Original Research Article

Knowledge awareness on the caries risk assessment tools and it's management strategies in children among dental students.

Running title: Knowledge and awareness on the caries risk assessment tools and it's management strategies in children among dental students.

ABSTRACT:

INTRODUCTION: Early identification of risk indicators and implementation of oral health preventive practices at a young age can reduce or avoid caries progression. Hence, dentists must know all the various techniques and early prevention methods.

AIM OF THE STUDY: The aim of the study is to create knowledge and awareness on the caries risk assessment tools and it's management strategies in children among dental students.

METHODOLOGY : A questionnaire survey was carried out online containing 10 questions and was sent to 100 students on the caries risk assessment tools and it's management strategies in children among dental students. An online survey was conducted using survey planet software and the data was collected and completely analysed for statistical difference.

RESULTS: According to our results, majority of the undergraduates thought that the child must visit a dentist from 12 months to 22 months and 66% of the undergraduates and 18% of post graduates think specific information gained from a systematic assessment of caries risk guides the dentist in the decision- making process for treatment and preventive protocols for children.

CONCLUSION: Dental practitioners have a major role in preventing and reducing the severity of ECC in young children and can implement preventive treatment protocols in their practice to determine the caries risk of their pediatric patients.

KEYWORDS: Oral health, Children,Caries risk assessment tools,survey,innovative study

INTRODUCTION:

Despite the great strides made in caries control in developed countries, caries remains the most common chronic childhood disease and a major financial burden on society.

A 2007 publication by the Centers for Disease Control and Prevention reported that although dental caries prevalence had declined significantly among school-aged children since the early 1970s (1), caries rates in children aged 2–5 years had increased. This confirmed early childhood caries (ECC) as the most prevalent chronic childhood disease; five times more common than asthma and seven times more common than hayfever. ECC is more prevalent among young children in low socioeconomic populations and among racial/ethnic minorities who are also more likely to face barriers in accessing care (2). Caries is a preventable infectious disease and it is well-documented that one of the best predictors for future tooth decay is the presence of current caries or evidence of prior caries experience.

Despite awareness of an increase in ECC prevalence, infant oral health care, as well as the establishment of a dental home by age 1, or when the first tooth erupts, has not yet become the standard of care in clinical practice (2). Several reports have shown that preventing the onset of ECC is more cost effective compared to treating advanced caries (3) (4). Typical costs of comprehensive oral care visits for preschoolers are considerably less than the cost of emergency room treatment or extensive restorations requiring sedation or treatment under general anesthesia (4) (5). Early identification of risk indicators and implementation of oral health preventive practices at a young age can reduce or avoid caries progression.

An individualized risk assessment of an infant or toddler for developing caries serves as the foundation for health care providers and parents/caregivers to identify and understand the child's ECC risk factors (4,5) (6). The specific information gained from a systematic assessment of caries risk guides the dentist in the decision-making process for treatment and preventive protocols for children already with disease and those deemed at risk. For optimal outcomes, caries risk assessment should be done as early as possible, and preferably, prior to the onset of the disease process. Since caries in the primary dentition is a strong predictor of caries in the permanent dentition, caries risk assessment and therapeutic management of the disease is crucial, as is the subsequent follow-up. Risk factors are determined from an interview with the parent and from a clinical assessment of the child (6) (7).

In practice, the caries risk assessment would begin in the dental office with an initial interview with the parent or caregiver (7) (8). The assessment interview should explore biological or lifestyle predisposing risk factors that contribute to the development or progression of caries. Examples of these risk factors include recently placed dental restorations or active caries in the mother, low health literacy of caregiver, frequent intake of fermentable carbohydrates by the infant, sleeping with a bottle that contains liquids other than water, prolonged use of a sippy cup containing milk, juice, or a sweetened beverage. The practitioner can simply circle "Yes" beside the risk or protective factors that apply in order to make a judgment as to whether the risk factors outweigh the protective factors or vice versa, thereby determining a risk status of low, moderate, or high. The risk level will then dictate which care path to be used.Disease indicators are indications of current and active caries and are obtained from the clinical examination of the child and include cavitated carious lesions, white spot lesions/ decalcifications, and recent restorations. Biological risk factors are also observed at the clinical examination and include the presence of plaque, gingival bleeding (an indicator of inadequate oral hygiene), and dry mouth. In older children, the presence of dental or orthodontic appliances increases plaque retention and the risk for caries (8) (9).

