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Knowledge, attitude and practice of various types of topical fluoride for prevention of caries

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Abstract--Background: The expression 'topical fluoride treatment' refers to methods that provide a high concentration of fluoride to exposed tooth surfaces for a local protective effect. The most popular topical fluoride agents are toothpastes (dentifrices), mouthrinses, gels and varnishes that contain fluoride. These may be used separately or in combination. Topical fluoride application will be a simple but important procedure that is nominated by dental care professionals. Topical fluoride applications using fluoride varnish are recommended between two and four times for children annually and twice for adults for treatment of dental caries. Materials and methods: The study was done as an online setting, the responses were obtained from 110 dental professionals from the Chennai sub population. A self structured questionnaire comprising about 12 questions and circulated as a link to the participants. The responses were exported to google sheets and data was retrieved and analysed in SPSS software version 26. The results were obtained from SPSS software. Results: From the results analysed, it has been found that male participants (57.27%) and undergraduates (77.27%) took the majority party in the study. The knowledge of the participants about the effective fluoride regimen for prevention of caries in children was water fluoridation (97.27%) and in adults was fluoride toothpaste (75.45%). The ADA has

recommended the age below 6 years in children for the application of topical fluoride, where 83.64% of the dental professionals were aware of it but the rest (16.36%) did not know it. The results of the present study proves that dental practitioners have enough knowledge, good attitude and greater practice level than the undergraduate, postgraduate dental students. Conclusion: Within the limits of the present study, the dental practitioners have higher levels of knowledge, attitude and practice on various types of topical fluoride and its uses than other dental professionals.

Keywords---Topical fluoride, dental caries, knowledge, attitude, practice, innovative technique.

Introduction

The expression 'topical fluoride treatment' refers to methods that provide a high concentration of fluoride to exposed tooth surfaces for a local protective effect. The most popular topical fluoride agents are toothpastes (dentifrices), mouthrinses, gels and varnishes that contain fluoride. These may be used separately or in combination. Children's caries have been found to be substantially reduced when using these products around the country [1]. In enamel, fluorine binds with free hydroxyapatite crystals, fluorohydroxyapatite is then formed and is redeposited in enamel. This would provide a defensive layer on top of the enamel. As a result, dental caries would be avoided [2,3]. Topical fluoride application will be a simple but important procedure that is nominated by dental care professionals. Topical fluoride applications using fluoride varnish are recommended between two and four times for children annually and twice for adults for treatment of dental caries [4].

Previous study by Eman Bahurji, etal, 2019 [5] was conducted to identify and describe school based fluoride varnish programs where the questions regarding the program description, assessment, process were asked. About 85% of the responding programs apply fluoride varnish as part of school based programs. Nearly one third of programs apply fluoride varnish once a year, 28% apply them twice a year. The work shows the importance of topical fluoride as an awareness part from dental practitioners. Another work by Rebecca L Slayton, etal, 2002 [6] found that only 2% reported having take their child by one year of age for topical fluoride treatment, but majority about 31% reported that they bring their child above 3 years of age for topical fluoride treatment, so majority of them are aware for specific age of topical fluoride application of their child. The work proves that the parents have some knowledge about topical fluoride application which is something interesting. The research work by Ritu Bassal, etal, 2012 [7] found that about 18.8% used fluoride varnish for adults by dental practitioners, where 57% of them incorrectly identified the effect of topical fluoride.

The previous works by different authors proves that the topical fluoride application is important for all irrespective of the age and should be practiced wisely and healthily by the dental professionals. The lacunae found in the previous research works are that the knowledge, awareness and practice methods

were not checked for dental practitioners, undergraduate, postgraduate students separately. They were not conducted in the Indian population mostly, the majority of the studies were not questionnaire based study. Our team has extensive knowledge and research experience that has translated into high quality publications [8–17], [18–21], [22–26], [27]. The aim of the present study is to check the knowledge, awareness and practice on various types of topical fluoride among different dental professionals.

Materials and Methods

The study was done as an online setting which may be a prospective observational study. The study includes large amounts of data that can be stored and is cost effective and easy to handle and the options may not be available to the participant and the participant's truthfulness cannot be tested. The responses were obtained from 110 dental professionals from the Chennai sub-population with inclusion criteria of undergraduate, postgraduate dental students, dental practitioners from various colleges and exclusion criteria of other professionals. The questionnaire was validated by the guide and principal investigator.

A self structured questionnaire comprising about 12 questions were prepared in google forms and circulated as a link to the participants. The responses were exported to google sheets and data was retrieved and analysed in SPSS software version 26. The statistics test that was used is descriptive statistics from SPSS software. The method of representation of output variables was a bar graph. The independent variables of the study were height, weight, skin tone and dependent variables are knowledge, awareness, practice, topical fluoride, caries. The results were obtained from SPSS software.

