 - 2268****Publication Issue:****July-August 2020****Article History****Article Received:06 June 2020****Revised: 29 June 2020****Accepted: 14 July 2020****Publication: 25 July 2020****Abstract:**

Development of caries is multifactorial. Caries is a common disease of the tooth which when caught early can be treated by excavation and restoration of the tooth. Clinical and epidemiological studies show a consistent trend of caries prevalence with females having more caries occurrence than males. The aim of the study is to establish an association between gender and filled teeth. Aretrospective study was done based on dataanalyzed from 86000 patients records collected in a dental outpatient department. Excel tabulation was done and the results obtained from SPSS version 20. Statistical test performed was the chi square test.In the study a total of 4230 patients were included out of which 2328 were males and 1902 were females. Using the DMFT Index, filled teeth status was acquired. Patients were grouped into three, based on filled teeth: 0-7,8-15,15-21. On performing chi square test to find an association between gender and filled teeth, a P value of 0.887 was arrived at, which is not significant. Hence within limits of the study, it was found that there was no clinical and statistical association between gender and filled teeth based on DMFT index.

Keywords:*Caries;females;males; filled teeth***INTRODUCTION**

Gender disparity in health and diseases is being increased drastically in the current world. Studies regarding dental restoration or fillings based on gender are abundant but such a study on an Indian population is sparse. Significant spread of caries among various populations makes this an interesting topic of study. Caries development is multi factorial.(Ferraro and Vieira, 2010)

Clinical and epidemiological studies show a consistent trend of caries prevalence with females having more caries occurrence than males. Most studies use DMFT/DMFS index tools to study such trends.(Lukacs and Largaespada, 2006) Also Tuncer et al states that females (59.1%) showed higher incidence of caries than males (40.9%)(Demirci, Tuncer and Yuceokur, 2010). Since the past several years, numerous studies have been done all over the world to assess the possible gender variations and oral health status of various populations. General consensus of these studies is that females shows higher caries rates thereby higher burden of dental restorations(Lukacs, 2011b), High caries rate among females may be due to diet , poor oral

hygiene, puberty, salivary flow, genetic variations, nutritional and hormonal changes that occur during pregnancy and other factors such as fasting , certain rituals in certain countries.(Lukacs and Largaespada, 2006; Ferraro and Vieira, 2010). However another group of studies claimed that females showed less severe periodontal diseases compared to males with exception of cases of pregnancy and puberty. On the other hand, it is generally accepted that with the exception of puberty and pregnancy, females exhibit lower periodontal diseases prevalence and severity than males(Stamm, 1986; Albandar, 2002).

There is also a speculation that females tend to have higher incidence due to a gene termed as AMELX.(Antunes *et al.*, 2003; Ferraro and Vieira, 2010) This gene resides on the X chromosome predominantly.The role of pregnancy in caries incidence in females has also been studied. During pregnancy, the oral cavity tends to set into a negative or a compromised environment due to reduced salivary flow, immunosuppression, food cravings and hormonal fluctuations(Lukacs and Largaespada, 2006; Ferraro and Vieira, 2010)/It is also seen that females tend to develop teeth at an early age than males (Menghini *et al.*, 2008), and therefore are exposed

more than male teeth leading to increased caries susceptibility (Ferraro and Vieira, 2010)

Previously our team had conducted numerous clinical trials (Kumar, Pradeep Kumar and Vijayalakshmi, 2017; Prabakar, John, I. Arumugham, *et al.*, 2018; Prabakar, John, I. M. Arumugham, Kumar and Srisakthi, 2018; Khatri *et al.*, 2019; Pratha, Ashwatha Pratha and Prabakar, 2019; Mathew *et al.*, 2020), lab studies (Prabakar, John, I. M. Arumugham, Kumar and Sakthi, 2018; Mohapatra *et al.*, 2019) and other studies (L *et al.*, 2015; Srudhy and Anitha, 2015; Leelavathi *et al.*, 2016; Prabakar, John and Srisakthi, 2016; Kannan *et al.*, 2017; Kumar, Pradeep Kumar and Preethi, 2017; Kumar, Pradeep Kumar and Vijayalakshmi, 2017; Patturaja, Leelavathi and Jayalakshmi, 2018; Harini and Leelavathi, 2019; Neralla *et al.*, 2019; Pavithra and Jayashri, 2019; Samuel, Acharya and Rao, 2020) over the past 5 years on the similar field of interest. A Study regarding dental restorations, or commonly known as fillings can give more insight into the trend of caries activity. Such study will also give an idea about the level of awareness among the general population about the need for dental fillings and help a practitioner to educate the patients accordingly. The aim of the study is to assess the association between gender and filled teeth based on DMFT index.

