Comparative Assessment of Oral Hygiene Status and Associated Risk Factors amongst 3-14-year-old School-going Children Residing in Konkan Region: An Analytical Study

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Abstract: Aims & Background: To evaluate the prevalence of oral hygiene status and examine its association with diet, dental trauma, tooth erosion, and fluorosis among 3–14-year-old school-going children in the Ratnagiri region of the Konkan, Maharashtra, India. **Materials and Methods:** A descriptive analytical study was done amongst 600 school children aged 3–14 years (294 males and 306 females). The oral hygiene status was assessed using the Gingival Index (Löe and Silness, 1963), Plaque Index (Silness and Löe, 1964) and the WHO Oral Health Assessment Form (2013). **Results:** Amongst 600 participants, 119 (19.83%) were aged 3–7 years, 258 (43.00%) were aged 8–10 years, and 223 (37.17%) were aged 11–14 years. The prevalence of gingivitis was high in boys (GI: 1.490, PI: 1.688) compared to girls (GI: 1.470, PI: 1.659). The incidence of gingival bleeding, mild enamel fluorosis, and dental erosion is seen to have a positive association with diet and tooth brushing. While Enamel fracture is most prevalent among 11-14-year-old children (38.73%), enamel fluorosis (85.71%) is most prevalent in 8-10-year-old children, as determined by using the paired t-test and analysis of variance. **Conclusion:** The findings reveal a major shortfall in dental treatment among children in this region, highlighting barriers to accessing and utilising oral health care services. Targeted oral health education, regular recall visits, and ongoing monitoring are crucial for enhancing both gingival health and overall oral health in this population. **Clinical significance:** However, observations from this study can be used to determine the impact of various risk factors on the oral health of the children in different districts of the Konkan region. This will aid in preparing oral health policies for the Konkan population.

Keywords: WHO Index, Gingival Index, Plaque Index, Oral Hygiene Status, School Children, Konkan region

Introduction:

Maintaining oral health is crucial to the overall well-being of a child. According to Horowitz et al., the oral cavity of humans plays a vital role in developing a healthy personality, shaping perceptions, and contributing to overall experiences of pleasure [1].If oral diseases in children are left untreated, they can lead to serious general health problems, significant pain, and interfere with mastication. The overall prevalence of gingivitis in children can range from 35% to 100% [2].

Gingivitis in children is caused by bacterial plaque accumulation on the tooth surfaces. This accumulation may vary depending on factors such as toothbrushing frequency, dietary habits, and the presence of dental caries.

The current research database offers a limited number of prevalence studies on the oral hygiene status of School-going Children Residing in the Konkan Region, especially in Ratnagiri. Hence, this study was conducted to evaluate the oral hygiene status and the associated risk factors in school-going children aged between 3 and 14 years. Therefore, the null hypothesis states that there is no direct association between oral hygiene status and various risk factors, like dietary habits and the age of school children in the Konkan region of Maharashtra.

Methods:

On receiving the ethical clearance (Protocol No. EC/NEW/INST/2022/2512, Ref. No.: YDCH/IEC/2107/30/2024), a written consent was obtained from the authorities of the eight schools and parents/guardians of both rural and suburban regions of Ratnagiri district of Konkan region. These schools were selected using a simple randomised sampling technique from the list provided by the Directorate of Education, Ratnagiri District. A total of 600 school-going children (294 boys and 306 girls) aged 3–14 years were selected using systematic randomised sampling and were divided into three sub-groups based on dentition: Primary (3–7 years), Mixed (8–10 years), and Permanent dentition (11–14 years). The number of study subjects was calculated after consulting the statistician.

School Children aged 3-14 years, both male and female, present on the day of examination, with parental consent, were considered for random sampling. Also, those children who cooperated with the clinical examination were included. Along with this, the child presenting various conditions like dental erosion, a history of missing teeth due to trauma, oral mucous lesions and conditions were also considered.

Children without consent, unwilling to participate, or those who were absent on the day of examination, medically compromised, undergoing orthodontic treatment or had severe extrinsic stains on teeth were not screened.

An intra-oral examination was conducted by a trained professional to reduce the errors. The Examination was carried out in well-ventilated classrooms under natural light using diagnostic tools (disposable tongue depressors, disinfectants, cotton pellets). Data collection was done by examiner 1, who recorded demographic details using a

structured questionnaire. Whereas the other two examiners performed the clinical examination using various indices like the WHO Index 2013, Gingival Index of Löe and Silness (1963), and Plaque Index of Silness and Löe (1964). All the examiners were blinded to reduce bias, with over 90% agreement. Any differences were resolved through discussion.

Sterilised instruments were used for each school visit, and all aseptic precautions were followed. Children needing further treatment were given referral cards to visit the nearest dental hospital. Findings were shared with school authorities and parents/guardians. After the survey, dental health education was provided in the local language to parents, teachers, and caregivers.