Results



Fig 1: The graph shows the gender of the dental professionals who participated in the study. X axis shows the gender, Y axis shows the percentage of responses.

Green colour bar depicts the male participants and the orange colour bar depicts the female participants. Males (57.27%) are the dominant group that took part in the study.

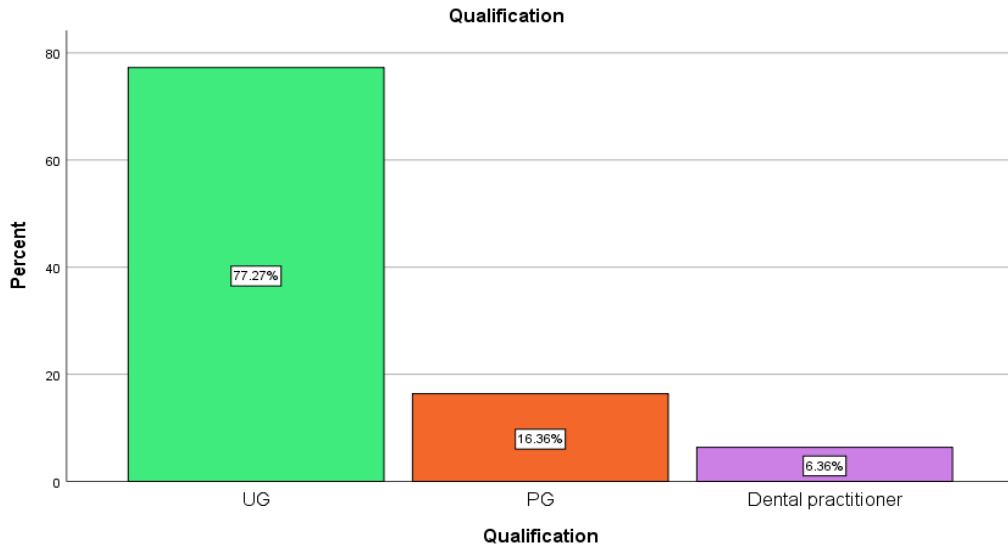


Fig 2: The graph shows the qualification of the participants of the present study. X axis shows the qualification, Y axis shows the percentage of responses. Green colour bar depicts the undergraduate participants, the orange colour bar depicts the postgraduate participants and the purple colour depicts the dental practitioners. Undergraduates (77.27%) are the major participants in the study, which is followed by the postgraduate students (16.36%) and dental practitioners (6.36%).

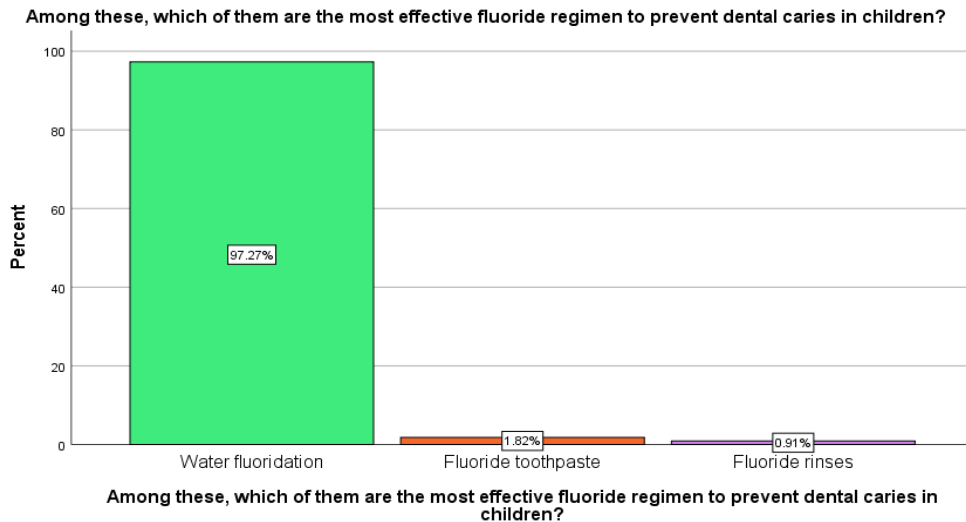


Fig 3: The graph shows the knowledge of the participants about the effective fluoride regimen that prevents caries in the children. X axis shows the responses,

Y axis shows the percentage of responses. Green colour bar depicts the water fluoridation, the orange colour bar depicts the fluoride toothpaste and the purple colour depicts the fluoride rinses as answered by the participants. Majority of the participants (97.27%) knew that water fluoridation is an effective treatment for children but the rest did not know about it.

