



Knowledge and awareness about uses of fluoride among adults - a survey

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ABSTRACT

Fluoride has been used for years to prevent dental caries. Tooth brushing reduces bacteria, hence reduces dental caries. Fluoride content in toothpaste helps to prevent dental caries. Dental caries are controlled in children who drink fluoridated water. The most effective way to prevent dental caries by topical fluoride application is through fluoridated toothpaste. The main aim of the study is to know and be aware of the uses of fluoride among adults. An online survey was conducted with a self-structured questionnaire comprising 15 questions related to the use of fluoride. The questionnaire was designed using the online survey platform "google forms". Descriptive analysis was carried out using the statistical software "SPSS software version 20". The results of the survey were represented in the form of pie charts and bar charts. Around 85% of the population know and are aware of the use of fluoride. Awareness of the uses of fluoride is adequate among the adult population. So it is evident from this study that people are aware of the positive and negative impacts due to appropriate or inappropriate levels of fluoride in their daily consumption.

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fluoride is present in saliva (Chong and Tseng, 2011; Shree, 2019). The most effective way to prevent dental caries through topical fluoride is through fluoridated toothpaste (Levy *et al.*, 1995; Gunasekaran and R, 2016; Palati *et al.*, 2020). Tooth brushing reduces bacteria, hence reduces dental caries and it is the reason for using toothpaste. The abrasive effects of toothpaste were extended. Oral hygiene was found to have a caries prevention effect and long-term compliance in oral self-care (Selwitz *et al.*, 1998; Prasanna and Gheena, 2016; Manohar and Abilasha, 2019).

INTRODUCTION

Fluoride supplements have been used for years to prevent dental caries. Fluoride has a preemptive effect in caries prevention and also certain levels of

Fluoridation of water is a basic procedure that ensures the presence of precise amounts of fluoride content in the drinking water so as to provide systemic and local benefits. Community water fluoridation is recommended by nearly all public

health, medical, and dental organizations, because of its contribution to the large decline in cavities. School water fluoridation and school-based fluoride tablet programs both have been shown in many studies to be effective in preventing dental caries. Fluoride content in toothpaste helps to prevent dental caries (Bellini *et al.*, 1981). Dental caries are controlled in children who drink fluoridated water (Bentley *et al.*, 1999; Harrita and Santhanam, 2019).

According to Rozier RG, Fluoride supplements should be prescribed only for children who are at high risk of developing caries and whose primary source of drinking water is deficient in fluoride (Rozier, 2010; Sheriff and Santhanam, 2018). According to Narendran S, deficiencies and ambiguity in respondent fluoride knowledge, as well as prescription practices, indicated a need for educational intervention (Narendran, 2006; Ahad and Gheena, 2016). According to Horowitz, dental diseases can be controlled and prevented using fluoride (Horowitz, 2003). The main aim of the study is to assess the knowledge and awareness about the uses of fluoride among adults.

MATERIALS AND METHODS

An online survey was conducted with a self-structured questionnaire with a sample size of 100 comprising dental students. The questionnaire consisted of questions related to awareness about the uses of fluoride and finally, questions related to established facts. The participants were given a short introduction about the awareness of the uses of fluoride. The questionnaire was validated in a standard manner. Measures such as a selection of participants randomly, steps to prevent asking irrelevant questions to the participants, placing restrictions over participant population and age groups are taken to minimise the bias occurring in sampling. The questionnaire was designed using the online survey platform “google forms”. For statistical analysis, data was initially entered in Microsoft excel sheet and analysed using IBM SPSS Software version 20.0. Descriptive statistics were expressed by means of frequency. Percentage and chi-square analysis for gender responses were also carried out using the same statistical software. The results of the survey were represented in the form of pie charts and bar charts.

RESULTS AND DISCUSSION

In this study, the results are collected, analyzed and discussed. A majority of 85% of respondents were aware and understood the advantages and disad-

vantages of fluoride. The outright results prove it.

