



Knowledge and Awareness on Silver Diamine Fluoride among Paediatric Dentists and Post Graduates in India - A Survey

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Authors' contributions

This work was carried out in collaboration between both authors. Author VB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript and managed the literature searches. Author MGM managed the analyses of the study. Both authors read and approved the final manuscript.

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ABSTRACT

Silver diamine fluoride (SDF) is a topically applied liquid that has been used to treat tooth hypersensitivity and arrest cavitated carious lesions. Lesion arrest can be achieved by painting the cavitated lesion with the SDF liquid without removing any infected soft dentin. SDF can serve as an alternative, particularly for patients who cannot tolerate traditional dental treatment, and can reduce the need for dental care to be performed under general anesthesia, with its associated health risks. The aims of this study were to assess Indian pediatric dentist's SDF educational experiences, knowledge, attitudes, and professional behavior and to explore the relationships among these constructs. A cross-sectional survey was conducted among 100 paediatric dentists and post graduates by asking them to take up a survey. All dentists from India. were invited to participate in the survey. An online multiple-choice and fill-in response questionnaire was created in Google Forms. Questions. The data obtained were compiled systematically and then statistically analyzed. Survey responses were received from 100 members. The data showed that 41% percent of

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respondents under 40 years of age in our study. Out of the 100 respondents were male (53%) than female (47%). The respondents ranged in age from 26 to 65 years; they had graduated from their BDS /MDS program. A lack of self-reported knowledge was most frequently reported concerning whether a restoration must be placed after SDF treatment even if SDF is being reapplied twice per year, whether SDF can be used on root caries lesions, and under which codes SDF treatment can be billed.

Keywords: *Pediatric dentistry; pediatric dentists; silver diamine fluoride; dental caries; knowledge; attitudes; professional behavior.*

1. INTRODUCTION

SDF is a topically applied liquid that has been used to treat tooth hypersensitivity and arrest cavitated carious lesions.[1] Lesion arrest can be achieved by painting the cavitated lesion with the SDF liquid without removing any infected soft dentin. [2] SDF can serve as an alternative, particularly for patients who cannot tolerate traditional dental treatment, and can reduce the need for dental care to be performed under general anesthesia, with its associated health risks. [3-5] In 2014, the Food and Drug Administration (FDA) approved the use of SDF in the U.S. as a “device” to treat tooth hypersensitivity, which is a similar regulatory pathway to the clearance of fluoride varnish.[6] Thus, use of SDF in the U.S. for caries management is “off label.” There is considerable evidence of the efficacy and safety of SDF for treating primarily cavitated carious lesions. The American Academy of Pediatric Dentistry (AAPD) supports using 38% SDF in primary teeth to arrest cavitated lesions as part of a comprehensive caries management plan [7].

A systematic review rated the level of evidence supporting SDF use to be high in primary teeth.[8] However, one barrier to SDF use is that it discolours the treated lesion black. In addition, Yee et al found that the percentage of arrested cavitated lesions decreased over a period of two years after a single initial application, suggesting that reapplication is necessary over time.[9] Applying SDF twice early has been shown to be slightly more effective than once yearly.[10] When applied twice per year, the 38% SDF solution had a success rate of 84.8% for arresting caries.[11] In addition, there seems to be a dose-response to the effectiveness of SDF, with a 38% SDF solution being more effective than a 12% SDF solution [12,13].

While no research so far has explored how well dental schools educate their graduates about SDF, Nelson et al. reported in 2016 that 79.9% of U.S. pediatric dentistry residency programs had started to include SDF-related content in their

curricula, with a quarter of the programs using it in clinical settings. [7] Surveying pediatric dentists about their SDF educational experiences, knowledge, attitudes, and professional use would offer an opportunity to investigate whether increased education in this context would result not only in more knowledge, but also in more positive attitudes and increased use. The aims of this study were therefore to assess pediatric dentists’ SDF educational experiences, knowledge, attitudes, and professional behaviour and to explore the relationships among these constructs.[14] Specifically, we sought to determine if SDF education in dental school, graduate programs, and professional development would be positively correlated with SDF knowledge, attitudes, and use.