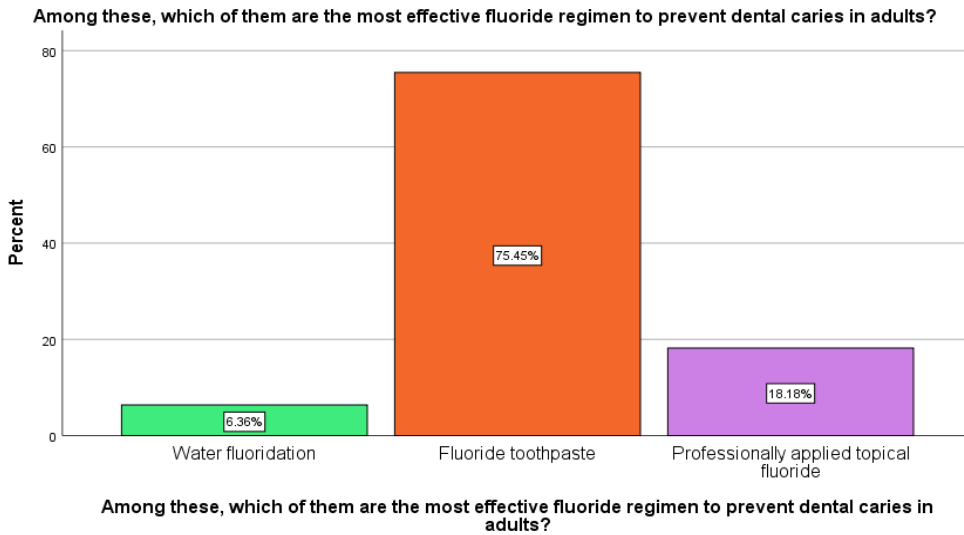


Fig 4: The graph shows the knowledge of the participants about the effective fluoride regimen that prevents caries in the adults. X axis shows the responses, Y axis shows the percentage of responses. Green colour bar depicts the water fluoridation, the orange colour bar depicts the fluoride toothpaste and the purple colour depicts the professionally applied topical fluoride as answered by the participants. About 75.45% of the participants knew that fluoride toothpaste is an effective treatment for adults but the rest failed to know about it.

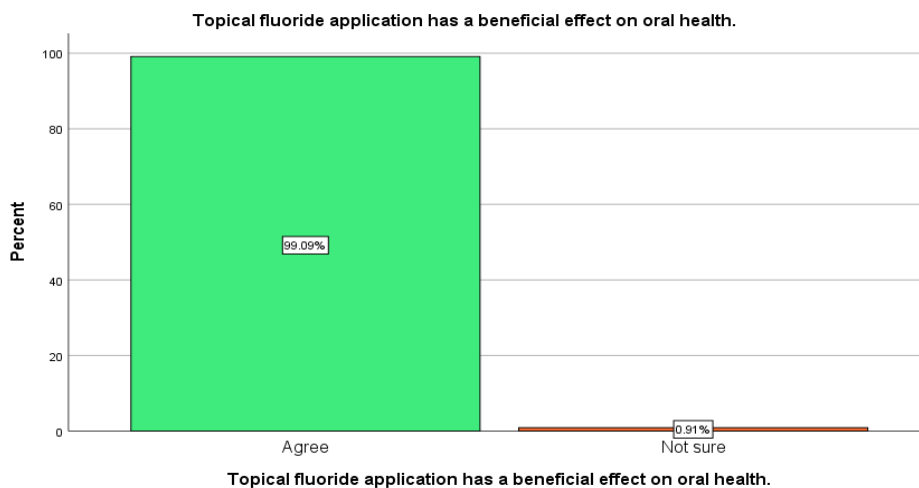


Fig 5: The graph shows the knowledge of topical fluoride application had beneficial effects on oral health. X axis shows the responses, Y axis shows the

percentage of responses. Green colour bar depicts the agreeable statement, the orange colour bar depicts the not sure statement as answered by the participants. Nearly, 99.09% of the participants agreed with the fact, but 0.91% of them did not know about it.