Data were tabulated using MS Excel (v 2019, Microsoft, Redmond, WA, USA), and it was statistically evaluated using SPSS (version 21.0, by International Business Machines Corporation). The data were presented in counts and percentages for qualitative measures and mean (Statistical Difference) for numerical observations.

To know the statistical significance between two variables student t-test was applied, whereas more than two variables were assessed using one-way ANOVA. The α error was at 5%, and the β error at 20%, with a power of 80%.

Results:

Among 600 school children examined, 119 (19.83%) were between 3-7 years of age, 258 (43%) were between 8-10 years, and 223 (37.17%) students were within the 11-14 years age group. A total of 294 (49.00%) male and 306 (51.00%) female students met the inclusion and exclusion criteria, amongst which 94 (15.67%) consumed a soft diet, while 506 (84.33%) preferred a mixed type of diet.

The (Figs. 1 and 2) show inter-group comparison of Gingival Index (GI) and plaque Index (PI) scores of index teeth of particular dentition with the Gender of school children. The overall values of the Gingival and Plaque indices are higher in males (GI: 1.490, PI: 1.688) compared to females (GI: 1.470, PI: 1.659). An inter-group comparison of the Gingival Index scores for specific teeth, based on the type of Diet (Soft or mixed) consumed by school children (Table 1). The Gingival Index (GI) score of (FDI Dental Notation System) 12, 32, 44 index teeth showed a significant difference of p<00.5. Whereas, statistically significant differences were also observed with 36 (p 0.043) and 82 (p 0.024) teeth upon comparing different diets. Further, the overall GI score (p 0.000) of all the Index teeth showed a highly significant difference in the study subjects after consuming different types of diet. Similarly, the plaque Index score of index teeth was compared for soft and mixed diets (Table 2). A highly significant difference was noted in the Plaque Index (PI) score of 12 (p 0.007), 82 (p 0.005) and 16 (p 0.023) index teeth. Overall PI score (p 0.038) of all the Index teeth showed a highly significant difference in subjects the consuming different types of diet.

Gingival and plaque Index score was highest in students aged 3-7 years (GI 1.54, PI 1.73), followed by 8-10 years (GI 1.51, PI 1.69), and 11-14 years (GI 1.41, PI 1.64). The Intergroup

comparison of the Gingival and Plaque indices of various index teeth at three age intervals was highly significant with GI (p 0.041) and PI (p 0.006) scores of maxillary first molar tooth using Analysis of independent Variances. An insignificant difference was observed when all three age groups were compared with GI and PI scores (Tables 3 and 4).

A non-significant difference was observed when gingival bleeding, enamel fluorosis, dental erosion, signs of dental traumatic injuries, oral mucosal conditions and lesions, need for intervention, Gingival and PI index were observed in both genders ($p > 0.001$) (Tables 5 and 6). While a highly statistically significant difference was observed in gingival index scores (p 0.005) and incidence of traumatic injuries (p 0.026) in the school children consuming soft and mixed diets. The incidence of gingival bleeding, mild enamel fluorosis, and dental erosion is seen to have a positive association with a mixed type of diet. The incidence of Enamel fracture was maximum at 11-14 years (42.17%), whereas the incidences of gingival bleeding (47.63%) and enamel fluorosis (85.71%) were maximum in 8-10-year-old children with the presence of moderate gingivitis (45.04%) and poor oral hygiene, as seen in plaque incidences (44.84%). Whereas a highly significant difference is observed in the GI scores (p 0.003) and incidences of dental traumatic injury (p 0.002) (Table 7).

Discussion:

Children at a young age usually present with limited manual dexterity. Additionally, during the mixed dentition period, the child may struggle to maintain oral hygiene effectively due to dental crowding. This can result in the accumulation of dental plaque, which serves as a primary predisposing factor for gingivitis in children [3]. Similar findings were reported in developing nations among children residing in rural areas with lower socioeconomic strata [4].

Therefore, the present study targeted school-going students across both urban and rural areas of the Konkan region. Our findings revealed that 63% of students used mechanical aids with dentifrice in paste or powder form to clean their teeth, while 37% failed to maintain routine oral hygiene practice. These findings diverge significantly from those of Vijayta Sharva et al., who reported that 96% of the population performed oral hygiene practices [5]. These findings clearly highlight that the oral health awareness remains low in the Konkan region compared to other areas. Hence, understanding the concern, the Dental Health Education Program was conducted post-examination for parents, teachers, and caregivers in the local language. Further, the status of oral hygiene of the school children was shared with school authorities and parents/guardians, and they were given appropriate referrals considering treatment needs in the children.

In the present study, the oral hygiene of children was assessed using different gingival and plaque indices along with WHO (2013), the findings of which underscore an urgent need for enhanced oral health promotion and preventive interventions in the Konkan

population. When looking at the gender, boys showed a higher prevalence (GI: 1.490, PI: 1.688) compared to girls (GI: 1.470, PI: 1.659). This difference can be due to poorer brushing habits in boys. These results align with research by Vijayta Sharva et al.[5], Das et al. [1], and Kumari A et al. [6];however, these studies are in contrast with the Sutcliff survey [7] that reported a high prevalence among girls.