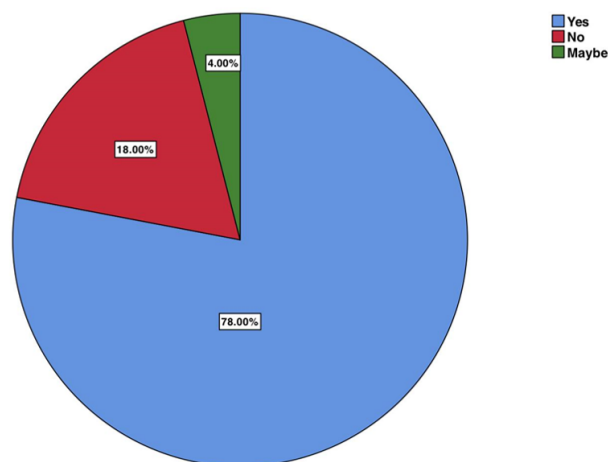


Figure 1: Pie chart depicts the responses to the question that fluoride exists in all water supplies naturally.

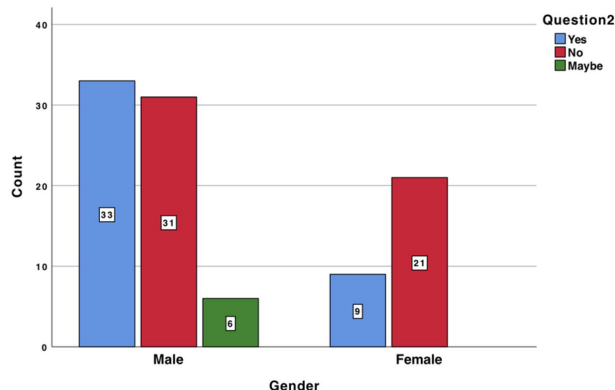


Figure 2: Bar chart represents the association between the gender of the participants and awareness about the fact towards sources of fluoride.

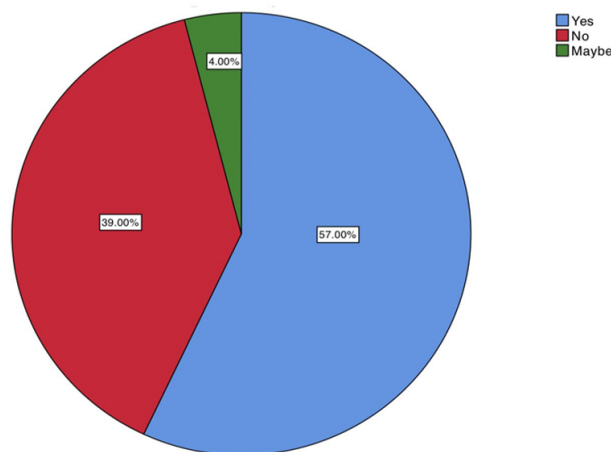


Figure 3: Pie chart shows responses to the question from birth until the age of 18 drink fluoridated city water for most of our water needs.

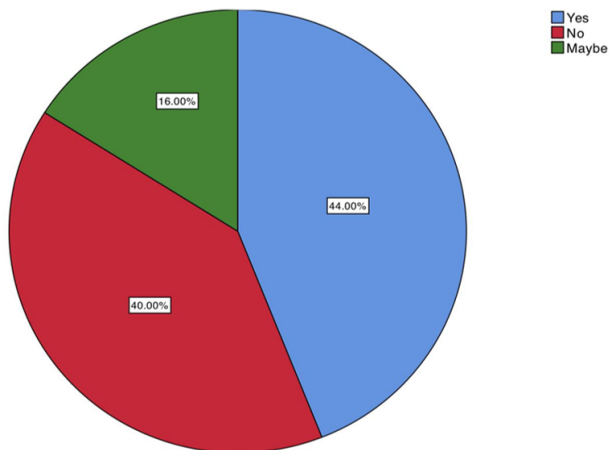


Figure 4: Pie chart depicts the responses for awareness about fluoridated water preventing tooth decay.

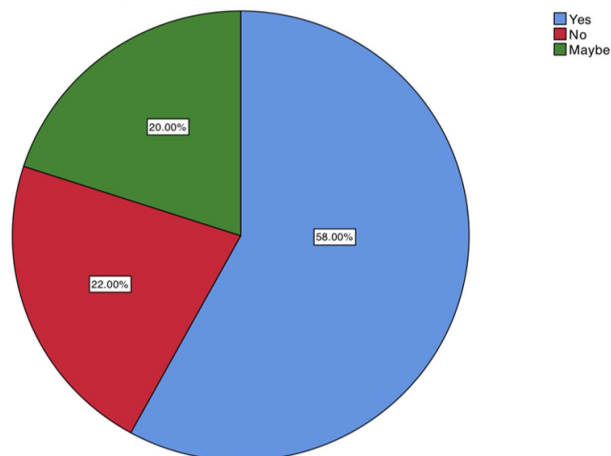


Figure 7: Pie chart depicts the responses on dental fluorosis leading to dental caries.