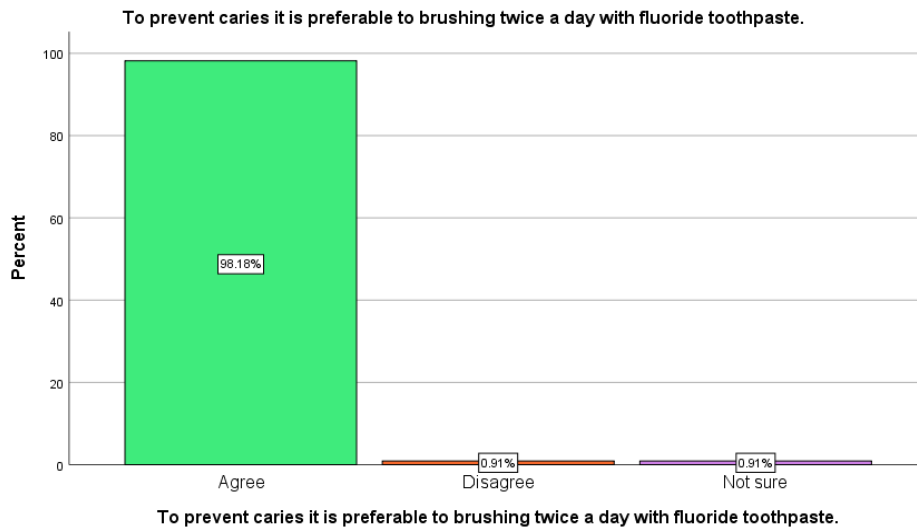


Fig 6: The graph shows the preference of the practice of brushing twice a day with fluoride toothpaste to prevent caries. X axis shows the responses, Y axis shows the percentage of responses. Green colour bar depicts the agreeable statement, the orange colour bar depicts the disagreeable statement and the purple colour depicts the not sure statement as answered by the participants. About 98.18% of the participants preferred the practice but the rest were not sure or disagreed.

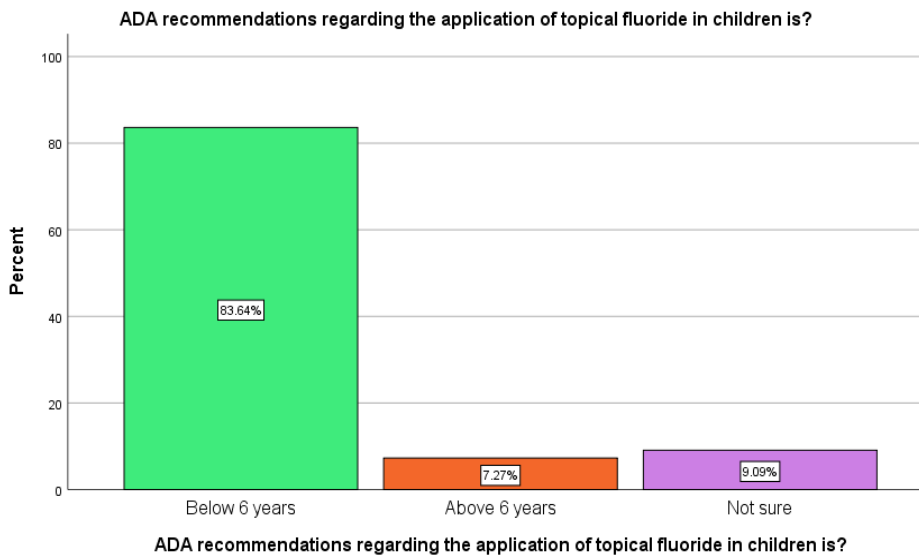


Fig 7: The graph shows the awareness of the participants that ADA recommended age group for application of topical fluoride. X axis shows the responses, Y axis

shows the percentage of responses. Green colour bar depicts below 6 years, the orange colour bar depicts above 6 years and the purple colour depicts the not sure statement as answered by the participants. Nearly 83.64% of the dental professionals are aware that below 6 years will be the age for application of topical fluoride in children, but the rest were not aware of the recommended age.

