



Oral Hygiene Index in Children Aged 7-10 Years with Stainless Steel Crowns: Retrospective Study

M. Dhakshinya ^{a++} and E. M. G. Subramanian ^{b#*}

^a Dental Research Cell, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

^b Department of Pediatric and Preventive dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

Authors' contributions

This work was carried out in collaboration between both authors. Author MD did the contributed to conception, design, data acquisition and interpretation, drafted and critically revised the manuscript. Author EMGS did the contributed to conception, design, and critically revised the manuscript. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJPR/2024/v14i1320

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/79845>

Original Research Article

Received: 10/11/2023
Accepted: 14/01/2024
Published: 16/01/2024

ABSTRACT

Introduction: Stainless steel crowns are the best treatment option for restoring primary carious teeth. However maintaining good oral hygiene in children with crowns can be difficult. Plaque and calculus deposits in these teeth will damage the usual teeth nearby.

Materials and Methods: This study was done to determine the OHI score in children under the age group of 7-10 years with stainless steel crowns. Data was gathered from a private dental institution's patient record system, with gender and the inclusion criteria was patients with stainless steel crowns. The study was conducted between September 2020 and March 2021. 114 patients meeting the inclusion and exclusion requirements being included in the report. Chi square test and descriptive analysis was done.

⁺⁺ Research Associate;

[#] Professor and Head;

^{*}Corresponding author: Emailsubramanian@saveetha.com;

Results: More than 50% of the children with stainless steel crowns had moderately good OHI scores. Girls had better oral hygiene scores compared to boys.

Discussion: Males generally visit the dentist less frequently than females, and seek oral therapy for an acute condition rather than disease prevention. Females have more positive views toward dental appointments, are more knowledgeable about oral health, and practice better oral hygiene than females.

Conclusion: Girls with stainless steel crowns had better oral hygiene scores compared to boys.

Keywords: OHI score; stainless steel crown; caries; innovative technique.

1. INTRODUCTION

The Oral Hygiene Index is made up of the combined Debris Index and Calculus Index, each of which is made up of 12 numerical determinations that reflect the amount of debris or calculus on the buccal and lingual surfaces of each of the three segments of each dental arch, namely the segment distal to the right cuspid, the segment distal to the left cuspid, and the segment mesial to the right and left first bicuspid [1]. Debris and calculus are analyzed in each sextant. Calculus is scored in the same way as debris, with the exception that subgingival deposits are reported separately [2]. The Simplified Oral Hygiene Index is a simplified edition (introduced by Greene and Vermilion in the year of 1964. Each sextant has a single tooth that is used to compute the segment's individual index. The tooth that will be used in the calculation must have the greatest debris or calculus on it [3]. These values represent only half of the score magnitude that can be attained with the OHI (Oral Hygiene Index) [4].

Stainless steel crowns have been an important part of pediatric dentistry's restorative arsenal for many years [5]. According to the description, these are prefabricated crown types that are tailored to individual teeth and cemented with a biocompatible luting agent. It's a reasonably simple restorative procedure [6] which has made it the most acceptable restorative material for crowns with the. Hence, despite their unattractive appearance, stainless steel crowns are still the restoration of choice for compromised primary molar teeth [7]. Stainless steel crowns are a suitable semi-permanent repair for permanent molar teeth that can be employed before more permanent and cosmetic coronal restorations are decided [8]. The complete crown coverage provided by stainless steel crowns practically eliminates re-decay, and their smooth surfaces make it easier to clean the tooth with regular oral hygiene procedures [9]. It has been found that stainless steel crowns can accumulate more

plaque than natural teeth. Our team has a wealth of research and knowledge that has resulted in high-quality publications [10–29].

Hence this study was undertaken to understand the OHI scores of teeth restored with stainless steel crowns.