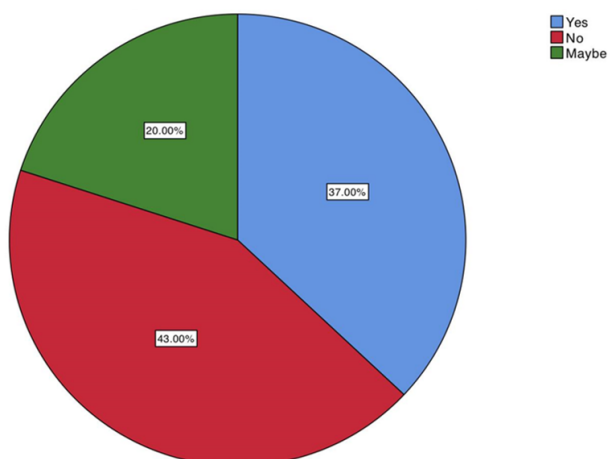


Figure 5: Pie chart depicts the distribution of responses to drinking government distributed public, or corporation water resources causes dental fluorosis.

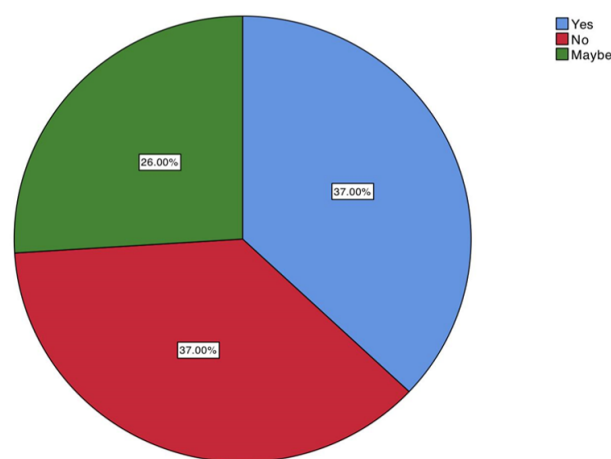


Figure 8: Pie chart shows the responses to fluoride application could prevent tooth decay.

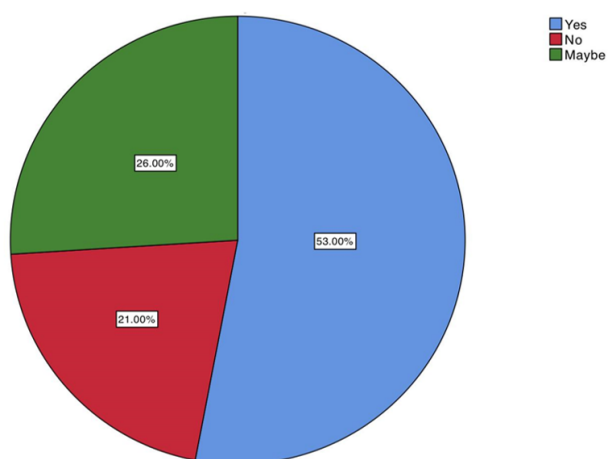


Figure 6: Pie chart depicts the responses to drinking public, or corporation water causes skeletal fluorosis.

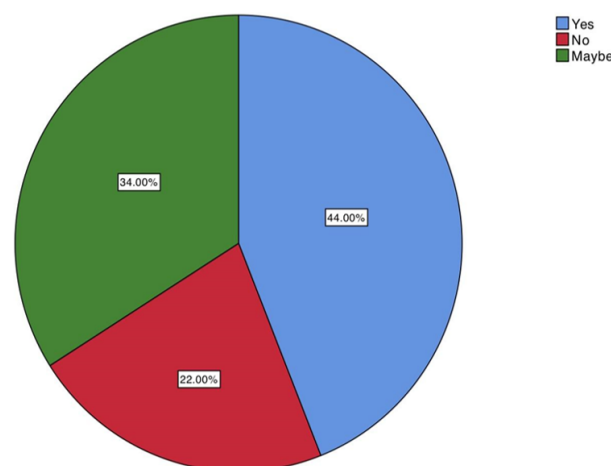


Figure 9: Depicts responses to the fact that a pregnant woman ingested with a high dose of fluoridated water; it affects the teeth development of the foetus.