MATERIAL AND METHODS

Study design and setting:

The study setting is university based study. A retrospective study was conducted on 4230 patient records in a hospital setting. The internal validity of the study was ascertained using standard measures of recording dental caries.

Ethical Approval

The ethical approval for the retrospective study was obtained from the institutional ethics board. Ethical approval

SDC/SIHEC/2020/DIASDATA/0619-0320.

Data Collection

All patient records were reviewed and analysed between June 2019 and March 2020. In DMFT index all the 28 permanent teeth excluding third molars are included. Filled teeth in DMFT index indicates the number of permanent teeth that have been attacked by caries, but which have been restored to keep in a healthy condition. For an individual, filled teeth can vary from 0 to 28 depending on their restoration status of carious teeth. Of the individual person. Data on the filled teeth based on the DMFT index was retrieved and filled teeth were grouped as 0-7, 8-14, 15-21 and 21-28. All available data was included in the study to minimize sampling bias. Patients above the age of 18 years were included in this study. Collected data was cross verified using photos and case sheets. Incomplete data was excluded from the study.

All data was collected and tabulated methodically using MS Excel.

Statistical Analysis

After tabulation using MS Excel, the data was exported to IBM SPSS software [Version 20: IBM Corporation NY USA] for statistical analysis. The dependent variable was filled teeth and the independent variable was gender. Descriptive statistics was done to calculate frequency and percentage distribution of gender and number of filled teeth in DMFT index. Pearson chi square test was done to statistically assess the association between gender and filled teeth. The significance level was set at 0.05

RESULTS

In the study a total of 4230 patient records were examined and filled teeth based on DMFT index among males and females were included, out of which 2328 were male (55%) and 1902 were female (45%). Using the DMFT Index, filled teeth status was acquired. Patients were grouped into three, based on filled teeth : 0-7, 8-14, 15-21 and 22-28. About 97.99% of the patients had 0-7 filled teeth, 1.84% of the study population had 8-14 filled teeth, 0.17% of the study population had 15-21 filled teeth

and none of the study participants had more than 21 filled teeth. Hence, 0-7 filled teeth was most prevalent among the study population (Figure 1).