We observed a gradual decrease in both the gingival and plaque scores as the age of students increased. Primary dentition (GI 1.54, PI 1.73) exhibits the highest level of gingival inflammation, followed by mixed dentition (GI 1.51, PI 1.69). The lowest score was observed with the permanent dentition stage (GI 1.41, PI 1.64). A notable variation was observed between our results and those of Agarwal A et al.[8], who reported that the permanent dentition was the most severely affected, followed by the mixed and deciduous stages. This study is the first of its kind to evaluate and compare the GI and PI scores of specific index teeth in children at different age intervals. We found that the anterior teeth showed less gingival inflammation compared to posterior teeth in all the age groups; a similar trend was observed by Sreenivasan PK et al. in the permanent dentition [9].

When the distribution of gingival inflammation within the dentition was analysed, it was found that in the primary dentition, the highest prevalence of gingivitis was found on the lower molar, followed by upper molar, upper incisor and lower premolar in mixed and permanent dentition, while deciduous mandibular incisors were most commonly affected. The results of which were in harmony with the study by Hugoson A et al. [10].

In our study, the prevalence of anterior tooth fractures with enamel involvement was highest in boys (42.17%) at the 11-14 age range. This could be linked with inadequate soft tissue/lip coverage. Bellamkonda P et al.[11], Castillo Sánchez LP et al.[12] also reported the association between Proclination of upper incisor and incidences of traumatic injuries. The potential reason for this could be the early eruption of the maxillary central incisors. Lower incisors are more resistant because of their flexible connection to the cranial base, making the impact on mandibular teeth more diffuse [11].

The prevalence of oral mucosal lesions and conditions was assessed in the present study, which was (0.17%) considerably lower than that reported by Jain Anubhuti et al. (3%)[13]. Likewise, enamel fluorosis was seen in 1.16% of the study population, where the maximum frequency was documented in children aged 8-10 years. The current findings demonstrated lower values compared to those reported by Jain Anubhuti et al. (4.3%)[13], Singh et al. (22.9%)[14], Srinivas et al. (32.5%)[15], and Mittal et al. (22.5% in 5 years; 76.04% in 12 years)[16], suggesting possibilities of geographic variation of fluoride exposure, and less availability of data on prevalence of fluorosis.

However, the information provided by the present study can be used as preliminary data, and further studies can be undertaken to identify the risk factors in various districts of the Konkan region to determine their impact on the specific tooth surfaces that are more prone to inflammatory changes at different age intervals.

Conclusion:

The findings of the current study highlight the necessity for early and appropriate dental treatment for the above-mentioned oral conditions. Regardless of age, school-going children were found to require prompt and immediate oral health care. Furthermore, parents/guardians and children should be educated and informed about their oral health and its potential future effects.

List of abbreviations:

WHO (World Health Organisation), GI (Gingival Index), PI (Plaque Index), ANOVA (Analysis of Variance)

References:

1. Das UM, Beena JP, Azher U (2009). Oral health status of 6- and 12-year-old school going children in Bangalore city: An Epidemiological Study. J Indian Soc Pedod Prev Dent.;27(1):6-8.
2. Feldens EG, Kramer PF, Feldens CA, Ferreira SH (2006). Distribution of plaque and gingivitis and associated factors in 3- to 5-year-old Brazilian children. J Dent Child (Chic).;73(1):4-10.
3. Reddy J, Parker JR, Africa CW, Stephen LX (1985). Prevalence and severity of periodontitis in a high fluoride area in South Africa. Community Dent Oral Epidemiol.;13(2):108-12.
4. Peretz B, Machtei EM, Bimstein E (1996). Periodontal status in childhood and early adolescence: three-year follow up. J Clin Pediatr Dent. Spring;20(3):229-32.
5. Sharva V, Reddy V, Bhambal A, Agrawal R (2014). Prevalence of Gingivitis among Children of Urban and Rural Areas of Bhopal District, India. J Clin Diagn Res.;8(11):ZC52-4.
6. Kumari A, Marya C, Oberoi SS, Nagpal R, Bidyasagar SC, Taneja P (2021). Oral Hygiene Status and Gingival Status of the 12- to 15-year-old Orphanage Children Residing in Delhi State: A Cross-sectional Study. Int J Clin Pediatr Dent. 14(4):482-487.
7. McDonald RE, Avery DR, Weddell JA. (1998). Gingivitis and periodontal disease. McDonald RE, Avery DR. eds: Dentistry for the child and Adolescent,5th ed. New Delhi: Laxmanchand Arya. 478p.
8. Agarwal A, Rehani U, Adlakha V, Kaushik M, Kaushik N (2009). Comparative analysis of the amount of plaque formation and associated gingival inflammation in deciduous, mixed and permanent dentition. Int J Clin Pediatr Dent.2(3):23-6.
9. Sreenivasan PK, Prasad KVV(2017). Distribution of dental plaque and gingivitis within the dental arches. J Int Med Res.45(5):1585-1596.
10. Hugoson A, Koch G, Rylander H (1981). Prevalence and distribution of gingivitis-periodontitis in children and adolescents. Epidemiological data as a base for risk group selection. Swed Dent J.5(3):91-103.
11. Bellamkonda P, Akkaloori A, Koothati RK, H T, Sharma M, Krishna V(2024). Investigation of Anterior Teeth Fractures Among Students Aged Between 8 and 13 Years in Hyderabad, India. Cureus. 16(1):e53131.