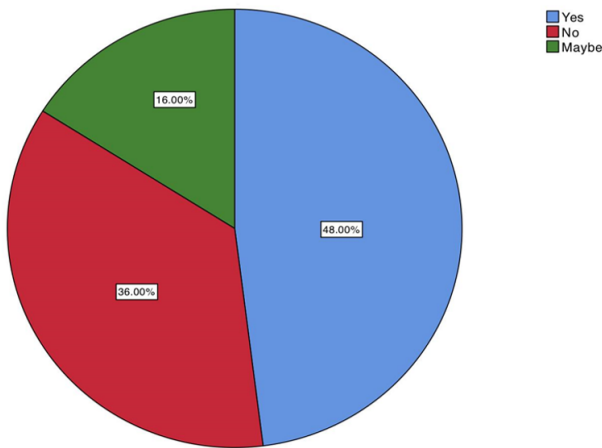


Figure 10: Pie chart depicts that percentage distribution on the consumption of prescribed fluoride supplements

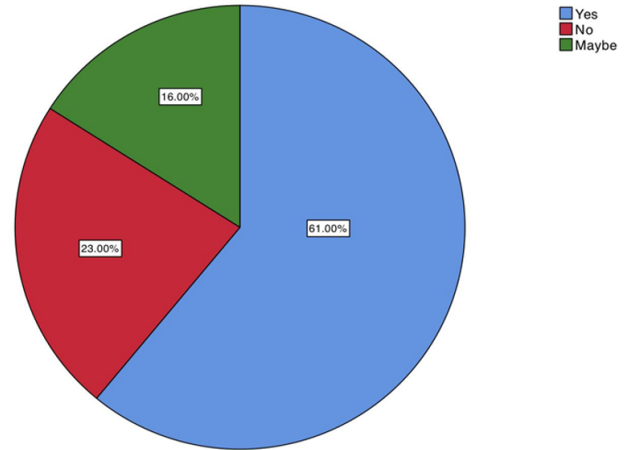


Figure 13: Pie chart depicts the responses of participants for the fact that the consumption of well water could prevent caries.

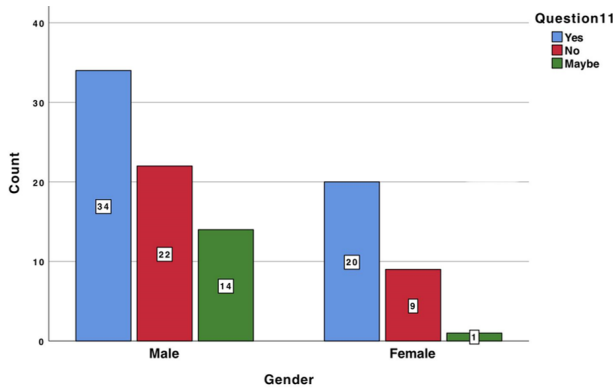


Figure 11: Bar chart represents the association between the gender of the participants and awareness about the fact that fluoride affects the thyroid gland.

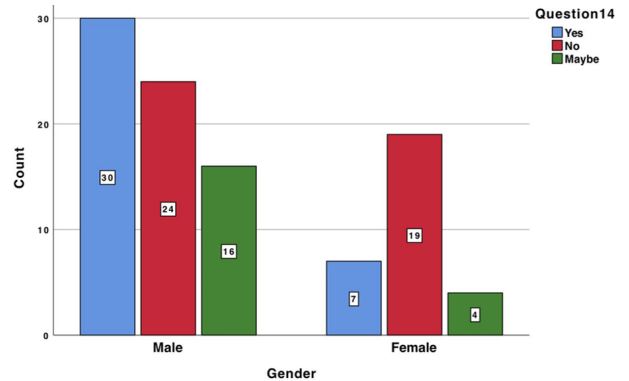


Figure 14: Bar chart represents the association between the gender of the participants and awareness about the benefits of the fluoride water to lower socio-economic backgrounds.

