



## Clinical Outcome of Root Canal Treatment, Dental Implants and Myofunctional Appliances in the Treatment of Grossly Carious Teeth, Edentulism and Malocclusion, Respectively.

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### ABSTRACT:

**Background:** This study was conducted to assess the clinical outcome of root canal treatment, dental implants and myofunctional appliances in the treatment of grossly carious teeth, edentulism and malocclusion, respectively.

**Material and methods:** This study comprised of 100 subjects who underwent oral clinical examination. The subjects had been explained the procedure and were asked for written consent. 10 out of 100 subjects denied to provide the consent and hence total 90 subjects had been involved in the study. It was observed that 30 subjects had grossly carious teeth for which they had undergone root canal treatment, 30 subjects had edentulism for which they had been planned for dental implants and the remaining 30 subjects had malocclusion for which myofunctional appliances had been fabricated. The success rate of all the treatment plans had been estimated in this study. The subjects had been divided into 3 groups of 30 each based on the condition and the treatment plan they received. Statistical analysis was conducted using SPSS software.

**Results:** In this study, there were 90 subjects of which 30 had grossly carious teeth, 30 had edentulism and 30 had malocclusion. Out of 30 subjects with malocclusion, 23 subjects had class 2 malocclusion while 7 had class 3 malocclusion. The subjects of group 1 with grossly carious teeth had been managed with root canal treatment. The subjects of group 2 with edentulism had been planned for dental implants and the subjects of group 3 with malocclusion had been given myofunctional appliances. For the subjects with class 2 malocclusion, Jasper Jumper appliance, Herbst appliance, Twin block appliance and Activator had been fabricated and for the subjects with class 3 malocclusion, Frankel III appliance, Reverse Twin Block appliance, Chin cup and Face mask had been fabricated. 3 out of 30 root canal cases failed while the rest 27 were successful, hence, the success rate of root canal treatment in this study was 90%. 4 out of 30 dental implant cases failed while the rest 26 were successful, hence, the success rate of dental implants in this study was 86.6%.



Only 1 out of 30 orthodontic cases failed while the rest 29 were successful, hence, the success rate of myofunctional appliances in this study was 96.6%.

Conclusion: On the basis of the results of this study, it can be concluded that the success rate of root canal treatment, dental implants and myofunctional appliances for the treatment of grossly carious teeth, edentulism and malocclusion, respectively was 90%, 86.6% and 96.6%.

## Introduction

Dental caries is a chronic disease displaying drastic variations in its prevalence across multiple factors and the obscurity of data on the same hinders the attainment of dental caries prevalence reduction goals set by WHO.<sup>1</sup> Considering the evolving dietary patterns in last few decades, globalization has been linked to increased consumption of sugar and growing obesity in middle and low income countries.<sup>2</sup> Some studies in developing countries such as India report a prevalence rate of 36.7% among 13–19 year olds while others like Saudi Arabia state prevalence to be as high as 83% among 6–8 year olds.<sup>3</sup>

Untreated dental caries can cause pain and difficulties in eating and sleeping, pain, which in turn leads to emergency dental visit, hospitalization, need for invasive treatment, and systemic health problems thereby lowering the quality of life.<sup>4</sup> Caries of the permanent teeth was reportedly the most common oral condition as per the Global Burden of Disease Study of 2017. Globally, around 2.4 billion people suffer from caries of the permanent teeth and 486 million children suffer from caries of the primary teeth.<sup>5,6</sup>

Significance of any disease in particular area can be gazed by its prevalence. This becomes even more important for developing country like India where oral health program and preventive measures are far from satisfying needs.

## Results

**Table 1: Group-wise distribution of subjects based on the condition**

Groups	Number of subjects	Percentage
Group 1 (Gross caries)	30	33.3
Group 2 (Edentulism)	30	33.3
Group 3 (Malocclusion)	30	33.3
Total	90	100

Prevalence of malocclusion has been studied in adolescents of Cicero, Negro children of Columbia, Black American children in the Evanston-Oak Park of Illinois, Minnesota, Indiana and Kikuyu tribe of Kenya, Korean cleft patients, Hvar Island Croatia, Italian students, Hungarian population, Naples, Iranian school children, and Tanzanian school children.<sup>7-18</sup>

This study was conducted to assess the clinical outcome of root canal treatment, dental implants and myofunctional appliances in the treatment of grossly carious teeth, edentulism and malocclusion, respectively.

## Material and methods

This study comprised of 100 subjects who underwent oral clinical examination. The subjects had been explained the procedure and were asked for written consent. 10 out of 100 subjects denied to provide the consent and hence total 90 subjects had been involved in the study. It was observed that 30 subjects had grossly carious teeth for which they had undergone root canal treatment, 30 subjects had edentulism for which they had been planned for dental implants and the remaining 30 subjects had malocclusion for which myofunctional appliances had been fabricated. The success rate of all the treatment plans had been estimated in this study. The subjects had been divided into 3 groups of 30 each based on the condition and the treatment plan they received. Statistical analysis was conducted using SPSS software.



In this study, there were 90 subjects of which 30 had grossly carious teeth, 30 had edentulism and 30 had malocclusion. Out of 30 subjects with malocclusion, 23

subjects had class 2 malocclusion while 7 had class 3 malocclusion.