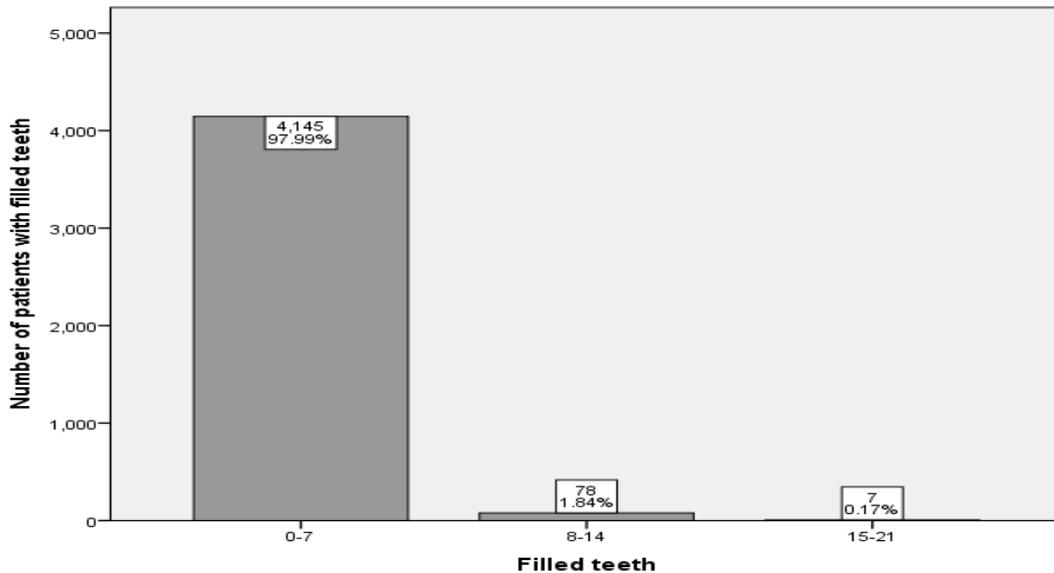


Figure 1: Bar chart depicting the distribution of filled teeth among the sample population.. X axis depicts the filled teeth. Y axis represents the number patients included in the study. The graph shows that a majority (97.99%) of the patients had 0-7 dental fillings.

In the study population, the distribution of males (55.04%) was more than females (Figure 2).

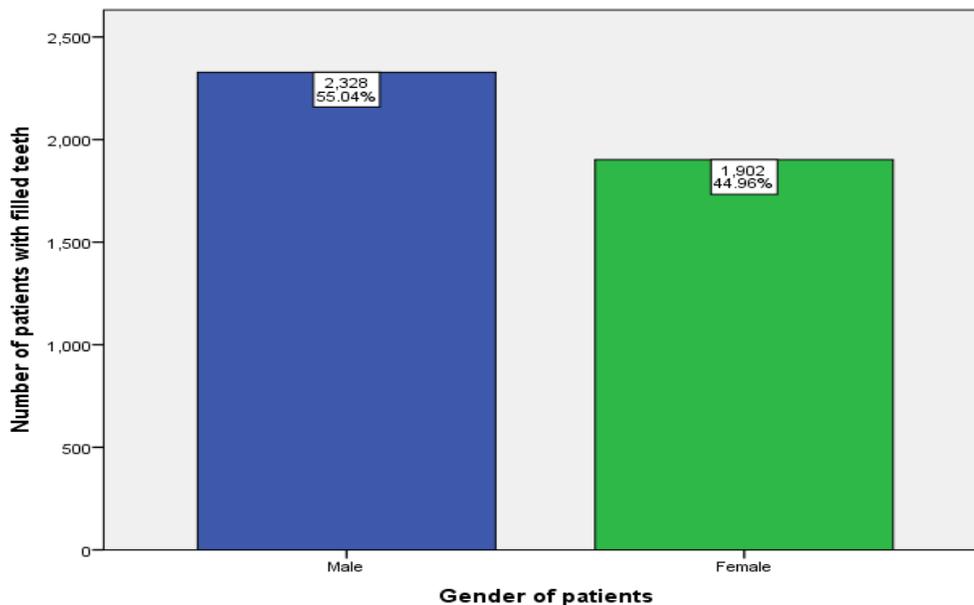


Figure 2: Bar chart depicting the gender distribution of filled teeth based on DMFT index among the sample population. X axis depicts the gender of patients. Y axis represents the number of patients included in the study. Blue depicts males and green shows females. The graph shows that males were more than females in the study population.

Among males, prevalence of 0-7 filled teeth was 97.9%. The prevalence of 8-14 filled teeth among males was 1.93% and about 0.172% of males had 15-21 filled teeth. Among females, similar to males, 0-7 filled teeth was the most prevalent (98.11%). The prevalence of 8-14 filled teeth in females was 1.73%.

The prevalence of 15-21 filled teeth was 0.158%. On performing chi square test to find an association between gender and filled teeth, a p value of 0.887 was arrived. The p value of the above result was >0.05 hence it was statistically not significant. (Figure 3, Table 1)

