

Original Research Article

ORAL HYGIENE INDEX IN CHILDREN AGED 7-10 YEARS WITH STAINLESS STEEL CROWNS

Running title : Prevalence of OHI score in children's with stainless steel crowns.

ABSTRACT:

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

Keywords: OHI score, Stainless steel crown, Caries, innovative technique

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 contained 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 are the segments distal to the right and left cuspids, respectively(1). Debris and calculus are analysed 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 one tooth that is used to calculate the individual index for that segment. The tooth chosen for the calculation must have the most debris or calculus covering it(3). With the OHI, these values are just half of the score magnitude that can be achieved (Oral Hygiene Index)(4).

Stainless steel crowns have been an important part of paediatric dentistry's restorative arsenal for many years(5). They are prefabricated crown types that are adapted to individual teeth and cemented with a biocompatible luting agent, according to the description. It is a relatively easy restorative treatment modality(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 useful semi-permanent restoration for permanent molar teeth that can be used before the tooth completely erupts and more permanent and aesthetic coronal restorations can be chosen(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 extensive knowledge and research experience that has translated into high quality publications(10–29).

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

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 . Case records of patients visiting the department of pediatric dentistry from September 2020 to December 2020 were analysed. 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 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.

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).

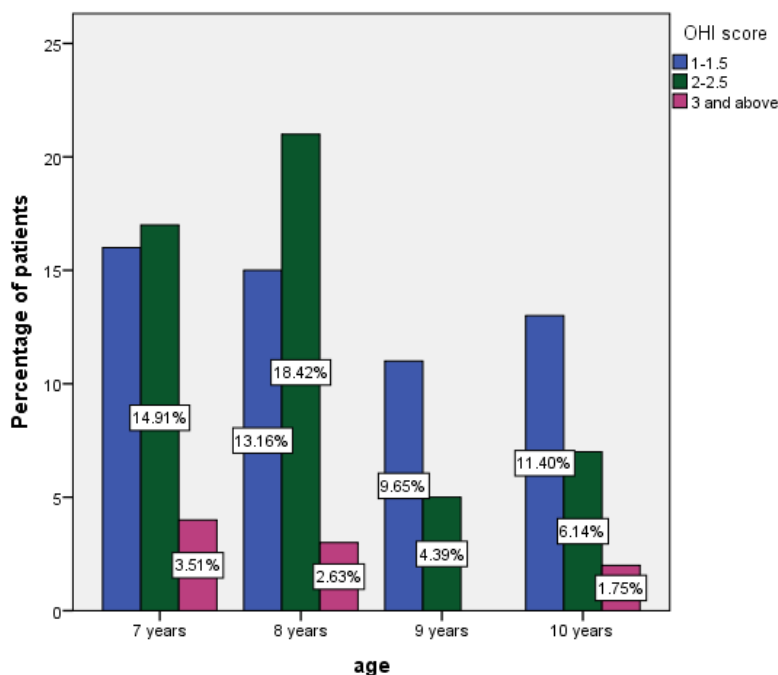


Figure: 1: The above bar graph represents the types of OHI score observed in different age groups. The x-axis indicates age and Y-axis indicates various responses. Blue colour indicates score of '1-1.5', green indicates '2-2.5' and Red indicates '3 and above'. 14.04% of patients in the age of 7 years, 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.