2. MATERIALS AND METHODS

This was a retrospective study conducted in a private dental institute in Chennai after obtaining clearance from the institutional review board. Data was obtained from the digital information archives system (DIAS). Case records of patients visiting the department of pediatric dentistry from September 2022 to December 2023 were analyzed. Patients with stainless steel crowns in the age group of 7-10 years were included. Patients who belonged outside the age group and did not visit during the specified time period were excluded from the study. 114 patients meeting the inclusion and exclusion requirements being included in the report. The report was collected from the Saveetha Dental College and Hospitals database. The inclusion criteria was patients under the age group of 7-10 years with stainless steel crown and the exclusion criteria was patients who were below 7 years of age and above 10 years of age without stainless steel crown.

The data was tabulated using the following criteria: age, gender, and children with stainless steel crowns. Gender are independent variables, Children with stainless steel crowns and age are dependent variables. The SPSS programme version 23 was used to analyse the data. The Pearson correlation and the chi-square test were used. Statistical non significance was described as a p-value of more than 0.05.

3. RESULTS AND DISCUSSION

Majority of the patients with stainless steel have an OHI score between 2-2.5 i.e 14.91% in 7 years old patients, 18.42% in 8 years old

patients, 4.39% in 9 year old patients and 6.14% in 10 year old patients (fig:1). When comparing the OHI score with gender both male and female had an OHI score more in the range of 1-1.5

which was 23.65% and 24.56% (fig:2). Figure 3 represents the age group of the patient where 34.21% of the patients belong to 8 years of age. 51.75 participants were males (Fig. 4).

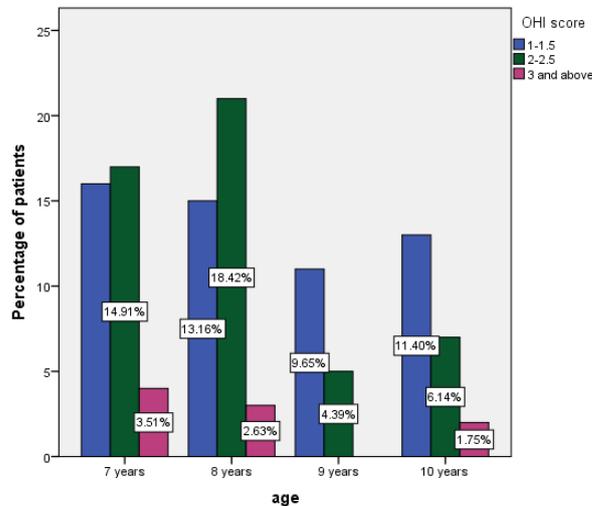


Fig. 1. The above bar graph represents the types of OHI score observed in different age groups. The x- axis indicates age and Y-axis indicates various responses. Blue color indicates score of '1-1.5', green indicates '2-2.5' and Red indicates '3 and above'. 14.04% of patients in the age of 7 years, 13.16% of 8 years old patients, 9.65% of 9 years old patients and 11.40% of 10 years old patients had OHI score in between 1-1.5. 14.91% of patients in the age of 7 years, 18.42% of 8 years old patients, 4.39% of 9 years old patients and 6.14% of 10 years old patients had OHI score in between 2-2.5. 3.51% of patients in the age of 7 years, 2.63% of 8 years old patients and 1.75% of 10 years old patients had OHI score of 3 and more. P value= 0.114, (>0.05) hence, statistically not significant

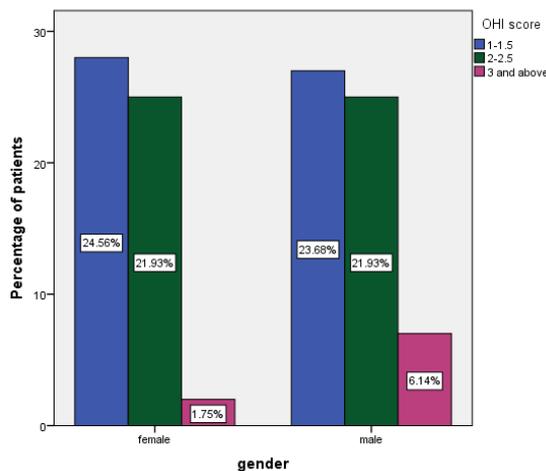


Fig. 2. The above bar graph represents the types of OHI score observed in different genders. The x- axis indicates gender and Y-axis indicates various responses. Blue color indicates score of '1-1.5', green indicates '2-2.5' and Red indicates '3 and above'. 24.56% of females and 23.68% of males had OHI score of 1-1.5. 21.93% of females and 21.93% of males had OHI score of 2-2.5. 1.75% of females and 6.14% of males had OHI score of 3 or more. P value= 0.260, (>0.05) hence, statistically not significant