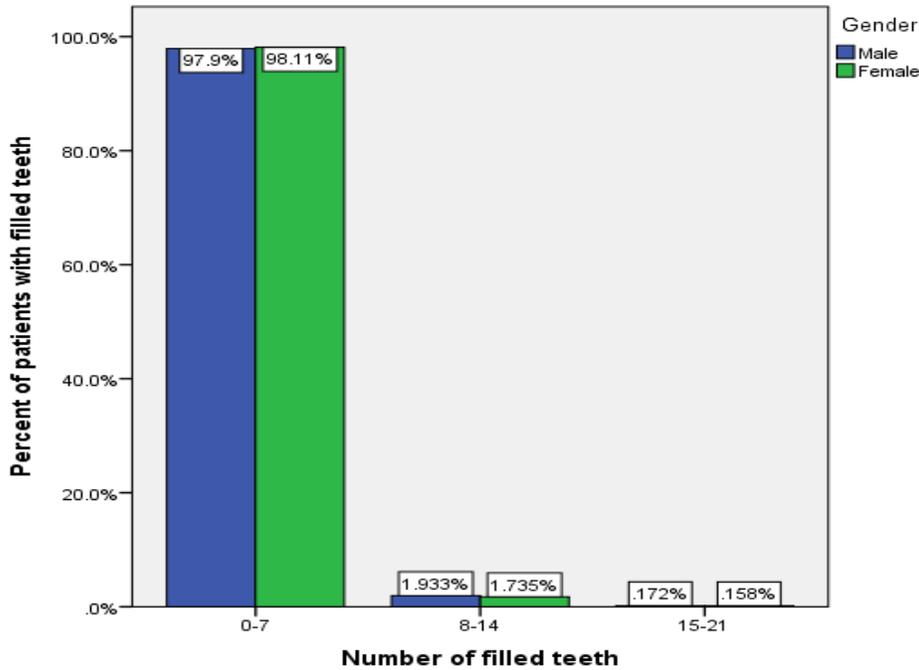


Figure 3: Bar chart depicting the association of gender and number of filled teeth based on DMFT index among patients. X axis depicts the gender of study population. Y axis represents the percentage of the patients with filled teeth. Green depicts females and blue represents males. The graph shows that the number of filled teeth based on the DMFT index was almost similar among males and females inferring that there was no difference in the filled teeth among gender. (Chi-square test, p value- 0.887 (p>0.05). Statistically not significant)

	Filled teeth based on DMFT index			
Gender	0-7 filled teeth	8-14 filled teeth	15-21 filled teeth	P value-0.887
Male	2279(97.9%)	45(1.9%)	4(0.2%)	
Female	1866(98.1%)	33(1.7%)	3(0.2%)	

Table 1. Table showing association of gender and filled teeth done using Pearson's Chi square test. p value - 0.887 (p>0.05). There was no clinical and statistical significant association between gender and filled teeth.

DISCUSSION

Oral Health varies greatly between both genders throughout a lifespan (Fukai, Takaesu and Maki, 1999). Oral health in both genders primarily depends on biological and environmental factors(Lukacs, 2008). The various environmental factors are not yet studied thoroughly. Each individual's environment is multifaceted, an individual's social environment comprising race,ethnicity,literacy level, stress , living conditions and social health. Apart from environmental factors , Genetic factors influence oral and general health significantly (Tabak, 2006; Lukacs, 2011b). Genetic variations may lead to bad oral health within entire families, cariogenic bacteria that affects oral health may be passed from mother to child during early stages of life of the infant.(McDonald *et al.*, 2011) From the current study it is seen that females tend to have marginally higher incidence of caries thereby more dental fillings

However, the current trend regarding female oral health is completely different from what it was historically.Since a long time it is believed females tend to have better oral hygiene than males in most races and among all age groups but it was seen that females had higher incidence of caries (Peres *et al.*, 2007; Fejerskov and Kidd, 2009)). This gender difference has been linked all the way back to agriculture. Changes in diet due to distribution of work based on gender led to females consuming more cariogenic foods explaining the reason for increased caries rates among females than males. (Fejerskov and Kidd, 2009). Dental caries are caused as a result of certain bacteria , sugars and acids deposited on tooth surfaces. (McDonald *et al.*, 2011). During the industrial revolution, there was a major change in dietary habits among males and females from a non cariogenic diet to a pro cariogenic diet.This change of diet seems to have influenced females more than men dur innate hormonal effects. Also,with time human settlement started to rise thereby a direct increase in

fertility rates. (Lukacs, 2011b). Increased pregnancies lead to overall decline in womens oral health(Lukacs, 2011b). Studies conducted on rats by Muhler and Shafer prove that estrogen shows increased level of caries whereas androgens such as testosterone are not linked with increase in caries(Shafer and Muhler, 1954). Females also show decreased salivary flow rate compared to females which make women more prone to caries(Dowd, 1999; Dodds, Johnson and Yeh, 2005; Tabak, 2006). Researchers have concluded that changes in salary composition occur during pregnancy which cause proliferation of cariogenic bacteria, also food cravings during pregnancy make the oral habitat more susceptible to caries(Flaxman and Sherman, 2000).