12. Castillo Sánchez LP, Andrade MRTC, Americano GCA, Cruz LR, De Marsillac MWS, Campos V (2019). Types of traumatic dental injuries to the primary dentition and the surface against which they occurred. RGO, Rev GaúchOdontol.67:e20190053.
13. Jain, Anubhuti; Parakh, Abhinav; Narshimamurty, Naveen; Agrawal, Rohit; Yunus, G. Y.; Jain, Kamlesh Kumar (2025). Oral Health Status of 5, 12, and 15 Years Old Rural Children of Chhattisgarh, India. Journal of Indian Association of Public Health Dentistry 23(2):p182-188.
14. Singh A, Sequiera P, Acharya S, Bhat M (2011). Oral health status of two 12-year-olds socially disadvantaged groups in South India: A comparative Study. Oral Health Prev Dent. 9:3-7.
15. Srinivas R, Srinivas P, Viswanath V, Suresh S, Devaki T, Narayana V (2012). Oral health status of institutionalized street children aged 5-15 years in Guntur city, Andhra Pradesh, India. Int J Sci Technol Res. 1:19-23.
16. Mittal M, Chaudhary P, Chopra R, Khattar V (2014). Oral health status of 5 years and 12 years old school going children in rural Gurgaon, India: an epidemiological study. J Indian Soc Pedod Prev Dent.32(1):3-8.

Table and table legends:

Index Tooth	Type of Diet	N	Mean	SD	T value	p Value
16	Soft	82	1.73	0.890	0.551	0.582
	Mixed	469	1.62	1.752		
12	Soft	40	2.50	1.038	3.900	0.000**
	Mixed	358	1.75	1.163		
24	Soft	40	1.23	1.209	1.114	0.266
	Mixed	340	1.03	1.030		
36	Soft	40	1.85	1.252	2.030	0.043*
	Mixed	342	1.43	1.228		
32	Soft	40	2.68	0.829	2.860	0.004**
	Mixed	349	2.11	1.226		
44	Soft	40	1.45	1.085	2.780	0.006**
	Mixed	343	0.97	1.018		
55	Soft	12	1.75	1.138	0.997	0.324
	Mixed	36	1.33	1.287		
62	Soft	54	1.69	0.843	0.726	0.469
	Mixed	146	1.59	0.828		
64	Soft	53	1.45	0.822	1.518	0.130
	Mixed	162	1.27	0.731		
75	Soft	53	1.47	0.723	0.931	0.353
	Mixed	161	1.35	0.875		
82	Soft	53	2.17	0.935	2.275	0.024*
	Mixed	155	1.85	0.884		
84	Soft	52	1.38	0.820	0.841	0.401

	Mixed	158	1.27	0.842		
Overall GI Score	Soft	94	1.72	0.569	4.338	0.000**
	Mixed	504	1.44	0.583		

Table 1: A table representing the inter-group comparison of Gingival Index (GI) scores of Primary and Permanent Index teeth with the type of Diet consumed by school children

Index Tooth	Type of Diet	N	Mean	SD	T value	p Value
16	Soft	83	1.87	0.908	2.277	0.023*
	Mixed	468	1.61	0.943		
12	Soft	41	2.61	0.997	2.715	0.007**
	Mixed	356	2.08	1.205		
24	Soft	41	1.29	1.078	1.141	0.255
	Mixed	339	1.10	1.013		
36	Soft	41	1.76	1.200	0.014	0.989
	Mixed	340	1.76	1.173		
32	Soft	41	2.54	0.951	0.364	0.716
	Mixed	349	2.46	1.230		
44	Soft	41	1.34	1.132	0.852	0.395
	Mixed	342	1.19	1.091		
55	Soft	11	1.73	1.009	0.594	0.556
	Mixed	37	1.46	1.386		
62	Soft	53	2.04	0.919	0.588	0.557
	Mixed	147	1.95	0.999		
64	Soft	53	1.42	0.795	0.194	0.846
	Mixed	165	1.39	0.915		
75	Soft	53	1.55	0.798	0.308	0.759
	Mixed	163	1.50	0.939		
82	Soft	52	2.56	0.873	2.870	0.005**
	Mixed	155	2.12	0.969		
84	Soft	53	1.38	0.657	0.639	0.524
	Mixed	162	1.46	0.900		
Overall PI Score	Soft	94	1.784	0.5554	2.083	0.038*
	Mixed	503	1.653	0.5613		