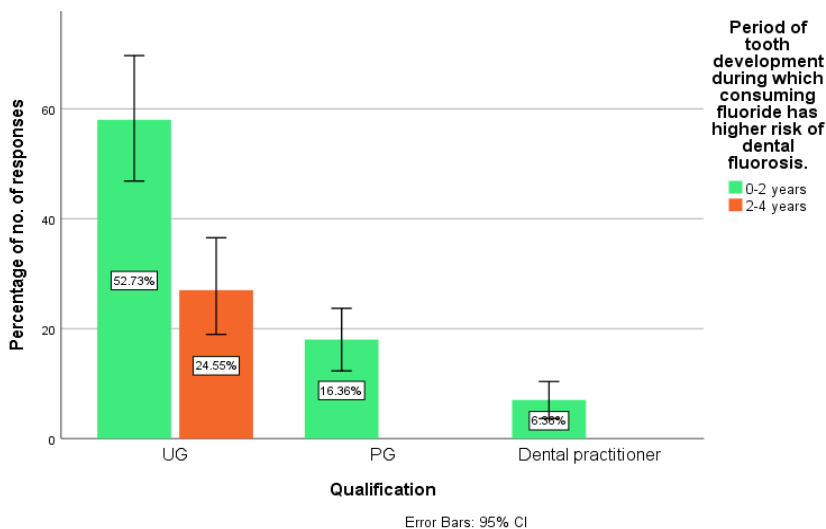


Fig 8: The graph shows the correlation of knowledge of the period of tooth development when there is higher risk of dental fluorosis between different dental professionals. X axis gives the qualification, Y axis gives the percentage of the responses. Green colour bar indicates 0-2 years and the orange colour bar indicates the 2-4 years age group as answered by the participants. Nearly 52.73% of the undergraduates know the period at which there is high risk of dental fluorosis, some 24.55% of them were not aware which shows that postgraduate (16.36%) and dental practitioners (6.36%) are more aware than them. Chi square test was done and the association was found to be statistically significant. p-value is 0.005 and it is statistically significant.

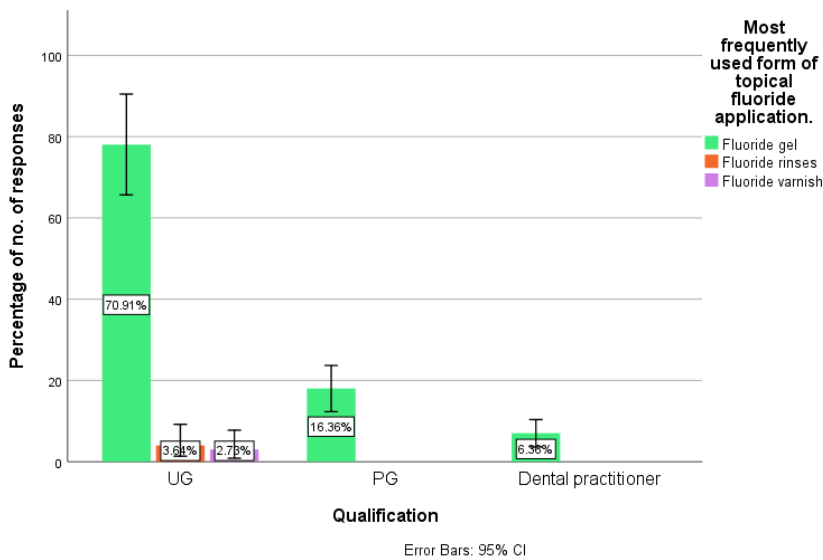


Fig 9: The graph shows the correlation of practice of frequently used form of topical fluoride in application between different dental professionals. X axis gives the qualification, Y axis gives the percentage of the responses. Green colour bar depicts the fluoride gel, the orange colour bar depicts the fluoride rinses and the purple colour depicts the fluoride varnish as answered by the participants. About 70.91% of the undergraduates practice fluoride gel than fluoride rinses (3.64%), fluoride varnish (2.73%), where postgraduates and dental practitioners use fluoride gel as topical fluoride application. Chi square test was done and the association was found to be not statistically significant. p-value is 0.699 and it is not statistically significant.

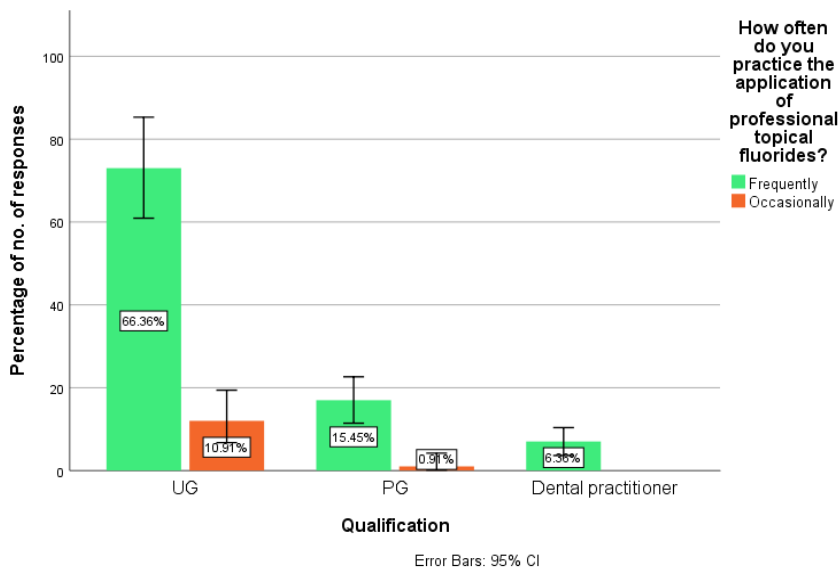


Fig 10: The graph shows the correlation of practice intervals of application of professional topical fluorides between different dental professionals. X axis gives

the qualification, Y axis gives the percentage of the responses. Green colour bar depicts the frequent practice and the orange colour bar depicts the occasional practice of topical fluoride as answered by the participants. About 66.36% of the undergraduates practice frequently, few (10.91%) practice occasionally where all dental practitioners practice frequently. Chi square test was done and the association was found to be not statistically significant. p-value is 0.359 and it is not statistically significant.