Currently in many societies and races women have better oral hygiene and decreased caries incidence than males(Peres *et al.*, 2007). According to(Swank, Vernon and Lairson, 1986), females tend to make more frequent dental visits for regular preventive treatment than males . From the results of the study, we can infer that females marginally tend to have more filling. These findings are consistent with general consensus surrounding this topic. According to Antunes et al, females are more susceptible to caries and tend to have more fillings.(Antuneset *al.*, 2003)Increased caries prevalence and dental fillings in females were also stated.(Lukacs, 2008, 2011a).Some studies such as (Shah, 2003) and (Ramezani, Norozi and Valael, 2003)claimed men had more fillings as a result of poor oral hygiene, leading to more caries formation. Shah et al (Shah, 2003)also included information on women, who in majority are single parents. Such single parents are subject to a lot of stress and economic disadvantage. Women on an average have a longer life expectancy leading to an increase in prevalence of caries and other systemic illness.(Shah, 2003) On a general outlook, women's economic status, dietary habits, hormonal variations , decreased salivary flow(Anjomshooa, Cooper and

Vieira, 2009) and other social factors that lead to the fact that females develop more caries than men. Since this study was conducted in hospitals, it can not be generalized to a large population and other ethnic groups. A major drawback of this study is that there were geographic limitations and the people involved in the study were from an isolated population and belonged to the same ethnic group. Subjective error bias can also be a limitation of study. Expanding the study for a larger diverse population can provide better results which may help in better diagnosis and improving public oral health in a population.

CONCLUSION

Within the limits of study, it can be concluded that the number of filled teeth based on the DMFT index was found to be less than eight among the majority of the study participants. There was no clinical and statistically significant association between gender and filled teeth based on the DMFT index.

CONFLICT OF INTEREST: The authors have no conflict of interest.

AUTHOR CONTRIBUTIONS

Suhas Manoharan carried out the retrospective study, planning the study design, collection and analysis of data and drafted the manuscript. Leelavathi L and Aravind Kumar S aided in conception of the topic, supervision and appraisal of the manuscript.

ACKNOWLEDGEMENT

The study was supported by Saveetha Dental College and Hospitals who provided insights and expertise that greatly assisted the study.

REFERENCES

1. Albandar, J. M. (2002) 'Global risk factors and risk indicators for periodontal diseases', *Periodontology* 2000, 29, pp. 177–206.
2. Anjomshoa, I., Cooper, M. E. and Vieira, A. R.

- (2009) 'Caries is Associated with Asthma and Epilepsy', *European journal of dentistry*, 3(4), pp. 297–303.
3. Antunes, J. L. F. *et al.* (2003) 'City-level gender differentials in the prevalence of dental caries and restorative dental treatment', *Health & place*, 9(3), pp. 231–239.
4. 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*, 4(3), pp. 270–279.
5. Dodds, M. W. J., Johnson, D. A. and Yeh, C.-K. (2005) 'Health benefits of saliva: a review', *Journal of dentistry*, 33(3), pp. 223–233.
6. Dowd, F. J. (1999) 'Saliva and dental caries', *Dental clinics of North America*, 43(4), pp. 579–597.
7. Fejerskov, O. and Kidd, E. (2009) *Dental Caries: The Disease and Its Clinical Management*. John Wiley & Sons.
8. Ferraro, M. and Vieira, A. R. (2010) 'Explaining gender differences in caries: a multifactorial approach to a multifactorial disease', *International journal of dentistry*, 2010, p. 649643.
9. Flaxman, S. M. and Sherman, P. W. (2000) 'Morning sickness: a mechanism for protecting mother and embryo', *The Quarterly review of biology*, 75(2), pp. 113–148.
10. Fukai, K., Takaesu, Y. and Maki, Y. (1999) 'Gender differences in oral health behavior and general health habits in an adult population', *The Bulletin of Tokyo Dental College*, 40(4), pp. 187–193.
11. Harini, G. and Leelavathi, L. (2019) 'Nicotine Replacement Therapy for Smoking Cessation-An Overview', *Indian Journal of Public Health Research & Development*, p. 3588. doi: 10.5958/0976-5506.2019.04144.5.
12. Kannan, S. S. D. *et al.* (2017) 'awareness and attitude towards mass disaster and its management