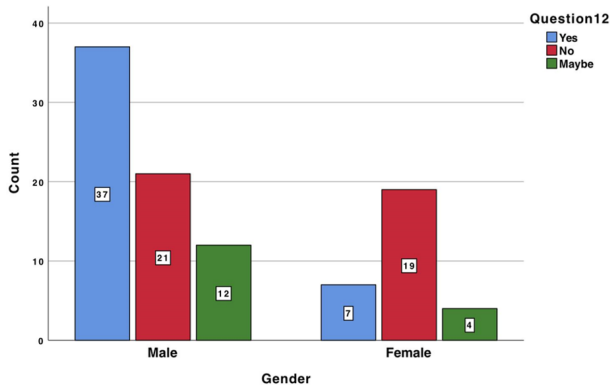


Figure 12: Bar chart represents the association between the gender of the participants and the use of fluoridated toothpaste during 0-10 years.

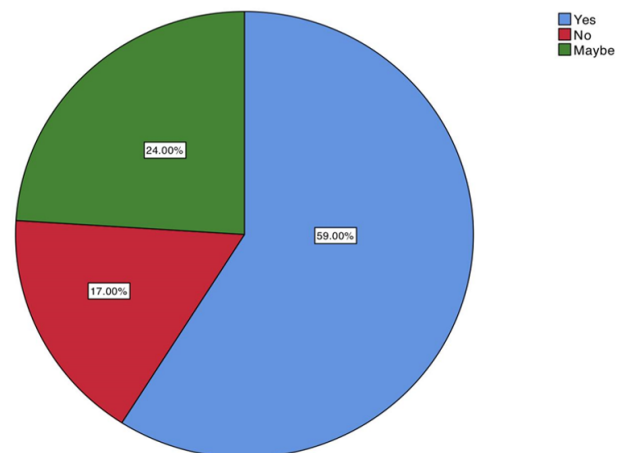


Figure 15: Depicts the responses of participants that bottled water is fluoridated.

Figure 1 depicts that fluoride exists in all water supplies naturally. 78%(blue) have knowledge of fluoride existence, 4%(green) have partial knowledge about it and 18%(red) do not have knowledge of fluoride existence. Figure 2 Bar chart represents the association between the gender of the participants and awareness about the sources of fluoride. The association between the variables was analyzed using Chi-square test (Pearson's Chi-square value - 6.711; P-value - 0.035 (>0.05)) and was found to be statistically not significant. The X-axis represents the gender of the participants and Y-axis represents the number of responses. Out of 42% of the participants who are aware, 33% constitutes male and 9% constitutes female. Figure 3 shows knowledge and awareness on the consumption of fluoridated city water for most of our water needs from birth until the age of 18. 57%(blue) had drunk the fluoridated city water, 39%(red) didn't drink fluoridated city water and 4%(green) didn't know that they had drunk fluoridated city water or not. Figure 4 depicts an awareness of fluoridated water. 44%(blue) were aware of fluoridated water, 40%(red) were not aware of fluoridated and 16%(green) were partially aware of fluoridated water prevents tooth decay. Figure 5 depicts that drinking public water causes dental fluorosis. 37% (blue) of participants know that it causes dental fluorosis; 43% (red) of participants don't know that public water causes dental fluorosis and 20%(green) of participants partially know that public water causes skeletal fluorosis.

Figure 6 depicts that drinking public water causes skeletal fluorosis. 53% (blue) of participants know that it causes skeletal fluorosis, 21% (red) of participants don't know about it and 26% (green) of participants partially know that public water causes skeletal fluorosis. Figure 7 depicts that dental fluorosis can lead to dental caries. 58% (blue) of participants agree, 22% (red) of participants disagree and 20% (green) partially agree to it. Figure 8 shows that fluoride application could prevent tooth decay. 37% (blue) of participants know that it prevents tooth decay, 37% (red) of participants unaware and 26% (green) partially aware of it. Figure 9 depicts awareness of the fact that if a pregnant woman ingested a high dose of fluoridated water, it affects the development of teeth in the foetus. 44% (blue) of participants aware, 22% (red) of participants unaware about it, 34% (green) partially aware of it. Figure 10 depicts that prescription of fluoride supplements. 48% (blue) of participants consumed pills, 36% (red) of participants had not consumed pills.