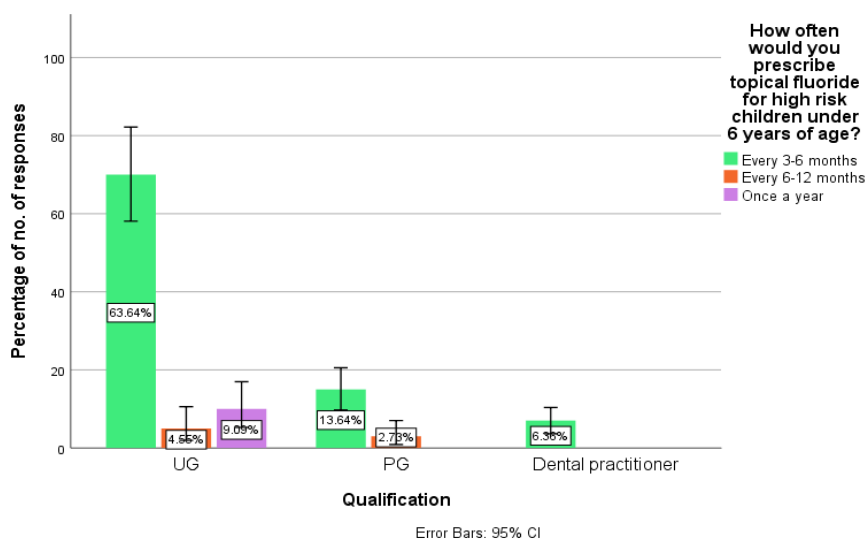


Fig 11: The graph shows the correlation of prescribing topical fluoride application for high risk caries children below 6 years between different dental professionals. X axis gives the qualification, Y axis gives the percentage of the responses. Green colour bar depicts every 3-6 months, the orange colour bar depicts every 6-12 months and the purple colour depicts once a year as answered by the participants. About 63.64% of the undergraduates prescribe it for every 3-6 months, where the rest prescribe every 6-12 months or once a year, where all dental practitioners prescribe application to be every 3-6 months. Chi square test was done and the association was found to be not statistically significant. p-value is 0.192 and it is not statistically significant.

From the results analysed, it has been found that male participants (57.27%) (fig 1) and undergraduates (77.27%) (fig 2) took the majority party in the study. The knowledge of the participants about the effective fluoride regimen for prevention of caries in children was water fluoridation (97.27%) (fig 3) and in adults was fluoride toothpaste (75.45%) (fig 4). They (99.09%) have agreed that the topical fluoride has a beneficial effect on oral health (fig 5) and brushing twice a day with fluoride toothpaste was preferred by 98.18% of the dental professionals to prevent caries (fig 6). The ADA has recommended the age below 6 years in children for the application of topical fluoride, where 83.64% of the dental professionals were aware of it but the rest (16.36%) did not know it (fig 7).

The results of the present study proves that dental practitioners have enough knowledge, good attitude and greater practice level than the undergraduate,

postgraduate dental students. The correlation of the knowledge of period of tooth development at which there is high risk of dental fluorosis (fig. 8), practice of frequently used topical fluoride application form (fig. 9), practice intervals of application of professional topical fluoride (fig. 10), prescribing topical fluoride application for high caries risk children below 6 years of age (fig 11) was checked between the dental professionals like the undergraduate, postgraduate dental students and dental practitioners. These results prove that the dental practitioners have immense knowledge, good attitude and experienced practice than the dental students.

Discussion

The study by Ritu Bansal, et al, 2012 [7] was conducted among the dentists of different departments. The results found about 18.8% reported the use of fluoride varnish as common topical fluoride that was used in practice. The participants about 57% failed to identify the primary effect of topical fluorides, similarly the present study which was conducted among the dental professionals found that 18.2% used the fluoride varnish for adults as daily practiced topical fluoride but the use of the topical fluoride was answered correctly by 93.6% of them which will be contradictory to the previous author's results. The work by Aqdar A Akbar, et al, 2018 [28] found that the participants (49%) were aware that the water fluoridation was the best method to prevent caries in children and in adults was fluoride toothpaste. In the present study, the majority of the participants about 97.3% knew that water fluoridation is the best method of treatment in children, 75.5% know that fluoride toothpaste for adults prevents caries efficiently. These results of the present study proves that the participants are quite aware of the use of topical fluoride.