Table 2: A table representing the inter-group comparison of Plaque Index (PI) scores of Primary and Permanent Index teeth with the type of Diet consumed by school children

Index Tooth	Age Intervals	N	Mean	SD	F value	p Value
16	3-7 years	83	1.59	0.625	3.209	0.041*
	8-10 years	246	1.83	2.195		
	11-14 years	222	1.45	1.107		
12	3-7 years	26	2.23	0.951	2.027	0.133
	8-10 years	151	1.86	1.108		
	11-14 years	221	1.76	1.230		
24	3-7 years	0	0.00	0.00	1.952	0.143
	8-10 years	134	1.15	1.073		
	11-14 years	221	0.96	1.035		
36	3-7 years	24	1.25	0.847	1.264	0.284
	8-10 years	137	1.60	1.286		
	11-14 years	221	1.43	1.236		
32	3-7 years	26	2.35	0.846	1.843	0.160
	8-10 years	142	2.29	1.194		
	11-14 years	221	2.06	1.238		
44	3-7 years	0	0.00	0.00	0.259	0.772
	8-10 years	136	1.07	1.056		
	11-14 years	221	0.99	1.053		
55	3-7 years	36	1.50	1.207	0.353	0.555
	8-10 years	12	1.25	1.422		
	11-14 years	0	0.00	0.00		
62	3-7 years	93	1.68	0.810	0.629	0.534
	8-10 years	0	0.00	0.00		
	11-14 years	0	0.00	0.00		
64	3-7 years	92	1.39	0.851	0.849	0.429
	8-10 years	122	1.26	0.678		
	11-14 years	0	0.00	0.00		
75	3-7 years	93	1.35	0.855	0.323	0.724
	8-10 years	120	1.39	0.833		
	11-14 years	0	0.00	0.00		
82	3-7 years	92	2.09	0.885	2.607	0.076
	8-10 years	0	0.00	0.00		
	11-14 years	0	0.00	0.00		
84	3-7 years	91	1.33	0.895	0.155	0.856
	8-10 years	118	1.28	0.794		
	11-14 years	0	0.00	0.00		
Overall GI Score	3-7 years	9	1.54	0.491	2.621	0.074
	8-10 years	258	1.51	0.540		
	11-14 years	222	1.41	0.681		

Table 3: A table representing the inter-group comparison of Gingival Index (GI) scores of Primary and Permanent Index teeth at three age intervals

Index Tooth	Age Intervals	N	Mean	SD	F value	p Value
16	3-7 years	83	1.84	0.740	5.251	0.006**
	8-10 years	247	1.72	0.878		
	11-14 years	221	1.50	1.052		
12	3-7 years	26	2.62	.983	2.586	0.077
	8-10 years	152	2.16	1.098		
	11-14 years	219	2.06	1.271		
24	3-7 years	0	0.00	0.00	0.542	0.582
	8-10 years	135	1.16	0.969		
	11-14 years	220	1.08	1.065		
36	3-7 years	25	1.56	1.158	0.808	0.446
	8-10 years	136	1.85	1.210		
	11-14 years	220	1.73	1.154		
32	3-7 years	26	2.50	.949	0.009	0.991
	8-10 years	144	2.47	1.262		
	11-14 years	220	2.47	1.195		
44	3-7 years	26	1.15	.925	0.124	0.884
	8-10 years	137	1.18	1.063		
	11-14 years	220	1.23	1.136		
55	3-7 years	36	1.50	1.183	0.815	0.449
	8-10 years	11	1.73	1.679		
	11-14 years	0	0.00	0.00		
62	3-7 years	93	1.94	0.953	0.635	0.531
	8-10 years	0	0.00	0.00		
	11-14 years	0	0.00	0.00		
64	3-7 years	94	1.50	0.948	1.240	0.291
	8-10 years	123	1.32	0.833		
	11-14 years	0	0.00	0.00		
75	3-7 years	94	1.55	0.911	0.299	0.742
	8-10 years	121	1.49	0.905		
	11-14 years	0	0.00	0.00		
82	3-7 years	92	2.39	0.889	2.992	0.052
	8-10 years	0	0.00	0.00		
	11-14 years	0	0.00	0.00		
84	3-7 years	93	1.48	0.789	0.319	0.727
	8-10 years	121	1.41	0.891		
	11-14 years	0	0.00	0.00		
Overall PI Score	3-7 years	119	1.726	0.5254	0.921	0.399
	8-10 years	257	1.678	0.5012		
	11-14 years	221	1.640	0.6423		

Table 4: A table representing the inter-group comparison of Gingival Index (GI) scores of Primary and Permanent Index teeth at three age intervals