Figure 11 shows a Bar chart representing the association between the gender of the participants and awareness about the fact that fluoride affects the

thyroid gland. The association between the variables was analyzed using Chi-square test (Pearson's Chi-square value - 5.176; P-value - 0.075 (>0.05)) and was found to be statistically significant. The X-axis represents the gender of the participants and Y-axis represents the number of responses. Out of 54% of the participants who are aware, 34% constitutes male and 20% constitutes female. Figure 12: Bar chart represents the association between the gender of the participants and the use of fluoridated toothpaste during 0-10 years. The association between the variables was analyzed using Chi-square test (Pearson's Chi-square value - 10.184; P-value - 0.006 (<0.05)) and was found to be statistically significant which clearly indicates the majority of males are more aware of the use of fluoridated toothpaste during the age period of 0-10 years than females. The X-axis represents the gender of the participants and Y-axis represents the number of responses. Out of 44% of the participants who are aware, 37% constitutes male and 7% constitutes female. Figure 13 depicts the fact that the consumption of fluoridated well water could prevent caries. 61% (blue) are aware that consuming fluoridated well water could prevent caries, 23% (red) unaware and 16% (green) partially aware that consumption of well water could prevent caries. Figure 14: Bar chart represents the association between the gender of the participants and awareness about the fluoride water benefits lower socio-economic backgrounds. The X-axis represents the gender of the participants and Y-axis represents the number of responses. Out of 37% of the participants who are aware, 30% constitutes male and 7% constitutes female. The association between the variables was analyzed using Chi-square test (Pearson's Chi-square value - 7.237; P-value - 0.027(>0.05)) and was found to be statistically significant. Hence the majority of males are more aware that fluoride water benefits people of lower socio economic backgrounds than females. Figure 15 depicts that bottled water is fluoridated. 59% (blue) were aware that bottled water is fluoridated, 17% (red) were aware that bottled water is fluoridated and 24% (green) were ambiguous on the awareness that bottled water is fluoridated.

According to O Jensen, the most effective way to administer fluoride is through the regular use of fluoride toothpaste (Jensen *et al.*, 2011; Sarbeen and Gheena, 2016) (Figure 12). Hence using fluoridated toothpaste helps in the prevention of caries. This survey helps us to know the awareness that the use of fluoride at a minimum level in toothpaste prevents dental caries (Jagtap, 2012; Palati *et al.*, 2019; Sukumaran and Padavala, 2018) (Figure 2). Parnell C explained in their study about the advantages

of using fluoride and the use of fluoride (Parnell and O'mullane, 2013; Abitha and Santhanam, 2019; Uma, 2020). Fluoride toothpaste helps in the prevention of dental caries (Heller et al., 1997; Murray et al., 1986) (Figure 4). Suppose excess intake of fluoride content causes dental fluorosis (Figure 5) and skeletal fluorosis (Figure 6).

Dental fluorosis is caused by taking in too much fluoride over a long period when the teeth are forming. Only children aged 8 years and younger are at risk because this is when permanent teeth are developing and children older than 8 years, adolescents, and adults cannot develop dental fluorosis. The study done by Lubon AJ relates about training rural women and children to improve access to oral health awareness programs in remote villages (Lubon et al., 2018; Krishnan et al., 2018) (Figure 9, Figure 10).

The previous study conducted was successful in creating awareness for rural people, mainly for pregnant women. Because if pregnant women drink fluoridated water, it can make kids less intelligent (Knevel and Gide, 2016; Namkaew and Wiwatanadate, 2012). (Hannah et al., 2018; Arshad and Imran, 2017) If pregnant women ingest a high dose of fluoridated water, it affects the tooth development of the fetus (Djordjevic, 2018; Chandrashekar and Anuradha, 2004) (Figure 9).

The limitations associated with the study is the limited sample size and therefore is not representative of the population by large. Water sources tested in the rural areas had lower fluoride concentration than the recommended level of 0.5 mg/L fluoride in water. Hence, a significant amount of fluoride should be supplemented to meet the biological needs.

