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# Kindergarten Smiles: Decoding the Relationship between Early Childhood Caries, Feeding Habits, and the Protective Potential of Glass Ionomer Cement"

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**KEYWORDS**

Early childhood caries,innovative technique, feeding, ,fluoride,Glass ionomer cement.

**ABSTRACT:**

The aim of this study is to evaluate the effect of early childhood caries and feeding practice in kindergarten students. The term dental caries is used to describe the result, signs and symptoms of a localized chemical dissolution of the tooth surface caused by metabolic events taking place in the biofilms that cover the affected area. Children in the age range of 12-36 months have a special caries pattern that differs from that in older children. This cross sectional study was conducted among patients visiting a university dental hospital in Chennai. Descriptive statistics and relation between variables was determined using the chi square test, where $p<0.05$ was considered statistically significant. Among 111 children about 27.3% of children belonged to the age group of 3 years, 40.9% of children belonged to the age group of 4 years, 31.8% of children belonged to the age group of 5 years .caries pattern and severe caries in the preschool childrens has long been considered a distinct clinical entity described previously as nursing caries or bottle caries and attributed to prolonged frequent bottle feeding with sweetened liquids. The findings indicate that ECC and feeding habits are significantly associated. Children from deprived families seemed to be most vulnerable with respect to ECC. The content of the bottle feed and feeding practice at night are the strongest factors among all feeding habits associated with ECC.

## 1. Introduction

The term dental caries is used to describe the localized chemical dissolution of the tooth surface caused by metabolic events taking place in the biofilms that cover the affected area. Children younger than 71 months have a special caries pattern that differs from that in older children. Caries affect the maxillary primary incisors and first primary molars in a way that reflects the pattern of eruption. The longer the tooth has been present and exposed to the caries challenge, the more it is affected. The upper incisor is most vulnerable, while the mandibular incisor is protected by the tongue and by saliva from submandibular and sublingual gland [1] [2].Some of these terms indicate the cause of dental caries in preschool childrens, Although the etiology of early childhood caries is similar to that of other types of coronal, smooth surface caries, the biology may differ in some respects. The bacterial flora and

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host defence systems in the young infant are in the process of being established, in addition to that tooth surface are newly erupted and immature, and may show hypoplastic defects [3]. Feeding behaviors in the first year of life set the stage for dietary habits and preferences later in childhood, with implications for nutrition related health.

Evidence implicates dietary habits in the development of caries in children, particularly the consumption of sugar containing snacks and drinks. Socioeconomic factors and hygiene practices were also assessed given the possibility of confounding the association between feeding practices and early childhood caries [4] [5]. Changing lifestyle and dietary patterns are markedly increasing the caries incidence, mothers are primary promortors of oral hygiene and they have a major influence on the dietary habits and food choice of children. Patterns of behavior learnt in early childhood are deeply ingrained and resistant to change, mothers have an important role in this aspect [6] [7].

In the realm of early childhood dental care, the prevalence of Early Childhood Caries (ECC) underscores the need for comprehensive strategies to safeguard the oral health of young children. There is an intricate interplay between Early Childhood Caries, feeding habits, and the potential protective role of Glass Ionomer Cement (GIC). Recognizing GIC's distinctive features, including its biocompatibility and fluoride-releasing properties, the research places a particular emphasis on exploring how this restorative material may offer a protective shield against the onset and progression of Early Childhood Caries. By scrutinizing the relationship between feeding practices, dental caries, and the application of Glass Ionomer Cement in the kindergarten age group, this study aims to contribute valuable insights into preventive measures and the potential efficacy of GIC in promoting lasting smiles among young children.Our team has extensive knowledge and research experience that has translate into high quality publications [8–20] [21–27]. Thus the aim of this study is to evaluate the effect of early childhood caries and feeding practice in kindergarten students.

**Methods**

**Study setting:**

This was a university dental hospital based cross sectional study conducted among patients visiting a university dental hospital in chennai. Since this was a university hospital setting, large sample size and distribution of population contributes to a major advantage for this study.