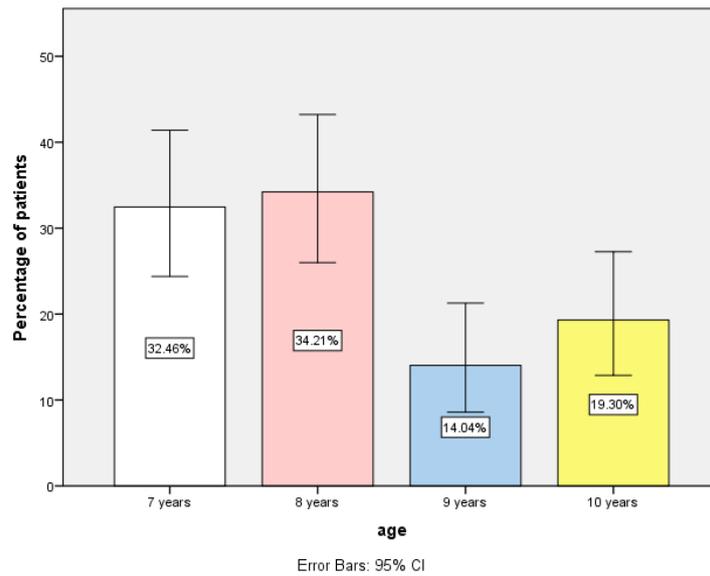


Fig. 3. The above bar graph represents the total number of patients separated according to their age group. The x- axis indicates age and Y-axis indicates various responses. 32.46% were in the age of 7 years, 34.21% were 8 years old, 14.04% came under the age of 9 years and 19.30% of children came under the age of 10 years

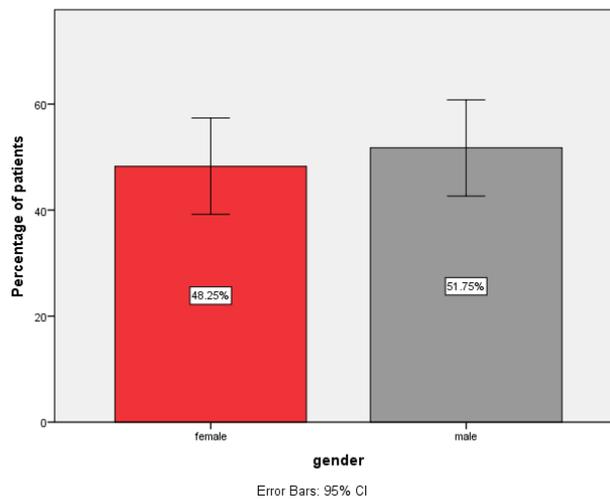


Fig. 4. The above bar graph represents the total number of patients according to their gender. The x- axis indicates gender and Y-axis indicates various responses. 48.25% were females and 51.75% of male participants

Previously done studies have shown that male children had poor oral hygiene when compared to female children [30]. This is similar to our findings where female patients with stainless steel crowns had good oral hygiene when compared to male children with stainless steel crowns [31]. In the present study, it was observed that as the age increased, oral hygiene improved. This could be attributed to children being able to master the skill of brushing by themselves and the ability to comprehend better

oral hygiene instructions. Stainless steel crowns have been found to accumulate more plaque than other crowns and the natural tooth structure. This could be due to the fact that stainless steel crowns can be adjusted and crimped which may bring changes in structure which allow bacterial adhesion. Hence proper oral hygiene instructions should be given to children who receive stainless steel crowns. Due to extended lifespan, stainless-steel crowns are recommended over amalgam or silver fillings. Together with