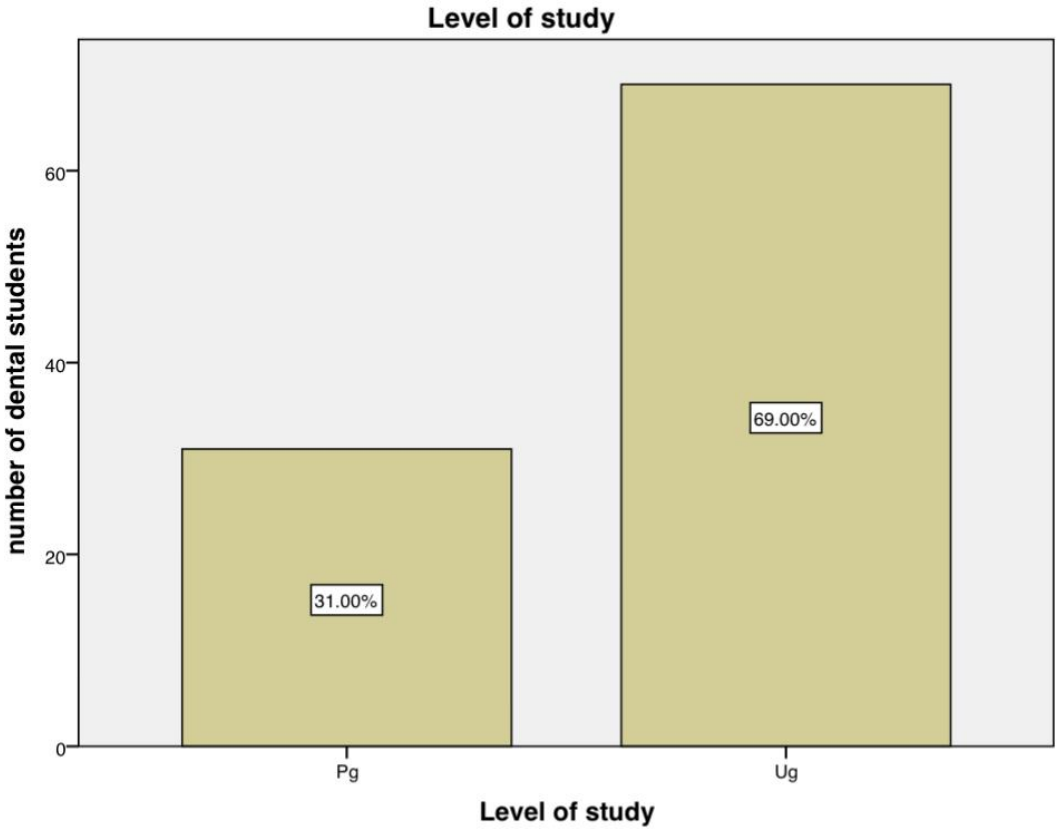
The clinician's experience, expertise, and personal historical experience with his patient and the child's caregivers, is of vital importance in determining a child's risk, which serves as the basis

for an individualized treatment plan for each infant/caregiver. These specific patient conditions and risks will help the practitioner and the parents understand the factors that contribute to or protect the patient from caries. Reassessment of risk factors and monitoring the progress of improvements in established self-management goals are essential elements of infant oral care visits. Modifications of recommendations or positive reinforcement for successful changes are necessary to achieve and sustain successful risk modification. Parents should be reminded that changing risk factors and lifestyles do not happen overnight and require persistence (9) (10). Our team has extensive knowledge and research experience that has translated into high quality publications (10–22) (23–29).

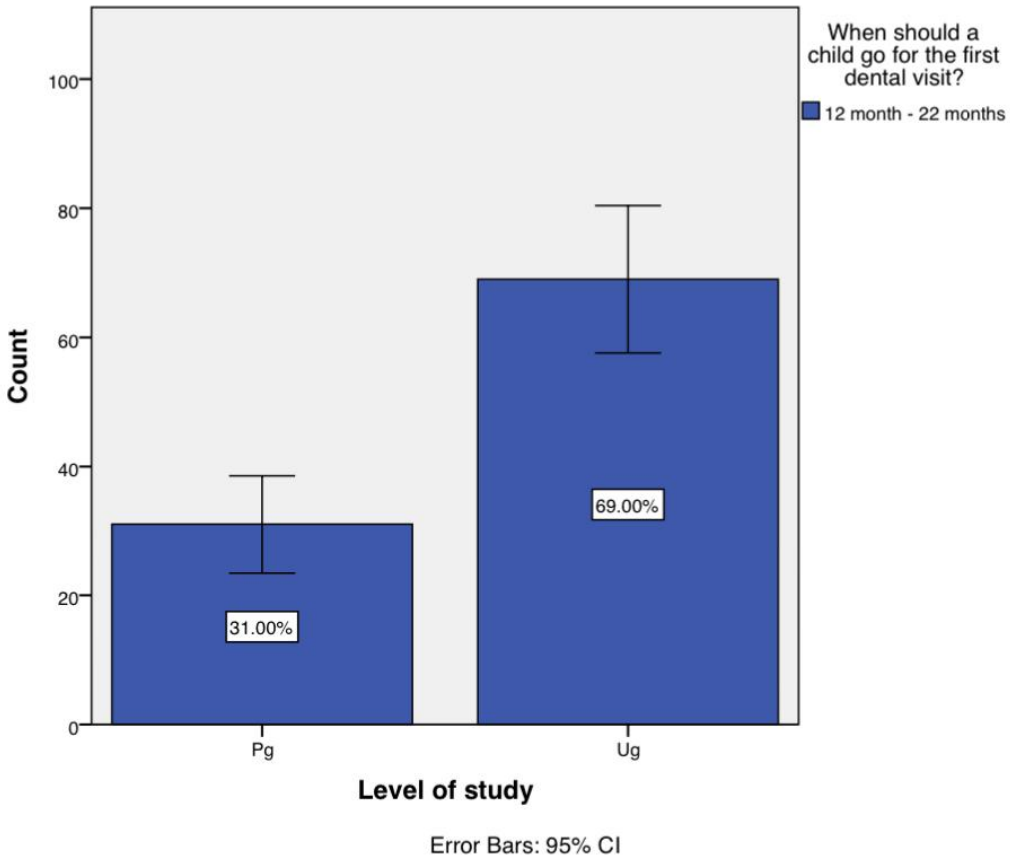
MATERIALS AND METHODS:

The present study is a survey based study. The sample size of the study is 100 dental students and the sampling method is a simple randomized simplifying method and a set of questionnaires being created using google forms on the knowledge and awareness of the caries risk assessment tools and it's management strategies in children among dental students. The data was then transferred to excel sheet and spss variable definition process was done using table and graphical illustration. By using the statistical software IBM SPSS version 2.0 statistical test like descriptive statistic test and inferential statistics were done keeping demographics. Following which chi square was done on the data obtained, the type of analysis that was done were correlated. It was approved by the institutional review board. The statistical study used in the study was Chi square test with p value less than 0.005 and confidence interval of 95%.