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years (Govindaraju, Jeevanandan and Subramanian, 2017a, 2017b; Panchal, Gurunathan and Shanmugavel, 2017; Ravikumar, Jeevanandan and Subramanian, 2017; Jeevanandan and Govindaraju, 2018; Nair et al., 2018; Ravikumar et al., 2018, 2019; Ravindra et al., 2018, 2019; Subramanyam et al., 2018; Vishnu Prasad et al., 2018; Jeevanandan, Ganesh and Arthilakshmi, 2019; Ramadurai et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Veerale Panchal, Jeevanandan and Subramanian, 2019; Vignesh et al., 2019; V. Panchal, Jeevanandan and Subramanian, 2019; Samuel, Acharya and Rao, 2020). With this inspiration we planned to pursue research on knowledge and awareness on silver diamine fluoride among paediatric dentists and post graduates.

2. MATERIALS AND METHODS

2.1 Study Design and Sample

A cross-sectional survey was conducted among 562 paediatric dentists and post graduates of whom 100 people responded by taking up the survey. All dentists from India were invited to

participate in the survey. Simple random sampling was done to minimize sampling bias.

The collected data were tabulated and statistically analyzed using SPSS software (Version 21: IBM Corporation NY USA). Descriptive statistics (frequencies and percentages) were calculated to explore the general features of the data. Chi-square test was done to statistically analyze the data.

2.2 Survey Instrument and Data Collection

An online multiple-choice and fill-in response questionnaire was created in Google Forms. This consisted of 15 questions. Questions consisted of personal information, years of practice experience (graduation year), specialty, workplace, and city. Six questions covered the current use of SDF and investigated in which type of teeth and dentition it was used. The data obtained were compiled systematically and then statistically analyzed.

3. RESULTS

Survey responses were received from 100 members. The data showed that 41% percent of

respondents under 40 years of age in our study. Out of the 100 respondents were male (33%) than female (67%) The respondents ranged in age from 26 to 60 years; they had graduated from their BDS /MDS program.

Regarding SDF knowledge, seven items assessed self-reported knowledge about distinct types of dental treatments. The majority (77%) reported that they knew very well what SDF was used for in dentistry, (68%) that they knew the advantages SDF treatment can have over traditional dental treatment, Five items assessed knowledge concerning when SDF can be used to treat lesions. A large majority (95%) strongly agreed that SDF can be used to arrest cavitated lesions in enamel, (77%) that it can be used to arrest cavitated lesions in dentin, and (59%) that infected dentin must not be removed prior to applying SDF. When asked about non-cavitated lesions, (64%) agreed/strongly agreed that SDF can be used to arrest non-cavitated lesions in enamel. The majority (77%) strongly disagreed that SDF should be used prior to all restorations, and (33%) that SDF should be used prior to all restorations in at-risk patients.

Were you educated about SDF in dental school in classroom?

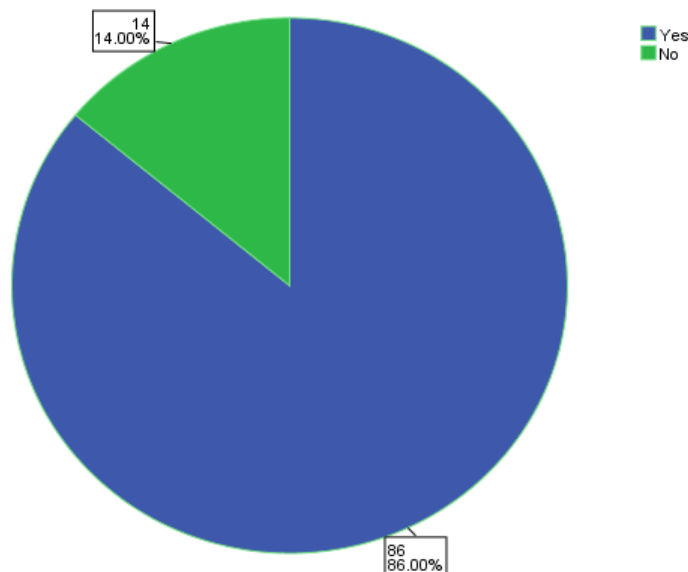


Fig. 1. Question 1: Were you educated about SDF in dental school in the classroom? 86% of the participants have been educated about SDF in dental school in the classroom (blue) and 30% have not been educated about SDF in dental school in the classroom (Green)

Is SDF used to treat dental caries in pediatric patients?