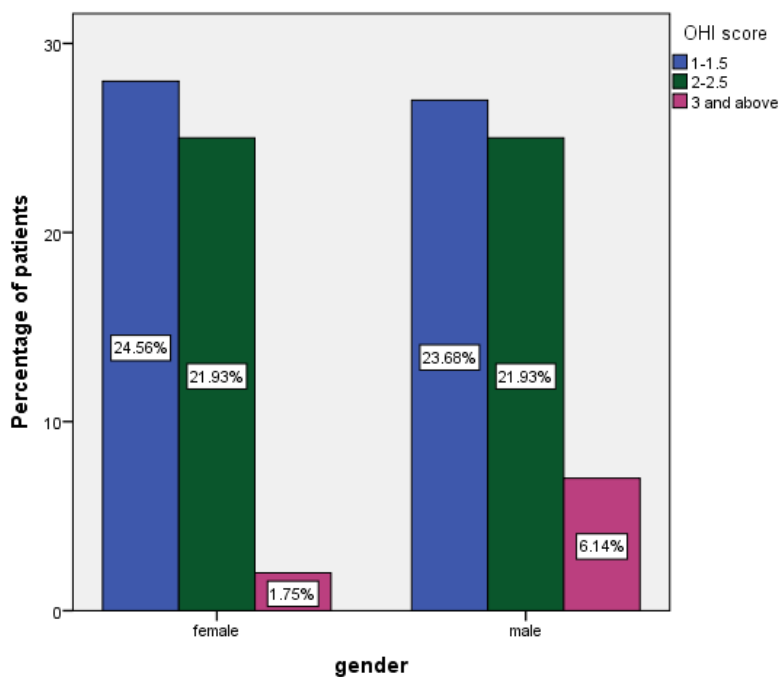
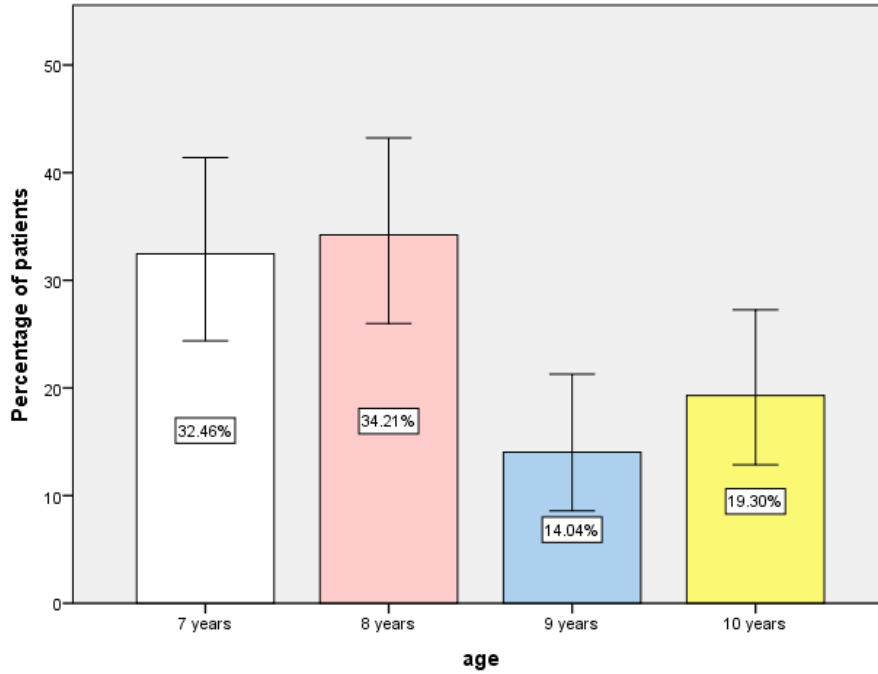


Figure: 2: The above bar graph represents the types of OHI score observed in different genders. The x- axis indicates gender and Y-axis indicates various responses. Blue colour indicates score of '1-1.5', green indicates '2-2.5' and Red indicates '3 and above'. 24.56% of females and 23.68% of males had 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.



Error Bars: 95% CI

Figure: 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.