Oral Health Determinants	Observations	Gender		Number of Children	Chi-Square test	p Value
		Male	Females			
Gingival bleeding	Absent	134 (47.34%)	149 (52.65%)	283 (47.17%)	0.584[a]	0.445
	Present	160 (50.47%)	157 (49.53%)	317 (52.83%)		
Enamel Fluorosis	Normal teeth	169 (48.29%)	181 (51.71%)	350 (53.33%)	0.319[a]	0.853
	Questionable	122 (50.20%)	121 (49.80%)	243(40.5%)		
	Very mild	3 (42.86%)	4 (57.14%)	7 (1.16%)		
Dental Erosion	Absence of Condition	294 (49.17%)	304 (50.83%)	598 (99.66%)	1.928[a]	0.381
	Enamel Lesion	0 (0.00%)	1 (100%)	1 (0.17%)		
	Dentin Lesion	0 (0.00%)	1 (100%)	1 (0.17%)		
Dental Trauma	No. Signs of Injury	131 (49.80%)	132 (50.20%)	263 (43.83%)	2.626[a]	0.453
	Treated Injury	32 (43.83%)	41 (56.17%)	73 (12.16%)		
	Enamel Fracture Only	130 (51.38%)	123 (48.62%)	253 (42.17%)		
	Enamel and Dentin Fracture	7 (70.00%)	3 (30.00%)	10 (1.67%)		
Oral mucous Condition and Lesion	No Abnormal Condition	0 (0.00%)	1 (100%)	1 (99.83%)	0.962[a]	0.327
	Not Recorded	294 (49.08%)	305 (50.92%)	599 (0.17%)		
Intervention Urgency	No Curative Treatment Needed	64 (49.61%)	65 (50.39%)	129 (21.5%)	0.191[a]	0.909
	Preventive or Routine Treatment Needed	5 (55.55%)	4 (44.44%)	9 (1.5%)		
	Prompt treatment (including Scaling) Needed	225 (48.70%)	237 (51.30%)	462 (77%)		
Gingival Index Interpretation	Absence	1 (33.33%)	2 (66.67%)	3 (0.5%)	2.469[a]	0.650
	Mild	53 (50.47%)	52 (49.53%)	105 (1.75%)		
	Moderate	193 (47.77%)	211 (52.23%)	404 (67.33%)		
	Severe	47 (53.41%)	41 (46.59%)	88 (14.67%)		
Plaque Index Interpretation	Absence	0 (0.00%)	2 (100%)	2 (0.33%)		
	Excellent	4 (80.00%)	1 (20.00%)	5 (0.83%)		

	Good	22 (43.14%)	29 (56.86%)	51 (8.50%)	4.591[a]	0.332
	Fair	158 (49.52%)	161 (50.48%)	319 (53.17%)		
	Poor	110 (49.33%)	113 (50.67%)	223 (37.17%)		

Table 5: Shows the inter-group comparison of oral health determinants based on the WHO 2013 Index scores and the gender of school-going children

Oral Health Determinants	Observations	Type of diet consumed		Number of Children	Chi-Square test	p Value
		Soft	Mixed			
Gingival bleeding	45 (15.90%)	238 (84.10%)	283 (47.17%)	45 (15.90%)	0.022[a]	0.881
	49 (15.46%)	268 (84.54%)	317 (52.83%)	49 (15.46%)		
Enamel Fluorosis	Normal teeth	58 (16.57%)	292 (83.43%)	350 (53.33%)	1.651[a]	0.438
	Questionable	36 (14.81%)	207 (85.18%)	243(40.5%)		
	Very mild	0 (0.00%)	7 (100%)	7 (1.16%)		
Dental Erosion	Absence of Condition	94 (15.92%)	504 (84.28%)	598 (99.66%)	0.373[a]	0.830
	Enamel Lesion	0 (0.00%)	1 (100%)	1 (0.17%)		
	Dentin Lesion	0 (0.00%)	1 (100%)	1 (0.17%)		
Dental Trauma	No. Signs of Injury	32 (12.17%)	231 (87.83%)	263 (43.83%)	9.252[a]	0.026*
	Treated Injury	7 (09.59%)	66 (90.41%)	73 (12.16%)		
	Enamel Fracture Only	52 (20.55%)	201 (79.45%)	253 (42.17%)		
	Enamel and Dentin Fracture	2 (20.00%)	8 (80.00%)	10 (1.67%)		
	Missing tooth	0 (0.00%)	1 (100%)	1 (0.17%)		
Oral mucous Condition and Lesion	No Abnormal Condition	0 (0.00%)	1 (100%)	1 (99.83%)	0.186[a]	0.666
	Not Recorded	94 (15.69%)	505 (84.31%)	599 (0.17%)		
Intervention Urgency	No Curative Treatment Needed	20 (15.50%)	109 (84.50%)	129 (21.5%)	0.150[a]	0.928
	Preventive or Routein Treatment Needed	1 (11.11%)	8 (88.88%)	9 (1.5%)		
	Prompt treatment (including	73 (15.80%)	389 (84.20%)	462 (77%)		