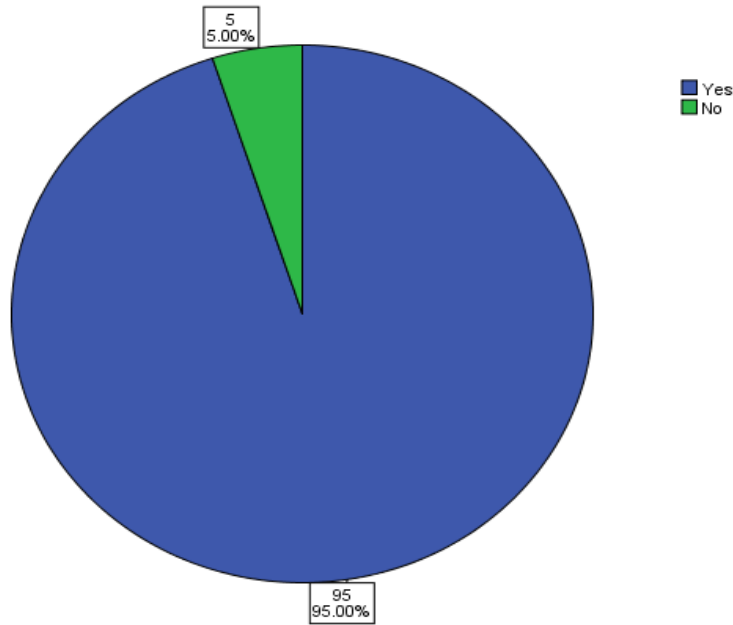


Fig. 2. Question 2: Is SDF used to treat dental caries in pediatric patients? 95% of the participants agreed SDF used to treat dental caries in pediatric patients (blue) and 5% participants did not agree that SDF used to treat dental caries in pediatric patients (Green)

Is SDF used for treatment of tooth sensitivity?

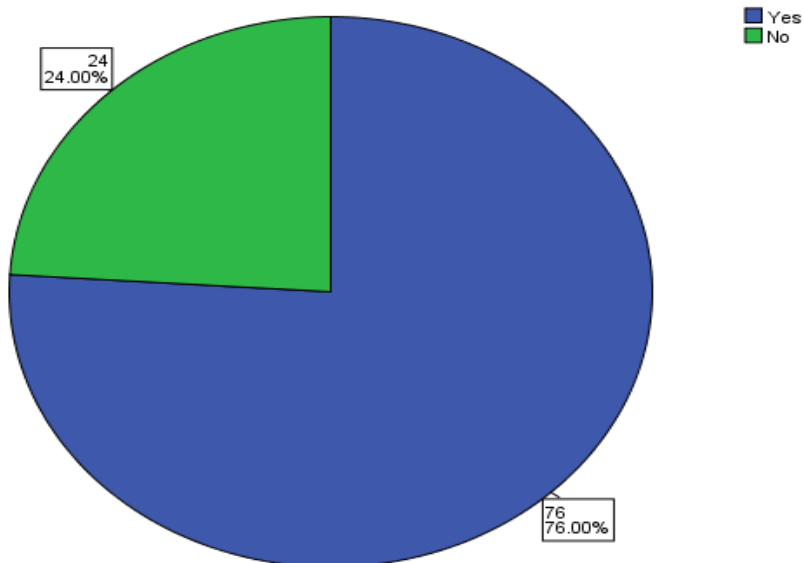


Fig. 3. Question 3: Is SDF used to treat dental caries in pediatric patients? 76% of the participants agreed SDF used to treat dental caries in pediatric patients (blue) and 24% participants did not agree that SDF used to treat dental caries in pediatric patients (Green)

Were you educated about SDF after graduation ?