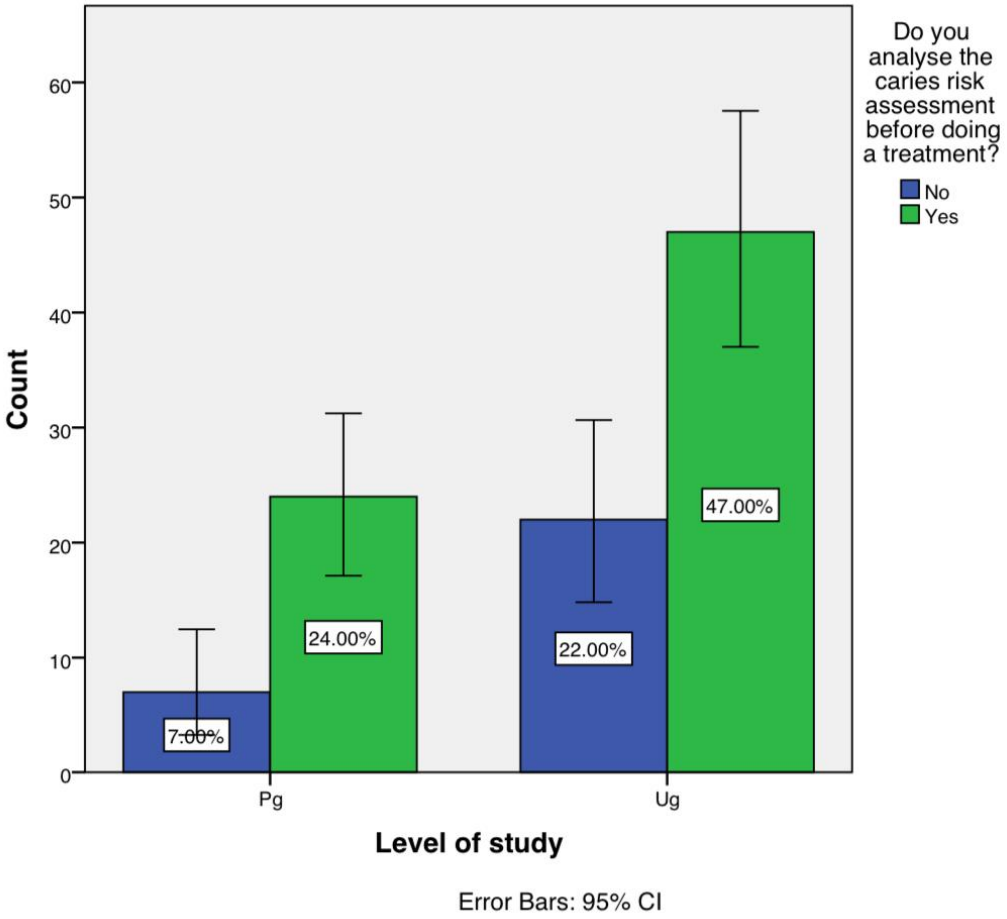
RESULTS:



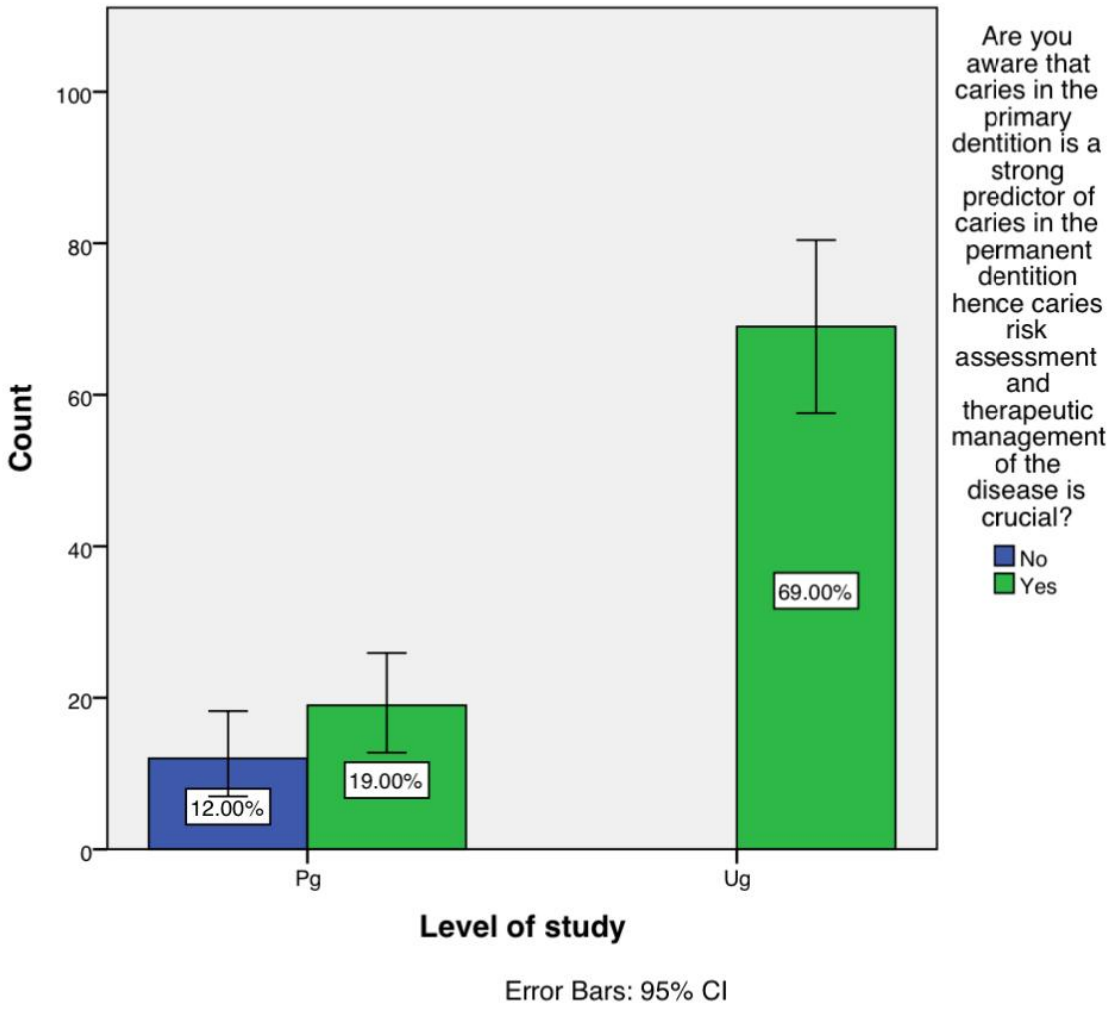
Graph 1: The bar chart depicts the level of study of the dental students. X-axis represents the level of study and the y-axis represents the number of students. In this study 69% of them were undergraduates and 31% of them are postgraduates.



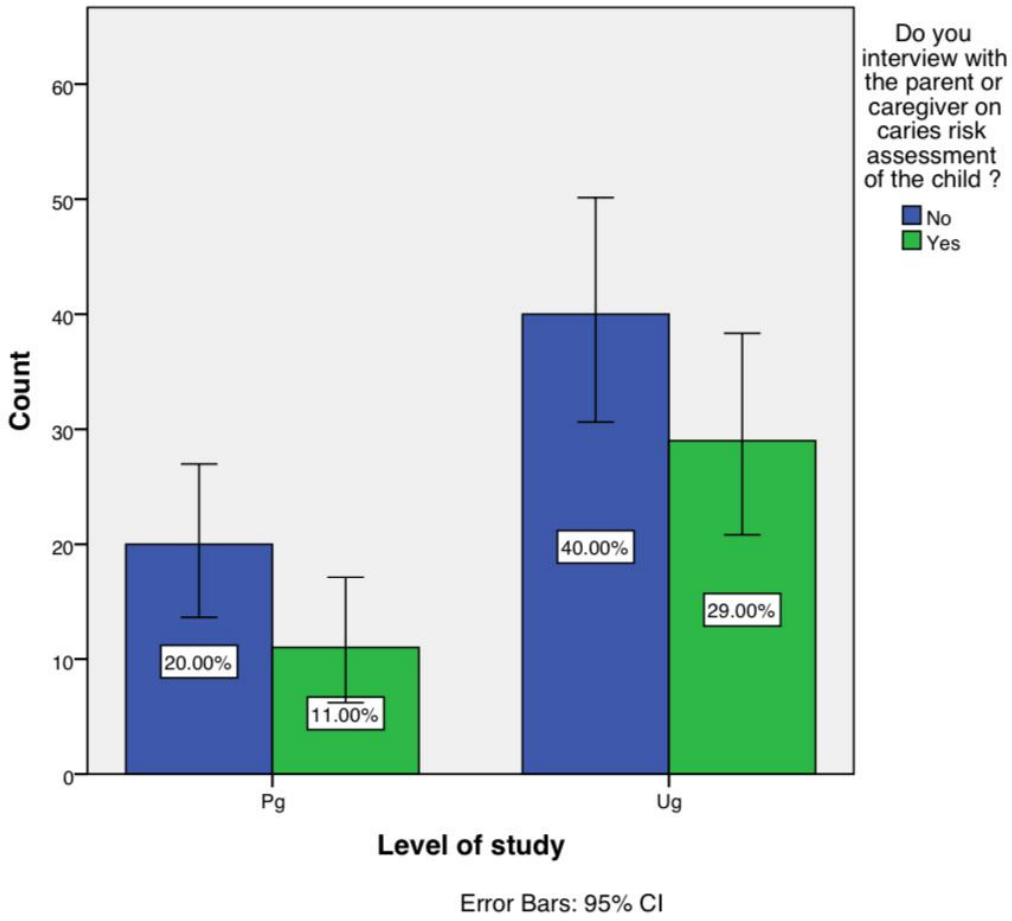
Graph 2: Bar chart depicting level of study and when do the dental students think a child should have his/her first dental visit, where 69% of the undergraduates and 31% of the post graduates thought that the child must visit from 12 months to 22 months. Chi square test was done, p value is found to be statistically significant ($p<0.05$).