Survey of a wider population to increase awareness on the uses of fluoride-containing dentifrices and community water fluoridation. The main aim is to prevent or decrease dental caries in all areas and reduce the incidence of dental caries (Brindha et al., 2011). In future strategies should be made to utilize media more effectively for oral health education (Madhankumar and Singarampillay, 2012). Dental treatments are expensive; in the future, the cost of dentistry will be reduced. Thus, the extension of preventive dentistry is still indispensable.

CONCLUSION

Within the limits of the present study, awareness and knowledge among the participants about the usage of fluoride are analysed and the study concludes that the majority of the population are aware of the uses of fluoride and the level needed to pre-

vent themselves from Dental Caries. So it is evident from this study that people are aware of the positive and negative impacts due to the level of fluoride in their daily routine and in preventing diseases.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

REFERENCES

- Abitha, T., Santhanam, A. 2019. Correlation between bizygomatic and maxillary central incisor width for gender identification. *Brazilian Dental Science*, 22(4):458-466.
- Ahad, M., Gheena, S. 2016. Awareness, attitude and knowledge about evidence based dentistry among the dental practitioner in Chennai city. *Research Journal of Pharmacy and Technology*, 9(11):1863-1866.
- Arshad, N., Imran, S. 2017. Assessment of arsenic, fluoride, bacteria, and other contaminants in drinking water sources for rural communities of Kasur and other districts in Punjab, Pakistan. *Environmental Science and Pollution Research*, 24(3):2449-2463.
- Bellini, H. T., Arneberg, P., Fehr, F. R. V. D. 1981. Oral hygiene and caries. *Acta Odontologica Scandinavica*, 39(5):257-265. Taylor and Francis.
- Bentley, E. M., Ellwood, R. P., Davies, R. M. 1999. Fluoride ingestion from toothpaste by young children. *British dental journal*, 186(9):460-462.
- Brindha, K., et al. 2011. Fluoride contamination in groundwater in parts of Nalgonda District, Andhra Pradesh, India. *Environmental monitoring and assessment*, 172(1-4):481-492.
- Chandrashekar, J., Anuradha, K. P. 2004. Prevalence of dental fluorosis in rural areas of Davangere, India. *International Dental Journal*, 54(5):235-239.
- Chong, G. T. F., Tseng, P. 2011. A Review of the Uses of Fluoride and Outcomes of Dental Caries Control in Singapore. *Singapore Dental Journal*, 32(1):14-18.
- Djordjevic, A. 2018. Parents Knowledge about the Effects of Oral Hygiene, Proper Nutrition and Fluoride Prophylaxis on Oral Health in Early Child-