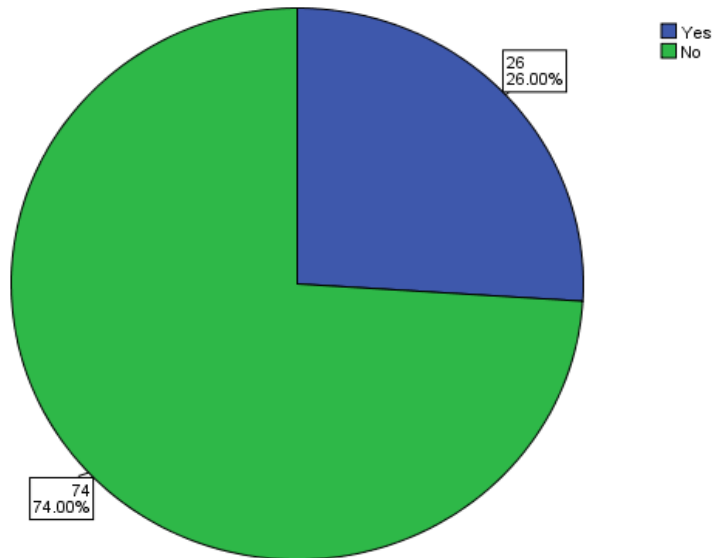


Fig. 4. Question 4: Were you educated about SDF after graduation? 74% of the participants have not been educated about SDF after graduation (Green) and 26% have been educated about SDF after graduation (blue)

Did you used SDF while you were in dental school?

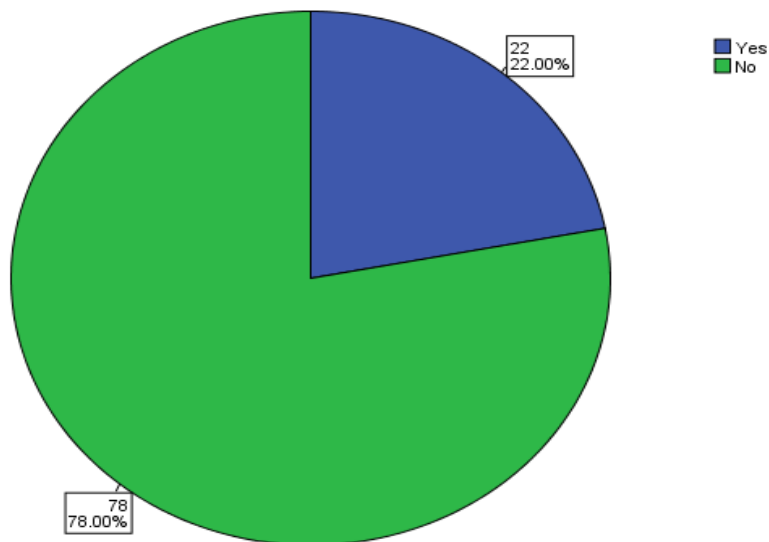


Fig. 5. Question 5: Did you use SDF while you were in dental school? 78% of the participants have not used SDF when they were in dental school (Green) and 22% have used SDF when they were in dental school (blue)

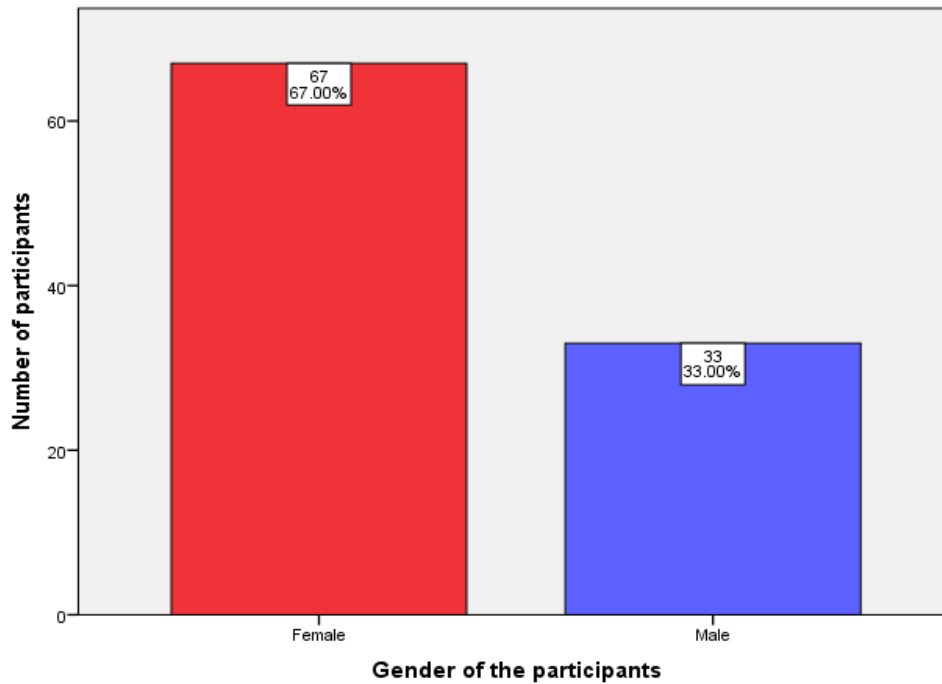


Fig. 6. Bar graph showing the frequency distribution of gender of participants. where the X-axis represents gender of participants and the Y-axis represents the number of patients. Majority of the study population were female 67% and males were 33% (blue)