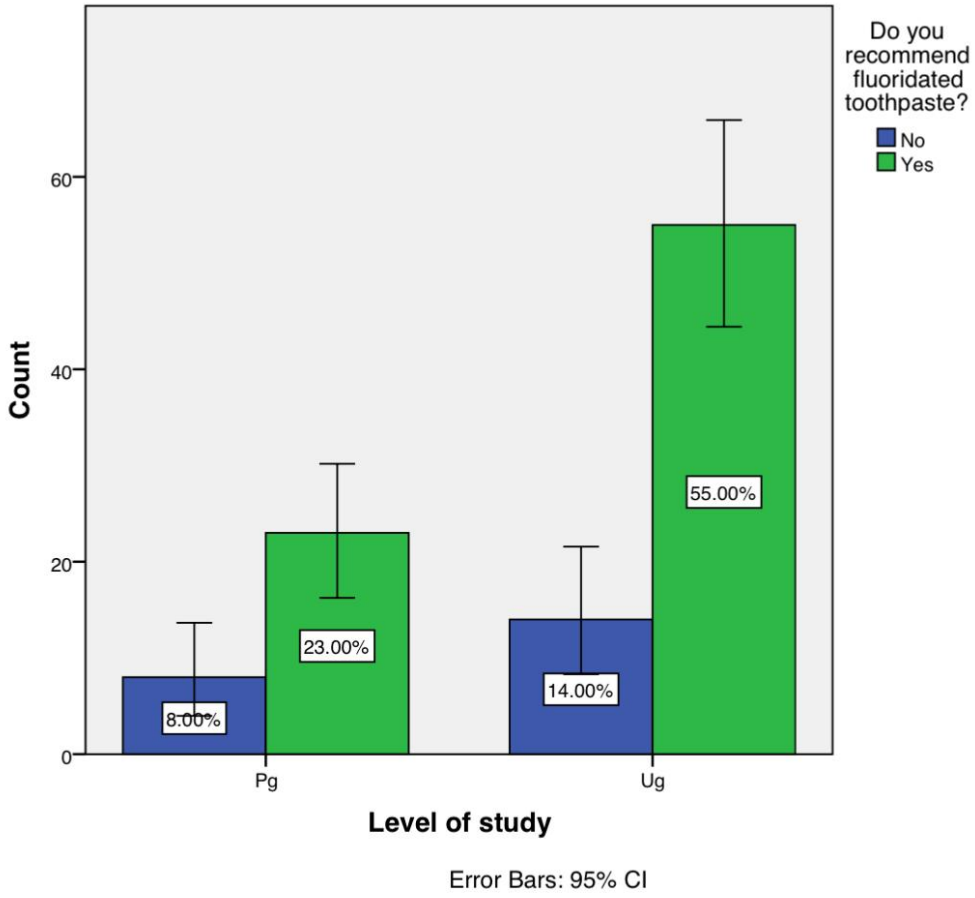
Graph 3: Bar chart depicting level of study and if the dental students analyse the caries risk assessment before doing a treatment, where 47% of the undergraduates and 24% of the post graduates analyse the caries risk assessment before doing a treatment and 22% of the undergraduates and 7% of the postgraduates don't. More number of postgraduates analysed the caries risk assessment. Chi square test was done, p value is found to be statistically significant ($p<0.05$).



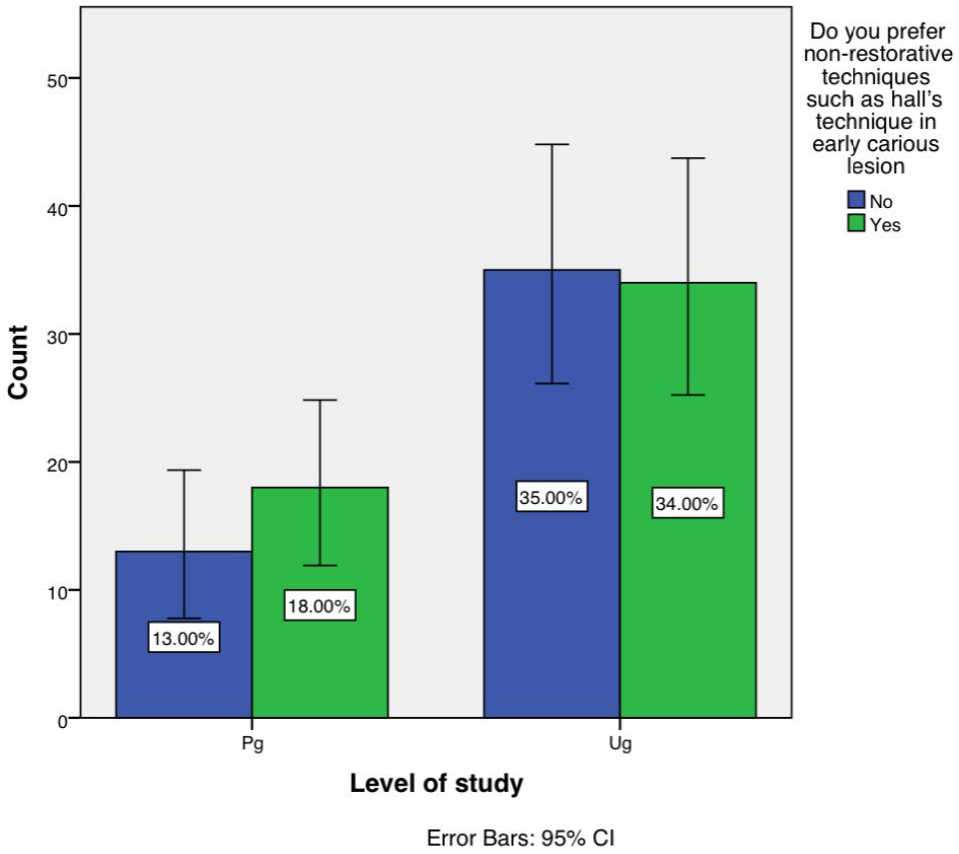
Graph 4: Bar chart depicting level of study and if the dental students were aware that caries in the primary dentition is a strong predictor of caries in the permanent dentition hence caries risk assessment and therapeutic management of the disease is crucial, where 69% of the undergraduates and 19% of the post graduates were aware. Chi square test was done, p value is found to be statistically significant ($p<0.05$).