maintaining sufficient room for the adult molar to grow into, the crown also shields the tooth. Premature tooth loss in children can lead to a number of issues that may eventually harm permanent teeth. Baby teeth are therefore shielded by stainless steel crowns until they fall out naturally. The conventional steel filling is not recommended in favor of stainless-steel crowns. These are the most affordable dental crowns for kids. Additionally, crowns last longer. Stainless-steel crowns outlast conventional crowns by three years, according to experts. The crowns' vivid silver hue makes them unsuitable for front teeth. Choose a filling for your front teeth that matches the original tooth if they are decayed. When the tooth falls out completely, the crown comes off, making space for the wisdom tooth to erupt. Most individuals only see the dentist once in their lifetime. Crowns seldom need to be repaired or replaced. After the crown is placed, take good care of your remaining teeth to avoid requiring more dental work. Make sure your child frequently cleans and flosses his teeth. To keep his teeth from chipping, he must also refrain from biting into extremely tough foods. The child needs to wear a mouthguard at all times when participating in an aggressive sport to avoid breaking teeth. Additionally, visit the dentist on a regular basis for examinations and cleanings at least twice a year. So it is very important to check for the oral hygiene index status of children in order to create awareness for both children and parents and moreover the primary tooth is lost due to decay so it's better to evaluate the stainless steel crown in regular intervals and provide proper oral hygiene measures.

Gap Analysis: There was a previously conducted study which included only the children within the age group of 3-6 years. This study helps in knowing about children above 6 years of age. Another study was on stainless steel crown for pulpotomy patients with early childhood caries which states that the mean pulpotomy to crown ratio was 0.34. Our study helped in knowing the Oral hygiene index which is more important to know, so that we can improvise by bringing new ideas in prevention of early childhood caries in the beginning.

4. CONCLUSION

The oral hygiene index, or OHI index, indicates a patient's level of oral hygiene as well as the amount of plaque on their teeth's surface. OHI enables the detection of food residues, material-

alba, and dental plaque. Within the limitations of our study, it was found that more than 50% of the children had good oral hygiene. 8% of children had poor OHI scores. In our study OHI scores were found to be better in females than males. Children should be given proper oral hygiene instructions and motivated to follow the same to prevent further deterioration of oral health. Studies can be conducted with more sample size in the future so improvise our study.

FUNDING

The present project is supported/funded/ sponsored by Saveetha Institute of Medical and Technical Sciences Saveetha Dental College and Hospitals Saveetha University.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENT

The authors thank Saveetha Dental College and Hospitals for the support to conduct this study

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Aljogja SF, Djais AA, Theodorea CF. *Treponema denticola* and *Porphyromonas gingivalis* as bioindicator oral hygiene status and oraganoleptic score in mouth breathing children [Internet]. International Journal of Applied Pharmaceutics. 2020; 21–5. Available: <http://dx.doi.org/10.22159/ijap.2020.v12s1.37421>
2. Al-damri H, Al-humaid R, Al-shehri S, Al-otaibi S, Abdulwahid A. A Comparison of DMF index and oral hygiene index between do [Internet]. Oral Health and Care. 2017;2(4). Available: <http://dx.doi.org/10.15761/ohc.1000126>
3. Al-Haddad KA, Al-Hebshi NN, Al-Ak'hali MS. Oral health status and treatment needs among school children in Sana'a City, Yemen [Internet]. International Journal of Dental Hygiene 2010;8(2):80–5.