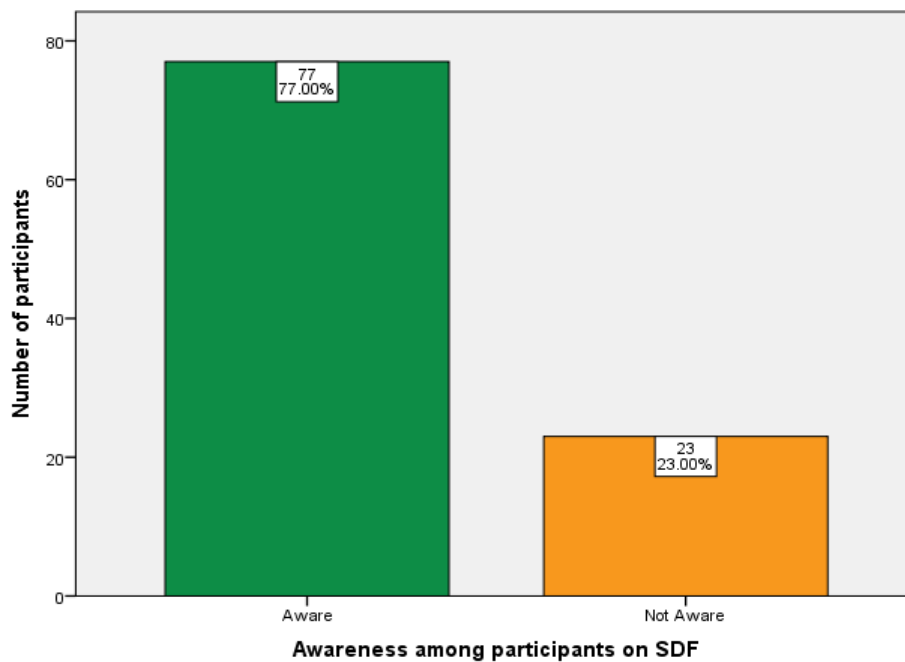


Fig. 7. Bar graph showing the frequency distribution of awareness among participants on SDF. Where the X-axis represents awareness among participants on SDF and the Y-axis represents the number of patients. Majority of the study population were aware about SDF 77% (Green) and 23% were unaware (Yellow)

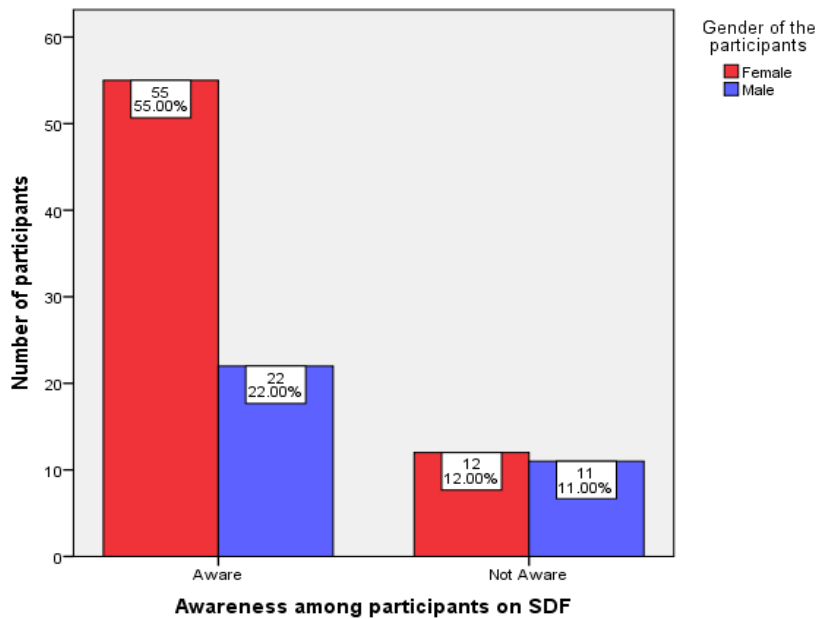


Fig. 8. Bar graph showing association between awareness and gender. Where the X axis represents awareness among participants on SDF. Y axis representing the number of participants. Majority of the female participants (Red) were aware about SDF compared to male participants (Blue) [Chi square test - Pearson's Chi-square value - 2.970.66] , p value - 0.015 (P< 0.05) Hence, statistically significant association between gender and awareness