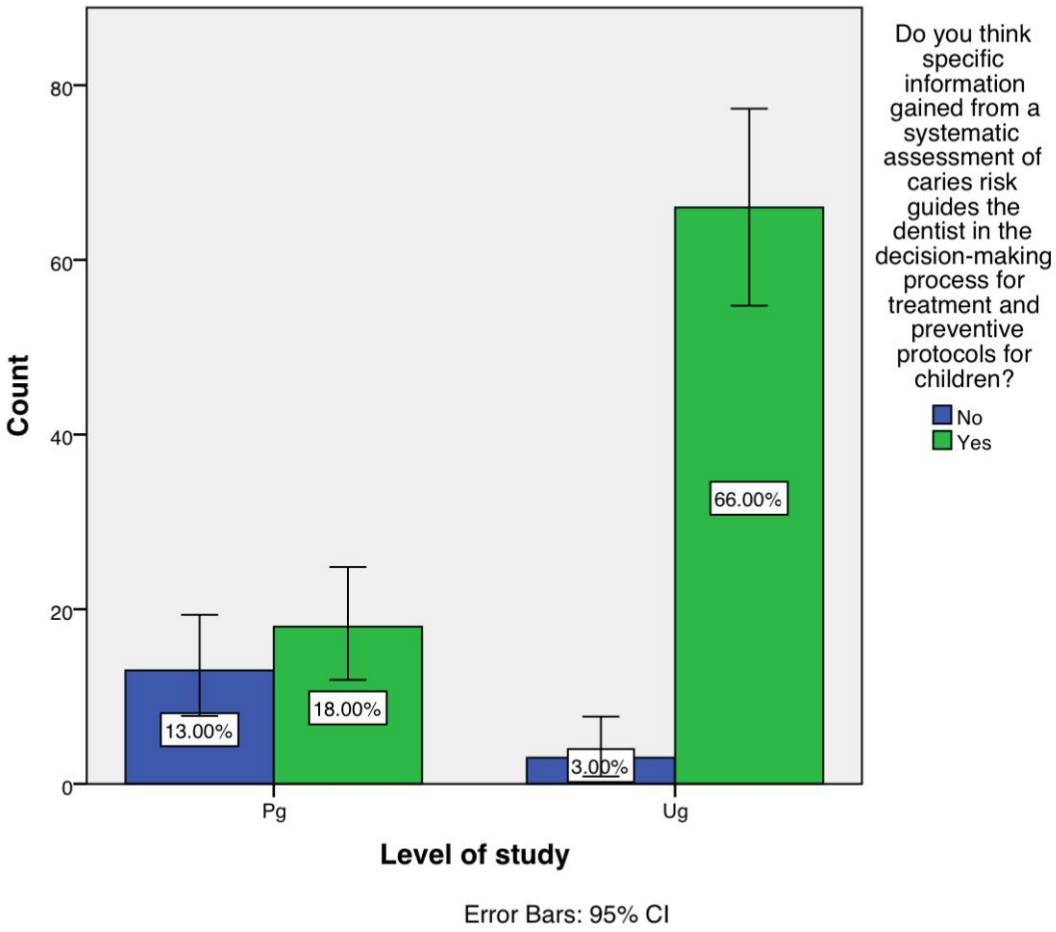
Graph 5: Bar chart depicting the level of study and if the dental students interview with the parent or caregiver on caries risk assessment of the child, where 40% of the undergraduates and 20% of the postgraduates did not interview with the parent or caregiver on caries risk assessment of the child. Chi square test was done, p value is found to be statistically significant ($p<0.05$).



Graph 6: Bar chart depicting the level of study and if the dental students recommend fluoridated toothpaste to their patients, where 55% of the undergraduates and 23% recommended fluoridated toothpaste to their patients. Chi square test was done, p value is found to be statistically significant ($p<0.05$).



Graph 7: Bar chart depicting the level of study and if the dental students prefer non-restorative techniques such as hall's technique in early carious lesion, where 34% of the undergraduates and 18% of post graduates prefer non-restorative techniques such as hall's technique in early carious lesion, 35% of the undergraduates and 18% of the post graduates do not prefer non-restorative techniques such as hall's technique in early carious lesion. Chi square test was done, p value is found to be statistically significant ($p<0.05$).