**Study Sampling:**

The study population was parents of patients visiting university hospitals who are affected with early childhood caries. The sample included patients in the age group of 3 to 5 years. Sample size was 111 patients. Independent variables were demographics such as age, gender etc. Dependent variable was the presence of early childhood caries. Incomplete dental records were excluded from the study. The data collected were tabulated in excel.

**Data analysis**:

Microsoft Excel was used for tabulation of the parameters and then the data was exported to the spss software version 20.0. Descriptive statistics and relation between variables was determined using the chi square test, where $p<0.05$ was considered statistically significant.

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**2. Results**

. Among 111 childrens about 27.3% of children belonged to the age group of 3 years, 40.9% of children belonged to the age group of 4 years, 31.8% of children belonged to the age group of 5

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years( Figure 1). 48.2% of childrens were boys and 51.8% of childrens were girls( Figure 2). 24.5% of childrens have high socioeconomic status, 41.8% of childrens have medium socioeconomic status and 33.6% of childrens have low socioeconomic status.74.5% of children were bottle fed for 1 year, 11.8% of children were bottle fed for 2 years, 12.7% of children were bottle fed for more than 2 year and 0.9% of children were bottle fed for 3 years( Figure 4). 74.5% of children were bottle fed for 1 year, 11.8% of children were bottle fed for 2 years, 12.7% of children were bottle fed for more than 2year and 0.9% of children were bottle fed for 3 years(Figure 5). 47.3% of childrens have day feed practise and 52.7% of children did not have day feed practice ( Figure 6). 74.5% of children have night feed practise and 25.5% of children did not have night feed practise( Figure 7).

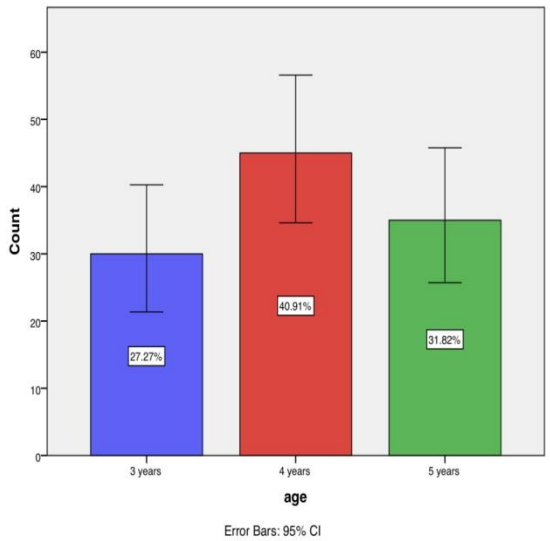


**Figure 1:** Bar chart showing the age distribution among children.Blue colour denotes 3 years, red colour denotes 4 years, green colour denotes 5 years. Here, 27.3% of children belonged to the age group of 3 years, 40.9% of children belonged to the age group of 4 years, 31.8% of children belonged to the age group of 5 years.

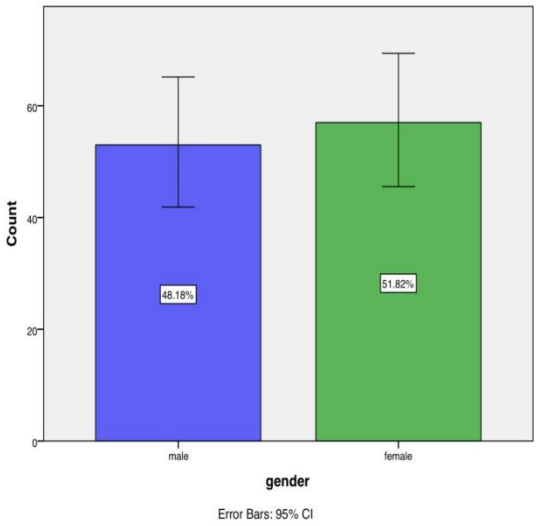


**Figure 2:** Bar chart showing the gender distribution among children. Blue colour denotes male and green colour denotes female. Here, 48.2% of children were boys and 51.8% of children were girls.