- hood. *Balkan Journal of Dental Medicine. content.sciendo.com*, 22(1):26-31.
- Gunasekaran, G., R, A. 2016. Tooth Sensitivity among Residential University Students in Chennai. *Asian Journal of Pharmaceutical and Clinical Research*, 9(8):63-65.
- Hannah, R., Ramani, P., Sherlin, H. J., Ranjith, G., Ramasubramanian, A., Jayaraj, G., Don, K. R., Archana, S. 2018. Awareness about the use, Ethics and Scope of Dental Photography among Undergraduate Dental Students Dentist Behind the lens. *Research Journal of Pharmacy and Technology*, 11(3):1012-1016.
- Harrita, S., Santhanam, A. 2019. Determination of Physical Height Using Clinical Crown Height of Deciduous Teeth. *Indian Journal of Forensic Medicine and Toxicology*, 13(4):23-27.
- Heller, K. E., Eklund, S. A., Burt, B. A. 1997. Dental Caries and Dental Fluorosis at Varying Water Fluoride Concentrations. *Journal of Public Health Dentistry*, 57(3):136-143.
- Horowitz, H. S. 2003. The 2001 CDC recommendations for using fluoride to prevent and control dental caries in the United States. *Journal of public health dentistry*, 63(1):3-10.
- Jagtap, S. 2012. Fluoride in drinking water and defluoridation of water. *Chemical Reviews*, 112(4):2454-2466.
- Jensen, O., et al. 2011. Fluoride toothpaste and toothbrushing; knowledge, attitudes and behaviour among Swedish adolescents and adults. *Swedish dental journal*, 35(4):203-213.
- Knevel, R., Gide, A. 2016. Observing history rhyme. A critical discourse on the introduction of dental hygiene education in Nepal.
- Krishnan, R. P., et al. 2018. Surgical Specimen Handover from Operation Theater to Laboratory: A Survey. *Annals of maxillofacial surgery*, 8(2):234-238.
- Levy, S. M., Kiritsy, M. C., Warren, J. J. 1995. Sources of Fluoride Intake in Children. *Journal of Public Health Dentistry*, 55(1):39-52.
- Lubon, A. J., Erchick, D. J., Khatry, S. K., Clerq, S. C. L., Agrawal, N. K., Reynolds, M. A., Katz, J., Mullany, L. C. 2018. Oral health knowledge, behavior, and care seeking among pregnant and recently-delivered women in rural Nepal: a qualitative study. *BMC Oral Health*, 18(1):97.
- Madhankumar, M. D. S. S., Singarampillay, V. 2012. Oral Hygiene Awareness among Two Non Professional College Students in Chennai, India - A Pilot Study. *Prevention*, 54:24-26.
- Manohar, J., Abilasha, R. 2019. A Study on the Knowledge of Causes and Prevalance of Pigmentation of Gingiva among Dental Students. *Indian Journal of Public Health Research & Development*, 10(8):95-100.
- Murray, J. J., et al. 1986. Appropriate use of fluorides for human health. World Health Organization. ISBN: 9241542039. 131pg.
- Namkaew, M., Wiwatanadate, P. 2012. Association of fluoride in water for consumption and chronic pain of body parts in residents of San Kamphaeng district, Chiang Mai, Thailand. *Tropical Medicine and International Health*, 17(9):1171-1176.
- Narendran, S. 2006. Fluoride knowledge and prescription practices among dentists. *Journal of dental education*, 70(9):956-964.
- Palati, S., Ramani, P., Sherlin, H. J., Gheena, S., Don, K. R., Jayaraj, G., Santhanam, A. 2019. Age Estimation of an Individual Using Olze's Method in Indian Population-A Cross-Sectional Study. *Indian Journal of Forensic Medicine and Toxicology*, 13(3):121-124.
- Palati, S., Ramani, P., Shrelin, H., Sukumaran, G., Ramasubramanian, A., Don, K. R., Jayaraj, G., Santhanam, A. 2020. Knowledge, Attitude and practice survey on the perspective of oral lesions and dental health in geriatric patients residing in old age homes. *Indian Journal of Dental Research*, 31(1):22-25.
- Parnell, C., O'mullane, D. 2013. After-brush rinsing protocols, frequency of toothpaste use: fluoride and other active ingredients. *Monographs in oral science*, 23:140-153.
- Prasanna, G. E., Gheena, S. 2016. A study of empathy across students from 4 health disciplines among 1st years and Final years. *Research Journal of Pharmacy and Technology*, 9(9):1472-1476.
- Rozier, R. G. 2010. Evidence-based clinical recommendations on the prescription of dietary fluoride supplements for caries prevention: a report of the American Dental Association Council on Scientific Affairs. *Journal of the American Dental Association*, 141(12):1480-1489.
- Sarbeen, J. I., Gheena, S. 2016. Microbial variation in climatic change and its effect on human health. *Research Journal of Pharmacy and Technology*, 9(10):1777-1781.
- Selwitz, R. H., Nowjack-Raymer, R. E., Kingman, A., Driscoll, W. S. 1998. Dental Caries and Dental Fluorosis Among Schoolchildren Who Were Lifelong Residents of Communities Having Either Low or Optimal Levels of Fluoride in Drinking Water. *Journal of Public Health Dentistry*, 58(1):28-35.

- Sheriff, K. A. H., Santhanam, A. 2018. Knowledge and Awareness towards Oral Biopsy among Students of Saveetha Dental College. *Research Journal of Pharmacy and Technology*, 11(2):543-546.
- Shree, K. H. 2019. Saliva as a diagnostic tool in oral squamous cell carcinoma—a systematic review with Meta-analysis. *Pathology oncology research: POR, Springer*, 25(2):447-453.
- Sukumaran, G., Padavala, S. 2018. Molar incisor hypomineralization and its prevalence. *Contemporary Clinical Dentistry*, 9(Supple 2):246-250.
- Uma, P. K. 2020. Knowledge about Legal Aspects of Medical Negligence in India among Dentists—A Questionnaire Survey. *Medico-Legal Update*, 20(1):111-115.