- among house surgeons in a dental college and hospital in chennai, india', *Disaster Management and Human Health Risk V.* doi: 10.2495/dman170121.
13. Khatri, S. *et al.* (2019) 'Retention of moisture-tolerant fluoride-releasing sealant and amorphous calcium phosphate-containing sealant in 6–9-year-old children: A randomized controlled trial', *Journal of Indian Society of Pedodontics and Preventive Dentistry*, p. 92. doi: 10.4103/jisppd.jisppd_173_18.
 14. Kumar, R. P., Pradeep Kumar, R. and Preethi, R. (2017) 'Assessment of Water Quality and Pollution of Porur, Chembarambakkam and Puzhal Lake', *Research Journal of Pharmacy and Technology*, p. 2157. doi: 10.5958/0974-360x.2017.00380.8.
 15. Kumar, R. P., Pradeep Kumar, R. and Vijayalakshmi, B. (2017) 'Assessment of Fluoride Concentration in Ground Water in Madurai District, Tamil Nadu, India', *Research Journal of Pharmacy and Technology*, p. 309. doi: 10.5958/0974-360x.2017.00063.4.
 16. Leelavathi, L. *et al.* (2016) 'Avulsed Tooth – A Review', *Biomedical and Pharmacology Journal*, pp. 847–850. doi: 10.13005/bpj/1015.
 17. L, L. *et al.* (2015) 'Nutrition and Oral Health - (Review)', *Biomedical and Pharmacology Journal*, pp. 545–548. doi: 10.13005/bpj/744.
 18. Lukacs, J. R. (2008) 'Fertility and Agriculture Accentuate Sex Differences in Dental Caries Rates', *Current anthropology*. The University of Chicago Press, 49(5), pp. 901–914.
 19. Lukacs, J. R. (2011a) 'Gender differences in oral health in South Asia: metadata imply multifactorial biological and cultural causes', *American journal of human biology: the official journal of the Human Biology Council*, 23(3), pp. 398–411.
 20. Lukacs, J. R. (2011b) 'Sex differences in dental caries experience: clinical evidence, complex etiology', *Clinical oral investigations*, 15(5), pp. 649–656.
 21. Lukacs, J. R. and Largaespada, L. L. (2006) 'Explaining sex differences in dental caries prevalence: Saliva, hormones, and "life-history" etiologies', *American Journal of Human Biology: The Official Journal of the Human Biology Association*. Wiley Online Library, 18(4), pp. 540–555.
 22. Mathew, M. G. *et al.* (2020) 'Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial', *Clinical oral investigations*. doi: 10.1007/s00784-020-03204-9.
 23. McDonald, R. E. *et al.* (2011) 'Dental Caries in the Child and Adolescent', *McDonald and Avery Dentistry for the Child and Adolescent*, pp. 177–204. doi: 10.1016/b978-0-323-05724-0.50014-x.
 24. Menghini, G. *et al.* (2008) 'Caries prevalence in 2-year-old children in the city of Zurich', *Community dental health*, 25(3), pp. 154–160.
 25. Mohapatra, S. *et al.* (2019) 'Assessment of Microhardness of Enamel Carious Like Lesions After Treatment with Nova Min, Bio Min and Remin Pro Containing Toothpastes: An in Vitro Study', *Indian Journal of Public Health Research & Development*, p. 375. doi: 10.5958/0976-5506.2019.02832.8.
 26. Neralla, M. *et al.* (2019) 'Role of nutrition in rehabilitation of patients following surgery for oral squamous cell carcinoma', *International Journal of Research in Pharmaceutical Sciences*. International Journal of Research in Pharmaceutical Sciences, Sponsored by JK Welfare &Pharmascope Foundation, 10(4), pp. 3197–3203.
 27. Patturaja, K., Leelavathi, L. and Jayalakshmi, S. (2018) 'Choice of Rotary Instrument Usage among Endodontists – A Questionnaire