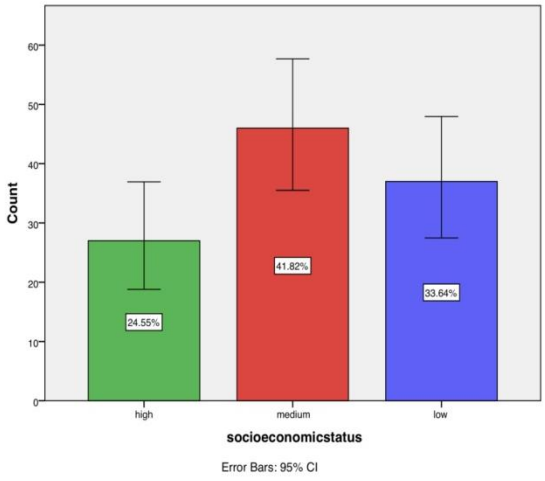


**Figure 3**: Bar chart depicting the socio economic status among children. Green colour denotes high, red colour denotes medium, blue colour denotes low. Here, 24.5% of childrens have high socioeconomic status, 41.8% of childrens have medium socioeconomic status and 33.6% of childrens have low socioeconomic status.

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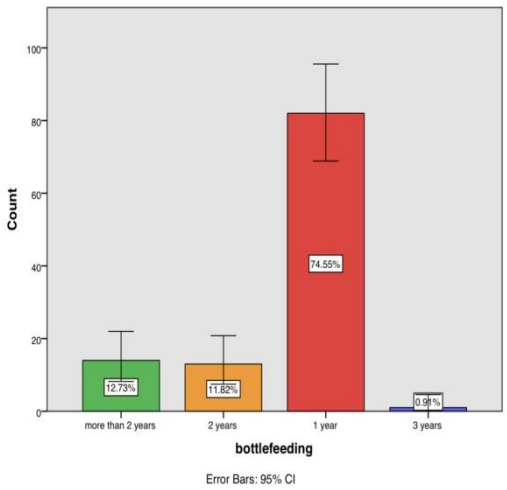


**Figure 4:** Bar chart depicting the duration of bottle feeding among children.green colour denotes more than 2 years, orange colour denotes 2 years, red colour denotes 1 year, blue colour denotes 3 years. Here, 74.5% of children were bottle fed for 1 year, 11.8% of children were bottle fed for 2 years, 12.7% of children were bottle fed for more than 2year and 0.9% of children were bottle fed for 3 years.

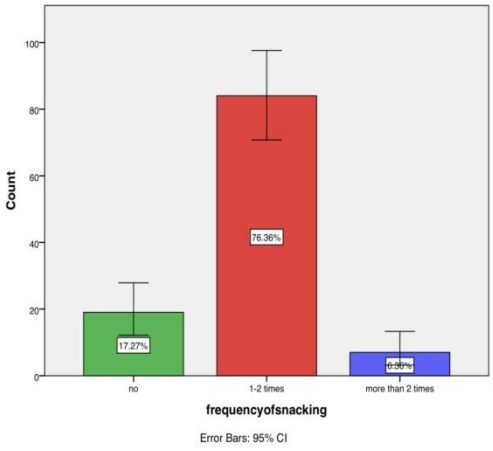


**Figure 5**: Bar chart depicting the frequency of snacking among children. Green colour denotes no, red colour denotes 1-2 times, blue colour denotes more than 2 times. Here, 76.4% of children have a snacking frequency of about 1-2 times, 6.4% of children have a snacking frequency of about more than 2 times and 17.3% of childrens have no snacking frequency.

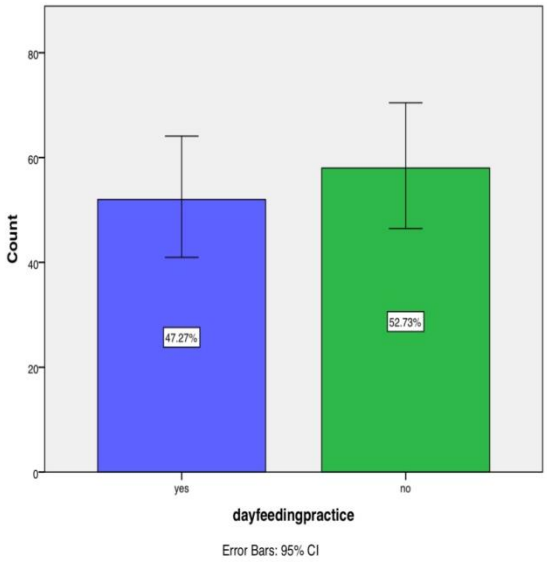


**Figure 6:** Bar chart depicting the day feed practise among children. Blue colour denotes yes, green colour denotes no. Here, 47.3% of childrens have day feed practise and 52.7% of children did not have day feed practise.