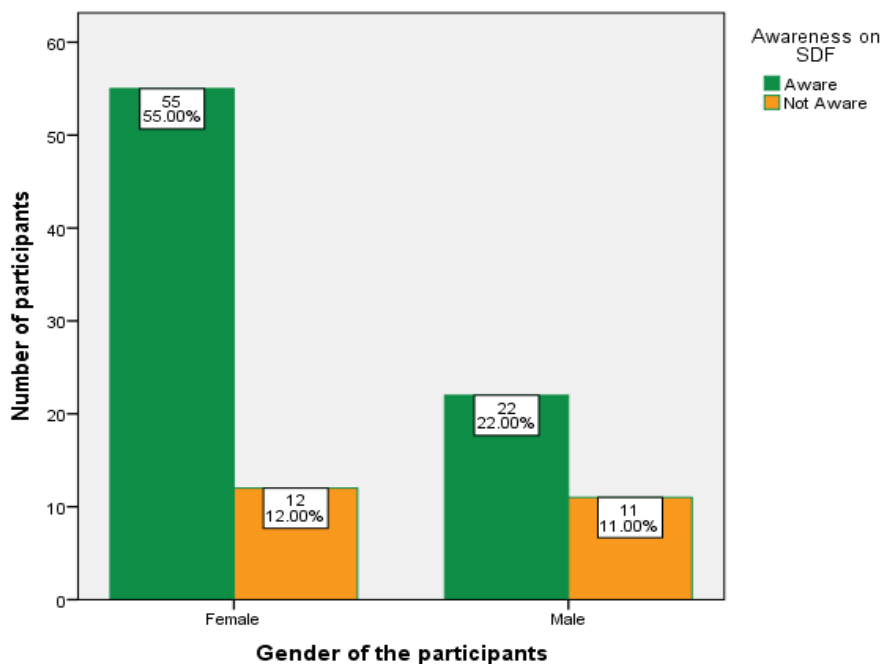


Fig. 9. Bar graph showing association between the gender and awareness of the participants. Where the X axis represents gender of the participants. Y axis representing the number of participants. Majority of the female participants (Red) were aware about SDF compared to male participants (Blue) [Chi square test - Pearson's Chi-square value - 2.970.66] , p value - 0.015 (P< 0.05) Hence, statistically significant association was seen between gender and awareness

4. DISCUSSION

Concerning SDF education, 86% of the respondents reported they were educated about SDF in classroom settings. This finding is surprising because SDF had not been cleared by the IDA for the treatment of dentin sensitivity until 2014, The increase in educational experiences in pediatric dental residency programs when compared to BDS/ MDS programs was also not surprising because one of the main target populations for SDF use is children. SDF education in pediatric dental residency programs will likely continue to increase over time. Pre doctoral and graduate programs, their knowledge about SDF use was quite high. This finding is likely due to their professional development education.[15,16] However, while 95% of the respondents answered that they knew what SDF was used for in dentistry, some responses were not consistent with empirical evidence. Most of the respondents 77% stated that they agreed/strongly agreed that SDF can be used to arrest cavitated lesions in dentin. This use is well supported by existing evidence.

This study had several limitations. First, survey research usually faces the problem that respondents who are more interested or more familiar with the survey topic may be more likely than non-respondents to take the time to respond.[17,18] This possibility should be considered when interpreting the findings.