- Available:<http://dx.doi.org/10.1111/j.1601-5037.2009.00398.x>
4. Arnljot HA. Oral Health Care Systems: An International Collaborative Study. Quintessence Publishing (IL); 1985.
 5. Ayedun OS, Oredugba FA, Sote EO. Comparison of the treatment outcomes of the conventional stainless steel crown restorations and the hall technique in the treatment of carious primary molars. Niger J Clin Pract. 2021;24(4):584–94.
 6. Olegário IC, Bresolin CR, Pássaro AL, de Araújo MP, Hesse D, Mendes FM, et al. Stainless steel crown versus bulkfill composites for the restoration of primary molars post-pulpectomy: 1-year survival and acceptance results of a Randomized Clinical Trial. Int J Paediatr Dent [Internet] 2021. Available:<http://dx.doi.org/10.1111/ipd.12785>
 7. Kher MS, Rao A. The Posterior preformed metal crown (Stainless Steel Crown) [Internet]. Contemporary Treatment Techniques in Pediatric Dentistry. 2019;99–116. Available:http://dx.doi.org/10.1007/978-3-030-11860-0_4
 8. Munoz-Sanchez M-L, Linas N, Decerle N, Collado V, Faulks D, Nicolas E, et al. Radiological Evaluation of Stainless Steel Crowns Placed on Permanent Teeth in Patients Treated under General Anaesthesia. Int J Environ Res Public Health. 2021;18(5). Available:<http://dx.doi.org/10.3390/ijerph18052509>
 9. Kaptan A, Korkmaz E. Evaluation of success of stainless steel crowns placed using the hall technique in children with high caries risk: A randomized clinical trial. Niger J Clin Pract. 2021;24(3):425–34.
 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 [Internet]. European Journal of Dentistry. 2018;12(01):067–70. Available:http://dx.doi.org/10.4103/ejd.ejd_266_17
 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; 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. Saudi Dent J. 2019;31(2):165–72.
 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 [Internet]. European Journal of Dentistry 2018;12(01): 021–6. Available:http://dx.doi.org/10.4103/ejd.ejd_247_17
 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;14(S01): 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;155:112374.
 16. Wei, Wei W, Li R, Liu Q, Seshadri VD, Veeraraghavan VP, 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 [Internet]. Arabian Journal of Chemistry. 2021;14(8):103238. Available:<http://dx.doi.org/10.1016/j.arabjc.2021.103238>
 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;24(1):41–50.
 18. Su P, Veeraraghavan VP, Mohan SK, Lu W. A ginger derivative, zingerone—a phenolic compound—induces ROS-mediated apoptosis in colon cancer cells (HCT-116). Journal of Biochemical and Molecular Toxicology. 2019;33(12). Available:<http://dx.doi.org/10.1002/jbt.22403>
 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. Clin Oral Investig 2020;24(9):3275–80.
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;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 [Internet]. Surface Topography: Metrology and Properties. 2021;9(2):025043. Available: <http://dx.doi.org/10.1088/2051-672x/ac0c61>
 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 [Internet]. Risk Management and Healthcare Policy. 2021;14:2851–61. Available: <http://dx.doi.org/10.2147/rmhp.s306880>
 23. Sekar D, Nallaswamy D, Lakshmanan G. Decoding the functional role of long noncoding RNAs (lncRNAs) in hypertension progression. Hypertens Res. 2020;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;47(1):3417–22.
 25. Sekar D. Circular RNA: a new biomarker for different types of hypertension. Hypertens Res 2019;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;26(7-8):179–82.
 27. Duraisamy R, Krishnan CS, Ramasubramanian H, Sampathkumar J, Mariappan S, Sivaprakasam AN. Compatibility of Nonoriginal Abutments With Implants. Implant Dentistry. 2019; 28(3):289–95. Available: <http://dx.doi.org/10.1097/id.0000000000000885>
 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;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;28(5): 5809–21.
 30. Jacobsson B. Oral health of children and adolescents in da nang. Journal of Oral Hygiene & Health. 2014;02(04). Available: <http://dx.doi.org/10.4172/2332-0702.1000145>
 31. Inc. KN, Kernel Networks Inc. Oral Health Perception and Difficulties Encountered by Parents in the Implementation of Oral Hygiene of Children Under 6. Case Medical Research; 2019. Available: <http://dx.doi.org/10.31525/ct1-nct04123184>

© 2024 Dhakshinya and Subramanian; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://www.sdiarticle5.com/review-history/79845>