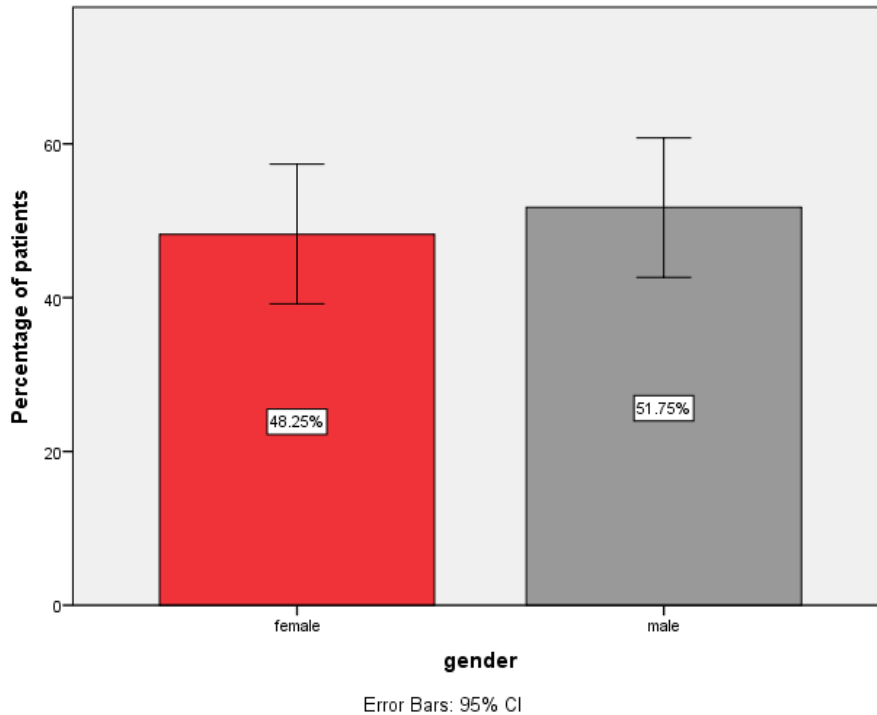


Figure: 4: The above bar graph represents the total number of patients according to their gender. The x- axis indicates gender and Y-axis indicates various responses. 48.25% were females and 51.75% of male participants.

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 aged 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.(Mathew et al. 2020) 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.

CONCLUSION:

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. OHI scores were found to be better in girls than boys. Children should be given proper oral hygiene instructions and motivated to follow the same to prevent further deterioration of oral health.

REFERENCES:

1. Aljogja SF, Djais AA, Theodorea CF. *TREPONEMA DENTICOLA AND PORPHYROMONAS GINGIVALIS AS BIOINDICATOR ORAL HYGIENE STATUS AND ORGANOLEPTIC SCORE IN MOUTH BREATHING CHILDREN* [Internet]. *International Journal of Applied Pharmaceutics*. 2020. p. 21–5. Available from: <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]. Vol. 2, *Oral Health and Care*. 2017. Available from: <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]. Vol. 8, *International Journal of Dental Hygiene*. 2010. p. 80–5. Available from: <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. 218 p.
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 Apr;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 Mar 16; Available from: <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. p. 99–116. Available from: 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* [Internet]. 2021 Mar 3;18(5). Available from: <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 Mar;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]. Vol. 12, *European Journal of Dentistry*. 2018. p. 067–70. Available from: 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 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. *Saudi Dent J*. 2019 Apr;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]. Vol. 12, *European Journal of Dentistry*. 2018. p. 021–6. Available from: 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 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 Sep;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]. Vol. 14, *Arabian Journal of Chemistry*. 2021. p. 103238. Available from: <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 Dec;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) [Internet]. Vol. 33, *Journal of Biochemical and Molecular Toxicology*. 2019. Available from: <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 Sep;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 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 [Internet]. Vol. 9, *Surface Topography: Metrology and Properties*. 2021. p. 025043. Available from: <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]. Vol. 14, *Risk Management and Healthcare Policy*. 2021. p. 2851–61. Available from: <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 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, Sivaprakasam AN. Compatibility of Nonoriginal Abutments With Implants [Internet]. Vol. 28, *Implant Dentistry*. 2019. p. 289–95. Available from: <http://dx.doi.org/10.1097/id.0000000000000885>
28. Parimelazhagan R, Umopathy 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. Jacobsson B. Oral Health of Children and Adolescents in Da Nang [Internet]. Vol. 02,

Journal of Oral Hygiene & Health. 2014. Available from: <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 [Internet]. Case Medical Research. 2019. Available from: <http://dx.doi.org/10.31525/ct1-nct04123184>

UNDER PEER REVIEW