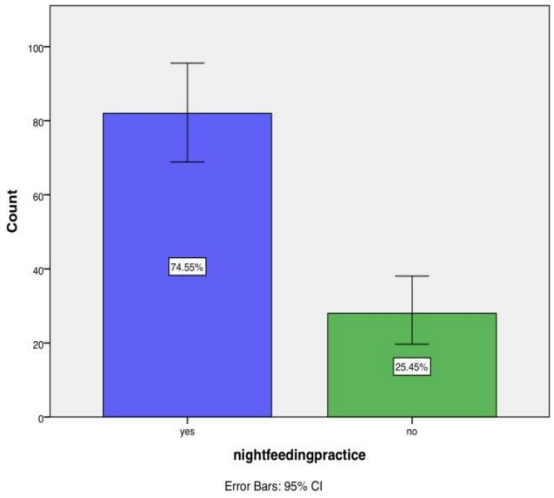


**Figure 7:** Bar chart depicting the night feed practise among children. Blue colour denotes yes, green color denotes no. Here, 74.5% of children have night feed practise and 25.5% of children did not have night feed practise.

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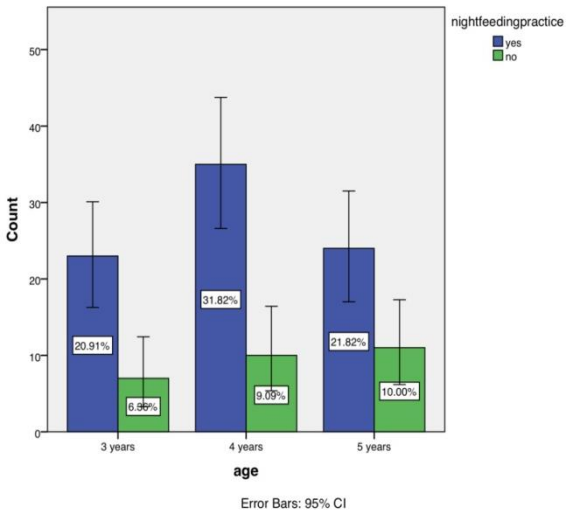


**Figure 8:** Bar chart shows the association between various age groups and night fed practise among children. Blue colour denotes yes and green colour denotes no. X- axis represents the age and Y- axis represents the night fed practise. Here, 31.82% of children with the age of 4 years have night feed practise compared to other age groups.

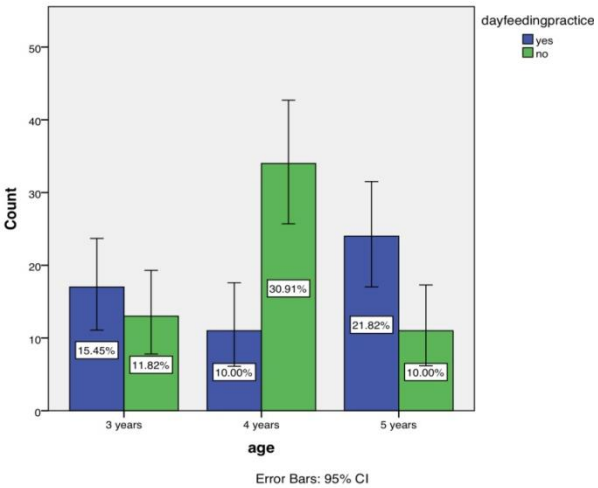


**Figure 9:** Bar chart showing the association between age group and day feed practise among children. Blue colour denotes yes and Green colour denotes No. X-axis represents the age and Y-axis represents the day feed practice. Here, 21.82% of children with the age group of 5 years have day feed practice compared to other age groups.