The work by Anchal Sharma, et al, 2017 [29] analysed and concluded that the dental professionals apply topical fluoride only with active caries was about 63.8% always and without caries was 44.9% but in present study, it was 86.4% for having active caries and only 13.6% for not having caries as a preventive measure. The results showed that the application of topical fluoride as a preventive measure for caries was less preferred. The study by Kenneth F, et al, 1992 [30] found that of the dental professionals about 96% prescribed proper fluoride supplements to the patients and 61% of them knew the importance and use of topical fluoride. Similarly, in the present study the participants about 93.64% were aware about the use of topical fluoride that it can prevent caries efficiently. Surprisingly, about 99.09% know that topical fluoride has a beneficial effect on oral health.

The research work by L. Timms, et al, 2020 [31] found that the dental practitioners would apply topical fluoride with active high risk caries by 47% of them and for low risk patients, it was 42% of them. In the present study, the practice of advocating topical fluoride in high risk caries patients was 100% and for low risk caries, it was 76.36%. The results show on a general basis for every 6-9 months, topical fluoride should be applied professionally for caries risk patients. These results from the present study, proves that there is immense level of knowledge, good attitude and greater practice of topical fluorides among dental practitioners when compared to other groups. There is a need to increase the knowledge, practice of undergraduates for the betterment of patients. So, in the

near future the prevalence of caries, the caries developing rate can be stopped and can have a healthy oral cavity.

Conclusion

Within the limits of the present study, the dental practitioners have higher levels of knowledge, attitude and practice on various types of topical fluoride and its uses than other dental professionals. There is a need to increase the knowledge, practice level among the undergraduates for having proper understanding of the treatment of caries.

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References

1. Marinho VC, Higgins JP, Logan S, Sheiham A. Fluoride varnishes for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev*. 2002;(3):CD002279.
2. Sun H, Luo F, Wan Q. The Application of Fluoride in Dental Caries [Internet]. *Dental Caries* [Working Title]. 2020. Available from: <http://dx.doi.org/10.5772/intechopen.91810>
3. Sasanka L K, Jayaraj G. Review on Caries Preventive Effect of Fluoride Toothpaste. *Indian Journal of*. 2020;
4. Carter E, Parker M, Gallagher JE. Fluoride application: a survey of dental nurses [Internet]. Vol. 9, *Vital*. 2012. p. 32–5. Available from: <http://dx.doi.org/10.1038/vital1568>
5. Bakhurji E, Hoaglin Cooper L. School-based fluoride varnish programs: a national survey. *J Public Health Dent*. 2019 Dec;79(4):279–85.
6. Slayton RL, Warren JJ, Levy SM, Kanellis MJ, Islam M. Frequency of reported dental visits and professional fluoride applications in a cohort of children followed from birth to age 3 years. *Pediatr Dent*. 2002 Jan;24(1):64–8.
7. Srinivas SR, Ritu R, Jithendra KD. Devastating dentifrices [Internet]. Vol. 212, *British Dental Journal*. 2012. p. 356–356. Available from: <http://dx.doi.org/10.1038/sj.bdj.2012.323>
8. Muthukrishnan L. Imminent antimicrobial bioink deploying cellulose, alginate, EPS and synthetic polymers for 3D bioprinting of tissue constructs. *Carbohydr Polym*. 2021 May 15;260:117774.
9. PradeepKumar AR, Shemesh H, Nivedhitha MS, Hashir MMJ, Arockiam S, Uma Maheswari TN, 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 Aug;47(8):1198–214.
10. Chakraborty T, Jamal RF, Battineni G, Teja KV, Marto CM, Spagnuolo G. A Review of Prolonged Post-COVID-19 Symptoms and Their Implications on