	Scaling) Needed					
Gingival Index Interpretation	Absence	0 (0.00%)	3 (100.00%)	3 (0.5%)	14.998[a]	0.005**
	Mild	4 (03.85%)	101 (97.11%)	105 (1.75%)		
	Moderate	72 (17.82%)	332 (82.18%)	404 (67.33%)		
	Severe	19 (21.60%)	69 (78.40%)	88 (14.67%)		
Plaque Index Interpretation	Absence	0 (0.00%)	2 (100%)	2 (0.33%)	5.857[a]	0.210
	Excellent	0 (0.00%)	5 (100%)	5 (0.83%)		
	Good	3 (05.88%)	48 (94.11%)	51 (8.50%)		
	Fair	56 (17.55%)	263 (82.45%)	319 (53.17%)		
	Poor	35 (15.70%)	188 (84.30%)	223 (37.17%)		

Table 6: Displays the inter-group comparison of oral health determinants based on the WHO 2013 Index scores and the type of diet consumed

Oral Health Determinant	Observation	Age Intervals			Number of Children	Chi-Square test	p Value
		3-7 years	8-10 years	11-14 years			
Gingival bleeding	Absent	54 (19.08%)	107 (37.81%)	122 (43.11%)	283 (47.17%)	8.599[a]	0.014*
	Present	65 (20.50%)	151 (47.63%)	101 (31.86%)	317 (52.83%)		
Enamel Fluorosis	Normal teeth	73 (20.86%)	130 (37.14%)	147 (42%)	350 (53.33%)	16.153[a]	0.003**
	Questionable	46 (18.93%)	122 (50.20%)	75 (30.86%)	243 (40.5%)		
	Very mild	0 (0.00%)	6 (85.71%)	1 (14.28%)	7 (01.16%)		
Dental Erosion	Absence of Condition	119 (19.89%)	256 (42.81%)	223 (37.29%)	598 (99.66%)	2.660[a]	0.616
	Enamel Lesion	0(0.00%)	1 (100%)	0 (0.00%)	1 (0.17%)		
	Dentin Lesion	0 (0.00%)	1 (100%)	0 (0.00%)	1 (0.17%)		
Dental Trauma	No. Signs of Injury	50 (19.01%)	131 (49.81%)	82 (31.18%)	263 (43.83%)	20.899[a]	0.002**
	Treated Injury	6 (08.22%)	30 (41.09%)	37 (50.68%)	73 (12.16%)		
	Enamel Fracture Only	61 (24.11%)	94 (37.15%)	98 (38.73%)	253 (42.17%)		
	Enamel and Dentin	1 (10%)	3 (30%)	6 (60%)	10 (1.67%)		

	Fracture						
	Missing tooth	0 (0.00%)	0 (0.00%)	1 (100%)	1 (0.17%)		
Oral mucous Condition and Lesion	No Abnormal Condition	0 (0.00%)	1 (100%)	0 (0.00%)	1 (99.83%)	1.328[a]	0.515
	Not Recorded	119 (19.86%)	257 (42.90%)	223 (37.23%)	599 (0.17%)		
Intervention Urgency	No Curative Treatment Needed	26 (20.15%)	54 (41.86%)	49 (37.98%)	129 (21.5%)	2.909[a]	0.573
	Preventive or Routine Treatment Needed	3 (3.33%)	5 (55.55%)	1 (11.11%)	9 (1.5%)		
	Prompt treatment (including Scaling) Needed	90 (19.48%)	199 (43.07%)	173 (37.44)	462 (77%)		
	No Curative Treatment Needed	26 (20.15%)	54 (41.86%)	49 (37.98%)	129 (21.5%)		
Gingival Index Interpretation	Absence	0 (0.00%)	1 (33.33%)	2 (66.66%)	3 (0.5%)	23.331[a]	0.003**
	Mild	14 (13.33%)	33 (31.43%)	58 (53.24%)	105 (1.75%)		
	Moderate	91 (22.52%)	182 (45.04%)	131 (32.42%)	404 (67.33%)		
	Severe	14 (15.91%)	42 (47.73%)	32 (36.36%)	88 (14.67%)		
Plaque Index Interpretation	Absence	0 (0.00%)	0 (0.00%)	2 (100%)	2 (0.33%)	13.461[a]	0.097
	Excellent	0 (0.00%)	3 (60.00%)	2 (40.00%)	5 (0.83%)		
	Good	9 (17.65%)	14 (27.45%)	28 (54.90%)	51 (8.50%)		
	Fair	62 (19.43%)	141 (44.20%)	116 (36.36%)	319 (53.17%)		
	Poor	48 (21.52%)	100 (44.84%)	75 (36.63%)	223 (37.17%)		

Table 7: Displays the inter-group comparison of oral health determinants based on the WHO 2013 Index scores and age intervals.