## 3. Discussion

Anterior caries pattern and severe caries in the preschool childrens has long been considered a distinct clinical entity described previously as nursing caries or bottle caries and attributed to prolonged frequent bottle feeding with sweetened liquids [28] . Bottle feeding irrespective of its duration whether it is given in the day or night has a higher risk of having early childhood caries. Feeding during the night may lead to prolonged exposure to fermentable carbohydrates and create a dentally harmful environment in the oral cavity. The night time bottle feeding showed the most prominent impact on the presence of early childhood caries [29] [30]. Early childhood caries is most commonly associated with free sugar intake and low socioeconomic status that's the main disadvantage, This disease affects the general population but is more likely to occur in infants who are of low socio-economic status (SES), whose mothers have low education level and who consume sugary foods. There was a greater likelihood of ECC among children whose free sugar intake exceeded the WHO <10% energy recommendation at 1 and 2 years of age than those with intake below the WHO <5% of energy recommendation at both time points. Sugar has been recognized as the most important dietary factor in the development of dental caries. Free sugars intakes are not necessary for a healthy diet and are associated with obesity as well as tooth decay, free sugar intake must be reduced to control the ECC.Maintaining primary dentition in a healthy condition is important for the well being of the child. Primary dentition is required for proper mastication, esthetics, phonetics, space maintenance, and for prevention of aberrant habits. Reducing dental plaque formation, changing the bacterial composition of plaque, and modification of dietary habits are essential for the prevention of dental caries. Prevention of the progress of early childhood caries can be achieved with the aid of restoration, diet counselling, educating parents

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regarding decay promoting feeding behaviours, maintaining good oral hygiene, and the use of preventive agents like topical fluorides [31]

Chemotherapeutic agents, such as povidone-iodine and chlorhexidine have shown antimicrobial effects against the most cariogenic streptococcus mutans [32,33]. Chlorhexidine varnish is applied to protect the tooth surface. In addition, fluorides are very effective in preventing dental caries, including fluoride toothpaste, water fluoridation, fluoride mouth rinse, and professional topical fluoride application, primarily by inhibiting mineral loss from the tooth [34] [34,35]. Professionally applied fluoride varnishes and supervised use of fluoride mouth rinses also also showed reduction in childhood caries.The findings underscore the promising role of Glass Ionomer Cement (GIC) as a potential preventive and restorative measure in combating Early Childhood Caries (ECC). The study illuminates the intricate connection between feeding habits, a significant contributor to ECC, and the protective properties of GIC. The biocompatibility and fluoride-releasing attributes of GIC have been instrumental in establishing it as a material with potential prophylactic benefits in early childhood dentistry. The discussion emphasizes the significance of incorporating GIC in preventive strategies, as it not only addresses caries but also offers a viable solution for minimizing the impact of adverse feeding practices on the oral health of young children. By decoding this relationship, the study advocates for the inclusion of GIC interventions in comprehensive dental care approaches tailored to the unique needs of early childhood, potentially heralding a preventive paradigm shift in pediatric dentistry.

**4. Conclusion**:

Within the limitations of the study, it was found that ECC was high in children who had night time feeding, frequent snacking, and were breastfed for 1 year. Children from medium socioeconomic groups had a higher prevalence of caries.