5. CONCLUSION

The following conclusions can be drawn based on this study's results. The data showed that 41% percent of respondents under 40 years of age in our study. Out of the 100 respondents were male (33%) than female (67%) The respondents ranged in age from 26 to 60 years; they had graduated from their BDS /MDS program. Most respondents had received their SDF education through professional development such as continuing education courses, dental journals/other publications, and online resources. A lack of self-reported knowledge was most frequently reported concerning whether a restoration must be placed after SDF treatment even if SDF is being reapplied twice per year, whether SDF can be used on root caries lesions, and under which codes SDF treatment can be billed. Discrepancies were found between how SDF should be applied according to existing evidence and how some respondents thought SDF should

be used. Educational efforts are therefore needed to increase knowledge about the proper use, benefits, and limitations of SDF.

CONSENT AND ETHICAL APPROVAL

As per university standard guideline, participant consent and ethical approval have been collected and preserved by the authors

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Gao SS, Zhao IS, Hiraishi N, et al. Clinical trials of silver diamine fluoride in arresting caries among children: a systematic review. *JDR Clin Trans Res.* 2016;1(3):201-10.
2. Chu CH, Lo ECM, Lin HC. Effectiveness of silver diamine fluoride and sodium fluoride varnish in arresting dentin caries in Chinese pre-school children. *J Dent Res.* 2002;81(11):767-70.
3. Nelson T, Scott JM, Crystal YO, et al. Silver diamine fluoride in pediatric dentistry training programs: survey of graduate program directors. *Pediatr Dent* 2016;38(3):212-7.
4. Chicka MC, De Mobo JB, Mathu-Muju KR, et al. Adverse events during pediatric dental anesthesia and sedation: a review of closed malpractice insurance claims. *Pediatr Dent* 2012;34(3):231-8.
5. Food and Drug Administration. FDA drug safety communication: FDA approves label changes for use of general anesthetic and sedation drugs in young children; 2017. Available:www.fda.gov/downloads/Drugs/DrugSafety/UCM554644.pdf. Accessed 28 Jan. 2018.
6. Hamad M, Baharvand M, Safi Y. Death rate of dental anaesthesia. *J Clin Diagn Res.* 2017;11(6):ZE07-9..
7. Horst JA, Ellenikiotis H, UCSF Silver Caries Arrest Committee, Milgrom PM. UCSF protocol for caries arrest using silver diamine fluoride: rationale, indications, and consent. *J Calif Dent Assoc.* 2016;44(1):16-28.
8. Chicka MC, De Mobo JB, Mathu-Muju KR, et al. Adverse events during pediatric dental anesthesia and sedation: a review of closed malpractice insurance claims. *Pediatr Dent.* 2012;34(3):231-8.

9. Food and Drug Administration. FDA drug safety communication: FDA approves label changes for use of general anesthetic and sedation drugs in young children; 2017. Available: www.fda.gov/downloads/Drugs/DrugSafety/UCM554644.pdf. Accessed 28 Jan. 2018.
10. Hamad M, Baharvand M, Safi Y. Death rate of dental anaesthesia. *J Clin Diagn Res* 2017;11(6):ZE07-9.
11. Horst JA, Ellenikiotis H, UCSF Silver Caries Arrest Committee, Milgrom PM. UCSF protocol for caries arrest using silver diamine fluoride: rationale, indications, and consent. *J Calif Dent Assoc.* 2016;44(1):16-28.
12. American Academy of Pediatric Dentistry, Council on Clinical Affairs. Policy on the use of silver diamine fluoride for dental caries management in children and adolescents, including those with special health care needs. *Pediatr Dent.* 2017;39(6):146-55.
13. American Academy of Pediatric Dentistry. Use of silver diamine fluoride for pediatric dental patients. *Pediatr Dent.* 2017;39(6):51-3.
14. Ashik Ahamed, Ganesh Jeevanandan. A survey among dentists treating pediatric patients about management of caries and opinion on various restorative modalities A.
15. Padmaharish, Deepa Gurunathan, Kanthaswamy AC. Satisfaction levels among pedodontic postgraduates for postgraduates program - a review V.
16. Aishwarya, Deepa Gurunathan. Stress level in dental students performing pedodontic procedure S.
17. Veerale Panchal, Ganesh Jeevanandan, EMG Subramanian. Comparison of instrumentation time and obturation quality between hand K-file, H-files, and rotary Kedo-S in root canal treatment of primary teeth: A randomized controlled trial.
18. R Mahesh, Vishnu Prasad, and Padma A. Menon. A case of accidental aspiration of an endodontic instrument by a child treated under conscious sedation. R Mahesh, Vishnu Prasad, and Padma A. Menon.

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