Figure and figure legends:

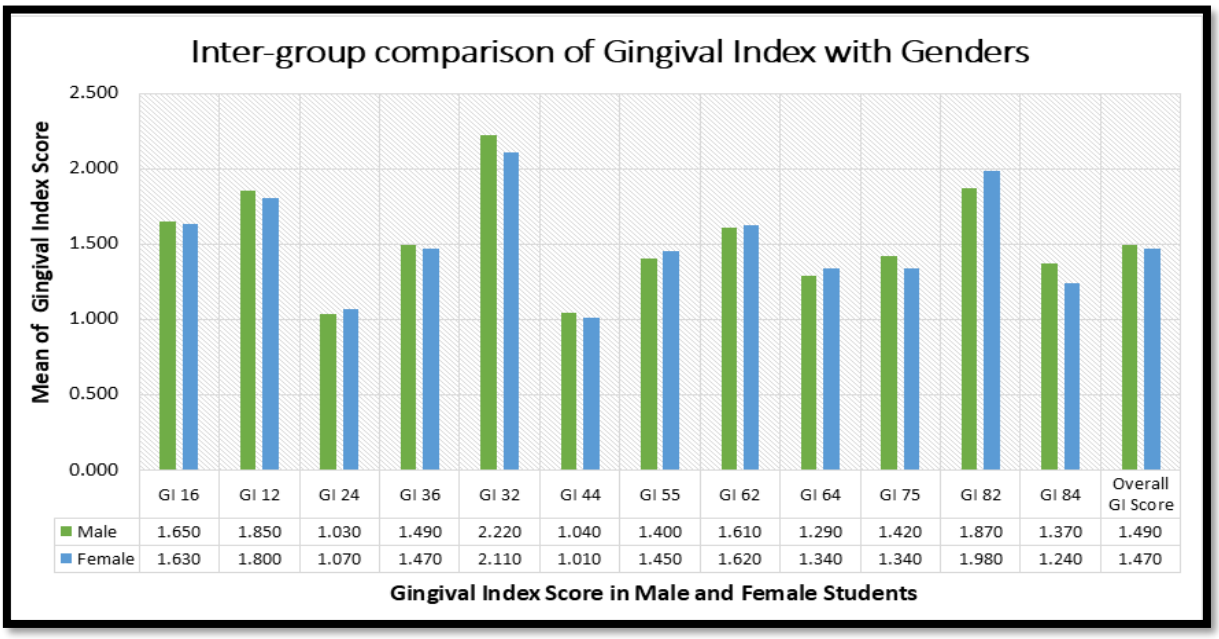

Figure 1: A graph representing the inter-group comparison of the Gingival Index score of different teeth with the gender of school children

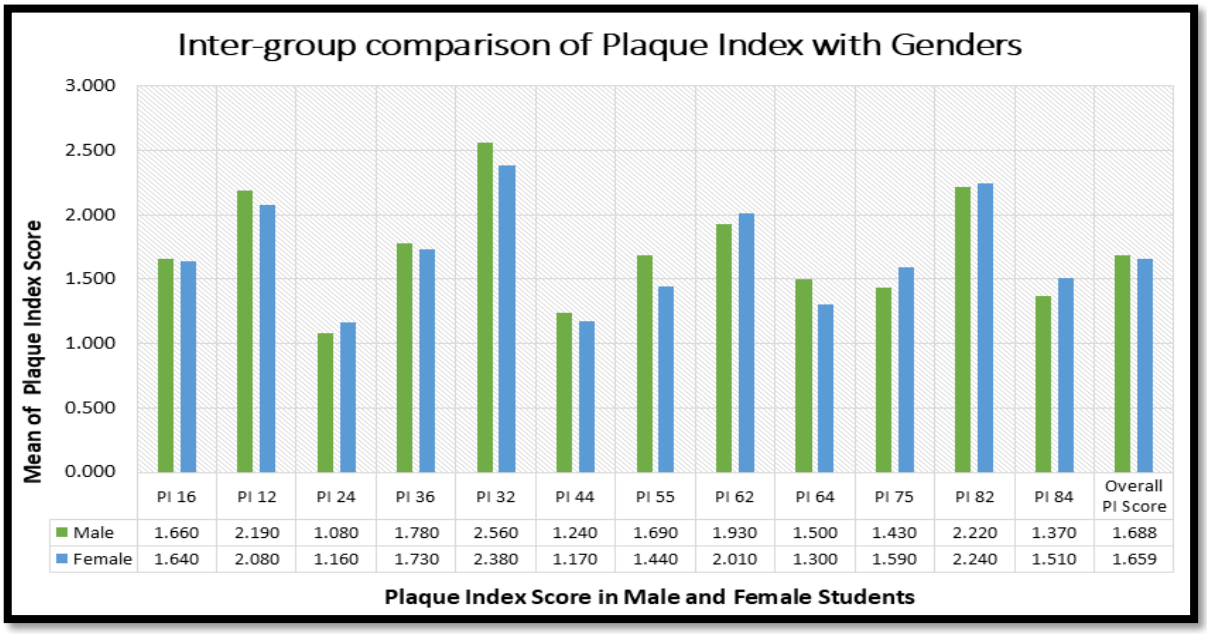

Figure 2: A graph representing the inter-group comparison of the Plaque Index score of different teeth with the gender of school children