**References**

1. Fejerskov O., Kidd E., Dental Caries: The Disease and Its Clinical Management. John Wiley & Sons. 2009. 640 p.
2. Rao A ., Principles and Practice Of Pedodontics. JP Medical Ltd.2012. 528 p.
3. Krasse B ., THE EFFECT OF CARIES-INDUCING STREPTOCOCCI IN HAMSTERS FED DIETS WITH SUCROSE OR GLUCOSE. Arch Oral Biol. 1965 Mar;10:223–6.
4. Coulthard H., Harris G., Emmett P. Long-term consequences of early fruit and vegetable feeding practices in the United Kingdom [Internet]. Vol. 13, Public Health Nutrition. 2010. p. 2044–51. Available from: http://dx.doi.org/10.1017/s1368980010000790
5. Möller LM , de Hoog MLA., van Eijsden M, Gemke RJB, Vrijkotte TGM. Infant nutrition in relation to eating behaviour and fruit and vegetable intake at age 5 years [Internet]. Vol. 109, British Journal of Nutrition. 2013. p. 564–71. Available from: http://dx.doi.org/10.1017/s0007114512001237
6. Sudha P., Bhasin S., Anegundi RT. Prevalence of dental caries among 5-13-year-old children of Mangalore city [Internet]. Vol. 23, Journal of Indian Society of Pedodontics and Preventive Dentistry. 2005. p. 74. Available from: http://dx.doi.org/10.4103/0970-4388.16446
7. Ismail AI., Sohn W.,A systematic review of clinical diagnostic criteria of early childhood caries. J Public Health Dent. 1999 Summer;59(3):171–91.
8. 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.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(2), 247-254 | ISSN:2251-6727

9. 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.
10. 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
11. 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.
12. 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.
13. 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.
14. 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.
15. 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.
16. Su P., Veeraraghavan VP., Krishna Mohan S., Lu W. A ginger derivative, zingerone-a phenolic compound-induced ROS-mediated apoptosis in colon cancer cells (HCT-116). J Biochem Mol Toxicol. 2019 Dec;33(12):e22403.
17. 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
18. 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.
19. 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.
20. 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.
21. 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.
22. 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

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(2), 247-254 | ISSN:2251-6727

Dec;47(1):3417–22.

23. Sekar D., Circular RNA: a new biomarker for different types of hypertension. Hypertens Res. 2019 Nov;42(11):1824–5.
24. 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.
25. 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.
26. 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.
27. 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.
28. Holt RD, Joels D, Bulman J, Maddick IH. A third study of caries in preschool aged children in Camden [Internet]. Vol. 165, British Dental Journal. 1988. p. 87–91. Available from: http://dx.doi.org/10.1038/sj.bdj.4806515
29. Azevedo TDPL, Bezerra ACB, de Toledo OA. Feeding habits and severe early childhood caries in Brazilian preschool children. Pediatr Dent. 2005 Jan;27(1):28–33.
30. Cleaton-Jones P., Richardson B.D., McInnes PMFatti L.P. Dental caries in South African white children aged 1-5 years [Internet]. Vol. 6, Community Dentistry and Oral Epidemiology. 1978. p. 78–81. Available from: http://dx.doi.org/10.1111/j.1600-0528.1978.tb01125.x
31. Duangthip D., Jiang M., Chu C.H., Lo ECM. Non-surgical treatment of dentin caries in preschool children – systematic review [Internet]. Vol. 15, BMC Oral Health. 2015. Available from: http://dx.doi.org/10.1186/s12903-015-0033-7
32. Amin M.S., Harrison R.L., Benton T.S., Roberts M., Weinstein P. Effect of povidone-iodine on Streptococcus mutans in children with extensive dental caries. Pediatr Dent. 2004 Jan;26(1):5–10.
33. Jayaprakash R., Sharma A., Moses J. Comparative evaluation of the efficacy of different concentrations of chlorhexidine mouth rinses in reducing the mutans streptococci in saliva: an in vivo study. J Indian Soc Pedod Prev Dent. 2010 Jul;28(3):162–6.
34. Blinkhorn A., Davies R., Using fluoride varnish in the practice [Internet]. Vol. 185, British Dental Journal. 1998. p. 280–1. Available from: http://dx.doi.org/10.1038/sj.bdj.4809792
35. Drury T.F., Horowitz A.M., Ismail A.I., Maertens M.P., Gary Rozier R., Selwitz R.H., Diagnosing and Reporting Early Childhood Caries for Research Purposes: A Report of a Workshop Sponsored by the National Institute of Dental and Craniofacial Research, the Health Resources and Services Administration, and the Health Care Financing Administration [Internet]. Vol. 59, Journal of Public Health Dentistry. 1999. p. 192–7. Available from: http://dx.doi.org/10.1111/j.1752-7325.1999.tb03268.x