- Dental Management. *Int J Environ Res Public Health* [Internet]. 2021 May 12;18(10). Available from: <http://dx.doi.org/10.3390/ijerph18105131>
11. Muthukrishnan L. Nanotechnology for cleaner leather production: a review. *Environ Chem Lett*. 2021 Jun 1;19(3):2527–49.
 12. Teja KV, Ramesh S. Is a filled lateral canal - A sign of superiority? *J Dent Sci*. 2020 Dec;15(4):562–3.
 13. Narendran K, Jayalakshmi, Ms N, Sarvanan A, Ganesan S A, Sukumar E. Synthesis, characterization, free radical scavenging and cytotoxic activities of phenylvilangin, a substituted dimer of embelin. *ijps* [Internet]. 2020;82(5). Available from: <https://www.ijpsonline.com/articles/synthesis-characterization-free-radical-scavenging-and-cytotoxic-activities-of-phenylvilangin-a-substituted-dimer-of-embelin-4041.html>
 14. Reddy P, Krithikadatta J, Srinivasan V, Raghu S, Velumurugan N. Dental Caries Profile and Associated Risk Factors Among Adolescent School Children in an Urban South-Indian City. *Oral Health Prev Dent*. 2020 Apr 1;18(1):379–86.
 15. Sawant K, Pawar AM, Banga KS, Machado R, Karobari MI, Marya A, et al. Dentinal Microcracks after Root Canal Instrumentation Using Instruments Manufactured with Different NiTi Alloys and the SAF System: A Systematic Review. *NATO Adv Sci Inst Ser E Appl Sci*. 2021 May 28;11(11):4984.
 16. Bhavikatti SK, Karobari MI, Zainuddin SLA, Marya A, Nadaf SJ, Sawant VJ, et al. Investigating the Antioxidant and Cytocompatibility of *Mimusops elengi* Linn Extract over Human Gingival Fibroblast Cells. *Int J Environ Res Public Health* [Internet]. 2021 Jul 4;18(13). Available from: <http://dx.doi.org/10.3390/ijerph18137162>
 17. Karobari MI, Basheer SN, Sayed FR, Shaikh S, Agwan MAS, Marya A, et al. An In Vitro Stereomicroscopic Evaluation of Bioactivity between Neo MTA Plus, Pro Root MTA, BIODENTINE & Glass Ionomer Cement Using Dye Penetration Method. *Materials* [Internet]. 2021 Jun 8;14(12). Available from: <http://dx.doi.org/10.3390/ma14123159>
 18. Rohit Singh T, Ezhilarasan D. Ethanolic Extract of *Lagerstroemia Speciosa* (L.) Pers., Induces Apoptosis and Cell Cycle Arrest in HepG2 Cells. *Nutr Cancer*. 2020;72(1):146–56.
 19. Ezhilarasan D. MicroRNA interplay between hepatic stellate cell quiescence and activation. *Eur J Pharmacol*. 2020 Oct 15;885:173507.
 20. Romera A, Peredpaya S, Shparyk Y, Bondarenko I, Mendonça Bariani G, Abdalla KC, et al. Bevacizumab biosimilar BEVZ92 versus reference bevacizumab in combination with FOLFOX or FOLFIRI as first-line treatment for metastatic colorectal cancer: a multicentre, open-label, randomised controlled trial. *Lancet Gastroenterol Hepatol*. 2018 Dec;3(12):845–55.
 21. Raj R K, D E, S R. β -Sitosterol-assisted silver nanoparticles activates Nrf2 and triggers mitochondrial apoptosis via oxidative stress in human hepatocellular cancer cell line. *J Biomed Mater Res A*. 2020 Sep;108(9):1899–908.
 22. Vijayashree Priyadharsini J. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J Periodontol*. 2019 Dec;90(12):1441–8.
 23. Priyadharsini JV, Vijayashree Priyadharsini J, Smiline Girija AS, Paramasivam A. In silico analysis of virulence genes in an emerging dental pathogen *A. baumannii* and related species [Internet]. Vol. 94, *Archives of*

- Oral Biology. 2018. p. 93–8. Available from: <http://dx.doi.org/10.1016/j.archoralbio.2018.07.001>
24. 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 Feb 10;34:e002.
 25. Gudipani RK, Alam MK, Patil SR, Karobari MI. 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 Dec 1;44(6):423–8.
 26. Chaturvedula BB, Muthukrishnan A, Bhuvaraghan A, Sandler J, Thiruvengkatachari B. Dens invaginatus: a review and orthodontic implications. *Br Dent J.* 2021 Mar;230(6):345–50.
 27. Kanniah P, Radhamani J, Chelliah P, Muthusamy N, Joshua Jebasingh Sathiya Balasingh E, Reeta Thangapandi J, et al. Green synthesis of multifaceted silver nanoparticles using the flower extract of *Aerva lanata* and evaluation of its biological and environmental applications. *ChemistrySelect.* 2020 Feb 21;5(7):2322–31.
 28. Akbar AA, Al-Sumait N, Al-Yahya H, Sabti MY, Qudeimat MA. Knowledge, Attitude, and Barriers to Fluoride Application as a Preventive Measure among Oral Health Care Providers. *Int J Dent.* 2018 Apr 16;2018:8908924.
 29. Sharma A, Chopra R, Sachdeva S, Sachdev V. Knowledge attitude and practice of Indian dentists on topical fluoride application in children. *J Dent Specialities.* 2017;5(1):36–9.
 30. Jones KF, Berg JH. Fluoride supplementation. A survey of pediatricians and pediatric dentists. *Am J Dis Child.* 1992 Dec;146(12):1488–91.
 31. Timms L, Sumner O, Deery C, Rogers HJ. Everyone else is using it, so why isn't the UK? Silver diamine fluoride for children and young people. *Community Dent Health.* 2020 May 29;37(2):143–9.