- Study', *Biomedical and Pharmacology Journal*, pp. 851–856. doi: 10.13005/bpj/1441.
28. Pavithra, R. P. and Jayashri, P. (2019) 'Influence of Naturally Occurring Phytochemicals on Oral Health', *Research Journal of Pharmacy and Technology*. A & V Publications, 12(8), pp. 3979–3983.
29. Peres, M. A. *et al.* (2007) 'The relation between family socioeconomic trajectories from childhood to adolescence and dental caries and associated oral behaviours', *Journal of Epidemiology & Community Health*, pp. 141–145. doi: 10.1136/jech.2005.044818.
30. Prabakar, J., John, J., Arumugham, I. M., Kumar, R. P. and Srisakthi, D. (2018) 'Comparative Evaluation of Retention, Cariostatic Effect and Discoloration of Conventional and Hydrophilic Sealants - A Single Blinded Randomized Split Mouth Clinical Trial', *Contemporary clinical dentistry*, 9(Suppl 2), pp. S233–S239.
31. Prabakar, J., John, J., Arumugham, I. M., Kumar, R. P. and Sakthi, D. S. (2018) 'Comparative Evaluation of the Viscosity and Length of Resin Tags of Conventional and Hydrophilic Pit and Fissure Sealants on Permanent Molars: An In vitro Study', *Contemporary clinical dentistry*, 9(3), pp. 388–394.
32. Prabakar, J., John, J., Arumugham, I., *et al.* (2018) 'Comparing the effectiveness of probiotic, green tea, and chlorhexidine- and fluoride-containing dentifrices on oral microbial flora: A double-blind, randomized clinical trial', *Contemporary Clinical Dentistry*, p. 560. doi: 10.4103/ccd.ccd_659_18.
33. Prabakar, J., John, J. and Srisakthi, D. (2016) 'Prevalence of dental caries and treatment needs among school going children of Chandigarh', *Indian journal of dental research: official publication of Indian Society for Dental Research*, 27(5), pp. 547–552.
34. Pratha, A. A., AshwathaPratha, A. and Prabakar, J. (2019) 'Comparing the effect of Carbonated and energy drinks on salivary pH- In Vivo Randomized Controlled Trial', *Research Journal of Pharmacy and Technology*, p. 4699. doi: 10.5958/0974-360x.2019.00809.6.
35. Ramezani, G. H., Norozi, A. and Valael, N. (2003) 'The prevalence of nursing caries in 18 to 60 months old children in Qazvin', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 21(1), pp. 19–26.
36. Samuel, S. R., Acharya, S. and Rao, J. C. (2020) 'School Interventions-based Prevention of Early-Childhood Caries among 3–5-year-old children from very low socioeconomic status: Two-year randomized trial', *Journal of public health dentistry*, 80(1), pp. 51–60.
37. Shafer, W. G. and Muhler, J. C. (1954) 'Experimental dental caries. III. The effect of estradiol and diethylstilbestrol on dental caries, fluorine metabolism, and the salivary glands of intact and gonadectomized rats', *Journal of dental research*, 33(6), pp. 842–848.
38. Shah, N. (2003) 'Gender issues and oral health in elderly Indians', *International dental journal*, 53(6), pp. 475–484.
39. Srudhy, L. and Anitha, M. (2015) 'Medicolegal Case Scenerios in Dental Practice - A Review of Literature', *Biomedical and Pharmacology Journal*, pp. 537–541. doi: 10.13005/bpj/742.
40. Stamm, J. W. (1986) 'Epidemiology of gingivitis', *Journal of clinical periodontology*, 13(5), pp. 360–366.
41. Swank, M. E., Vernon, S. W. and Lairson, D. R. (1986) 'Patterns of preventive dental behavior', *Public health reports*, 101(2), pp. 175–184.
42. Tabak, L. A. (2006) 'In defense of the oral cavity: the protective role of the salivary secretions', *Pediatric dentistry*, 28(2), pp. 110–7; discussion 192–8.