Graph 8: Bar chart depicting the level of study and if the dental students think specific information gained from a systematic assessment of caries risk guides the dentist in the decision-making process for treatment and preventive protocols for children, where 66% of the undergraduates and 18% of post graduates think specific information gained from a systematic assessment of caries risk guides the dentist in the decision- making process for treatment and preventive protocols for children. Chi square test was done, p value is found to be statistically significant ($p<0.05$)

DISCUSSION:

In this study 69% of them were undergraduates and 31% of them are postgraduates. In our study 47% of the undergraduates and 24% of the post graduates analyse the caries risk assessment before doing a treatment and 22% of the undergraduates don't.

The specific information gained from a systematic assessment of caries risk guides the dentist in the decision-making process to establish treatment and preventive protocols for children with oral disease and for those deemed to be at risk. To achieve the best management and outcomes for good oral health, the caries risk assessment should be done as early as possible preferably before the onset of disease.

In our study 69% of the undergraduates and 31% of the post graduates thought that the child must have his/her first dental visit as early as 12 months to 22 months.

Signs of ECC can be detected soon after the eruption of the first tooth. Its progression is entirely prevent- able, provided that risk indicators are identified and preventive oral health practices are implemented at a young age.

For this reason, the American Academy of Pediatric Dentistry, and the American Academy of Pediatrics all have recommended that children should see a dentist by age 1 (or when the first tooth erupts) and that a dental home be established as soon as possible (30) (11).

In our study 69% of the undergraduates and 19% of the post graduates were aware that caries in the primary dentition is a strong predictor of caries in the permanent dentition hence caries risk assessment and therapeutic management of the disease is crucial.

Majority of the students 55% of the undergraduates and 23% recommended fluoridated toothpaste to their patients. The ADA recommends that children categorized as high caries risk receive a full-mouth topical fluoride varnish (FV) application every three months (31) (12).

Children with a moderate caries risk should receive FV every six months, even if the child lives in a community with fluoridated water. The provider should reiterate the cumulative benefit of FV, even if it has been mentioned earlier in the visit.

CONCLUSION:

General dentists have an important role in preventing and reducing the severity of ECC in young children. By embracing the concepts of the dental home and perinatal and infant oral health, general dentists can implement preventive and treatment protocols in their practice by using an appropriate, age-specific caries risk assessment instrument to determine the caries risk of their pediatric patients.

Limitation

The main drawback of this study is limited sample size and confined to a single source for data. Further descriptive studies on a larger scale can help us to give comprehensive data for arriving at a conclusion and to plan health oral health programs for the population studied.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

REFERENCE :

1. Dye BA, Arevalo O, Vargas CM. Trends in paediatric dental caries by poverty status in the United States, 1988-1994 and 1999-2004. Int J Paediatr Dent. 2010 Mar;20(2):132–43.

2. Vargas CM, Crall JJ, Schneider DA. Sociodemographic distribution of pediatric dental caries: NHANES III, 1988-1994. J Am Dent Assoc. 1998 Sep;129(9):1229–38.

3. Poland C 3rd, Hale KJ. Providing oral health to the little ones. J Indiana Dent Assoc. 2003;82(4):8–14.

4. Chan KS, Parikh MA, Thorpe RJ, Gaskin DJ. Health Care Disparities in Race-Ethnic Minority Communities and Populations: Does the Availability of Health Care Providers Play a Role? [Internet]. Vol. 7, Journal of Racial and Ethnic Health Disparities. 2020. p. 539–49. Available from: http://dx.doi.org/10.1007/s40615-019-00682-w

5. Oredugba FA, Sanu OO. Knowledge and behavior of Nigerian dentists concerning the treatment of children with special needs [Internet]. Vol. 6, BMC Oral Health. 2006. Available from: http://dx.doi.org/10.1186/1472-6831-6-9

6. Gillis JM. Screening Practices of Family Physicians and Pediatricians in 2 Southern States [Internet]. Vol. 22, Infants & Young Children. 2009. p. 321–31. Available from: http://dx.doi.org/10.1097/iyc.0b013e3181bc4e21

7. Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies. Pediatr Dent. 2018 Oct 15;40(6):60–2.

8. Peretz B, Ram D, Azo E, Efrat Y. Preschool caries as an indicator of future caries: a longitudinal study. Pediatr Dent. 2003 Mar;25(2):114–8.

9. Tagliaferro EP da S, da Silva Tagliaferro EP, Pereira AC, de Castro Meneghim M, Ambrosano GMB. Assessment of Dental Caries Predictors in a Seven-year Longitudinal Study [Internet]. Vol. 66, Journal of Public Health Dentistry. 2006. p. 169–73. Available from: http://dx.doi.org/10.1111/j.1752-7325.2006.tb02575.x

10. Subramanyam D, Gurunathan D, Gaayathri R, Vishnu Priya V. Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries. Eur J Dent. 2018 Jan;12(1):67–70.

11. Ramadurai N, Gurunathan D, Samuel AV, Subramanian E, Rodrigues SJL. Effectiveness of 2% Articaine as an anesthetic agent in children: randomized controlled trial. Clin Oral Investig. 2019 Sep;23(9):3543–50.

12. Ramakrishnan M, Dhanalakshmi R, Subramanian EMG. Survival rate of different fixed posterior space maintainers used in Paediatric Dentistry – A systematic review [Internet]. Vol. 31, The Saudi Dental Journal. 2019. p. 165–72. Available from: http://dx.doi.org/10.1016/j.sdentj.2019.02.037

13. Jeevanandan G, Thomas E. Volumetric analysis of hand, reciprocating and rotary instrumentation techniques in primary molars using spiral computed tomography: An in vitro comparative study. Eur J Dent. 2018 Jan;12(1):21–6.

14. Princeton B, Santhakumar P, Prathap L. Awareness on Preventive Measures taken by Health Care Professionals Attending COVID-19 Patients among Dental Students. Eur J Dent. 2020 Dec;14(S 01):S105–9.

15. Saravanakumar K, Park S, Mariadoss AVA, Sathiyaseelan A, Veeraraghavan VP, Kim S, et al. Chemical composition, antioxidant, and anti-diabetic activities of ethyl acetate fraction of Stachys riederi var. japonica (Miq.) in streptozotocin-induced type 2 diabetic mice. Food Chem Toxicol. 2021 Jun 26;155:112374.

16. Wei W, Li R, Liu Q, Devanathadesikan Seshadri V, Veeraraghavan VP, Surapaneni KM, et al. Amelioration of oxidative stress, inflammation and tumor promotion by Tin oxide-Sodium alginate-Polyethylene glycol-Allyl isothiocyanate nanocomposites on the 1,2-Dimethylhydrazine induced colon carcinogenesis in rats. Arabian Journal of Chemistry. 2021 Aug 1;14(8):103238.

17. Gothandam K, Ganesan VS, Ayyasamy T, Ramalingam S. Antioxidant potential of theaflavin ameliorates the activities of key enzymes of glucose metabolism in high fat diet and streptozotocin - induced diabetic rats. Redox Rep. 2019 Dec;24(1):41–50.

18. Su P, Veeraraghavan VP, Krishna Mohan S, Lu W. A ginger derivative, zingerone-a phenolic compound-induces ROS-mediated apoptosis in colon cancer cells (HCT-116). J Biochem Mol Toxicol. 2019 Dec;33(12):e22403.

19. Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial [Internet]. Vol. 24, Clinical Oral Investigations. 2020. p. 3275–80. Available from: http://dx.doi.org/10.1007/s00784-020-03204-9

20. Sekar D, Johnson J, Biruntha M, Lakhmanan G, Gurunathan D, Ross K. Biological and Clinical Relevance of microRNAs in Mitochondrial Diseases/Dysfunctions. DNA Cell Biol. 2020 Aug;39(8):1379–84.

21. Velusamy R, Sakthinathan G, Vignesh R, Kumarasamy A, Sathishkumar D, Nithya Priya K, et al. Tribological and thermal characterization of electron beam physical vapor deposited single layer thin film for TBC application. Surf Topogr: Metrol Prop. 2021 Jun 24;9(2):025043.

22. Aldhuwayhi S, Mallineni SK, Sakhamuri S, Thakare AA, Mallineni S, Sajja R, et al. Covid-19 Knowledge and Perceptions Among Dental Specialists: A Cross-Sectional Online Questionnaire Survey. Risk Manag Healthc Policy. 2021 Jul 7;14:2851–61.

23. Sekar D, Nallaswamy D, Lakshmanan G. Decoding the functional role of long noncoding RNAs (lncRNAs) in hypertension progression. Hypertens Res. 2020 Jul;43(7):724–5.

24. Bai L, Li J, Panagal M, M B, Sekar D. Methylation dependent microRNA 1285-5p and sterol carrier proteins 2 in type 2 diabetes mellitus. Artif Cells Nanomed Biotechnol. 2019 Dec;47(1):3417–22.

25. Sekar D. Circular RNA: a new biomarker for different types of hypertension. Hypertens Res. 2019 Nov;42(11):1824–5.

26. Sekar D, Mani P, Biruntha M, Sivagurunathan P, Karthigeyan M. Dissecting the functional role of microRNA 21 in osteosarcoma. Cancer Gene Ther. 2019 Jul;26(7-8):179–82.

27. Duraisamy R, Krishnan CS, Ramasubramanian H, Sampathkumar J, Mariappan S, Navarasampatti Sivaprakasam A. Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments. Implant Dent. 2019 Jun;28(3):289–95.

28. Parimelazhagan R, Umapathy D, Sivakamasundari IR, Sethupathy S, Ali D, Kunka Mohanram R, et al. Association between Tumor Prognosis Marker Visfatin and Proinflammatory Cytokines in Hypertensive Patients. Biomed Res Int. 2021 Mar 16;2021:8568926.

29. Syed MH, Gnanakkan A, Pitchiah S. Exploration of acute toxicity, analgesic, anti-inflammatory, and anti-pyretic activities of the black tunicate, Phallusia nigra (Savigny, 1816) using mice model. Environ Sci Pollut Res Int. 2021 Feb;28(5):5809–21.

30. Thenisch NL, Bachmann LM, Imfeld T, Leisebach Minder T, Steurer J. Are Mutans Streptococci Detected in Preschool Children a Reliable Predictive Factor for Dental Caries Risk? A Systematic Review [Internet]. Vol. 40, Caries Research. 2006. p. 366–74. Available from: http://dx.doi.org/10.1159/000094280

31. American Dental Association. Fluoridation Facts. American Dental Association; 2018. 114 p.