**Table 2: Treatment plan of the subjects**

Groups	Treatment plan
Group 1 (Gross caries)	Root Canal Treatment
Group 2 (Edentulism)	Dental Implants
Group 3 (Malocclusion)	
<ul style="list-style-type: none"> <li>Class 2 malocclusion</li> </ul>	Jasper Jumper appliance, Herbst appliance, Twin block appliance, Activator
<ul style="list-style-type: none"> <li>Class 3 malocclusion</li> </ul>	Frankel III appliance, Reverse Twin Block appliance, Chin cup, Face mask

The subjects of group 1 with grossly carious teeth had been managed with root canal treatment. The subjects of group 2 with edentulism had been planned for dental implants and the subjects of group 3 with malocclusion had been given myofunctional appliances. For the subjects with class 2 malocclusion, Jasper Jumper

appliance, Herbst appliance, Twin block appliance and Activator had been fabricated and for the subjects with class 3 malocclusion, Frankel III appliance, Reverse Twin Block appliance, Chin cup and Face mask had been fabricated.

**Table 3: Success rate of all the treatment plans**

Treatment plan	Number of successful cases	Number of failed cases
Root canal treatment	27	03
Dental implants	26	04
Myofunctional appliances	29	01

3 out of 30 root canal cases failed while the rest 27 were successful, hence, the success rate of root canal treatment in this study was 90%. 4 out of 30 dental implant cases failed while the rest 26 were successful, hence, the success rate of dental implants in this study was 86.6%. Only 1 out of 30 orthodontic cases failed while the rest 29 were successful, hence, the success rate of myofunctional appliances in this study was 96.6%.

## Discussion

Edentulism is defined as the state of lacking natural teeth. Complete edentulism specifically refers to an oral environment entirely free of teeth. The presence of sufficient dental structures is essential for maintaining

overall health and enhancing quality of life. This condition poses a considerable public health issue, especially among the aging population, and has significant ramifications for primary healthcare practices. Edentulism is a profound and irreversible condition, often viewed as a critical marker of the oral health-related disease burden. Individuals affected by edentulism exhibit a wide range of physical attributes and health complications. The absence of teeth can negatively influence essential functions such as chewing and speaking, as well as raise aesthetic concerns, ultimately leading to a reduction in quality of life.<sup>19-23</sup>

In light of the growing awareness surrounding malocclusion and the heightened emphasis on aesthetics



among the general populace, it is imperative for dental practitioners to possess extensive knowledge and expertise in the diagnosis and treatment planning of malocclusion to fulfil patient expectations. In contemporary practice, patients are increasingly seeking clinical intervention at a younger age for the correction of malocclusion.<sup>24</sup>

The prevalence of Class III malocclusion exhibits variability across different racial groups, with the mean incidence rate among Caucasians ranging from 1% to 4%, while a higher prevalence is observed in Asian populations, reported to be between 4% and 14%. The etiology of Class III malocclusion is complex and multifactorial, with hereditary factors identified as the predominant cause.<sup>25</sup>

This study was conducted to assess the clinical outcome of root canal treatment, dental implants and myofunctional appliances in the treatment of grossly carious teeth, edentulism and malocclusion, respectively.

In this study, there were 90 subjects of which 30 had grossly carious teeth, 30 had edentulism and 30 had malocclusion. Out of 30 subjects with malocclusion, 23 subjects had class 2 malocclusion while 7 had class 3 malocclusion. The subjects of group 1 with grossly carious teeth had been managed with root canal treatment. The subjects of group 2 with edentulism had been planned for dental implants and the subjects of group 3 with malocclusion had been given myofunctional appliances. For the subjects with class 2 malocclusion, Jasper Jumper appliance, Herbst appliance, Twin block appliance and Activator had been fabricated and for the subjects with class 3 malocclusion, Frankel III appliance, Reverse Twin Block appliance, Chin cup and Face mask had been fabricated. 3 out of 30 root canal cases failed while the rest 27 were successful, hence, the success rate of root canal treatment in this study was 90%. 4 out of 30 dental implant cases failed while the rest 26 were successful, hence, the success rate of dental implants in this study was 86.6%. Only 1 out of 30 orthodontic cases failed while the rest 29 were successful, hence, the success rate of myofunctional appliances in this study was 96.6%.

The study conducted by Go H et al<sup>26</sup> examined trends in the incidence of edentulism among the older Korean population using data from the Korean National Health

Insurance Service (KNHIS). Data on older adults, aged  $\geq 75$  years of age, were obtained from the KNHIS for the period 2013-2018. Edentulism was defined as a treatment history of complete dentures in the KNHIS database. The exclusion criteria consisted of both disease codes and treatment codes related to conservative dental treatment, including periodontal and extraction treatment afterward. Crude incidence rates (CIRs) and age-standardized incidence rates (AIRs) with 95% confidence intervals were calculated and reported per 100,000 person-years by the direct method. Trends were tested by Cochran Armitage models. Statistically significant increasing trends in both CIRs and AIRs were found among the older Korean population registered in the KNHIS (CIRs, 707.92 to 895.92; AIRs, 705.11 to 889.68;  $p < 0.01$ ). The incidence tended to increase in both genders ( $p < 0.01$ ). Both CIRs and AIRs in specific regions also showed slight but significant annual increases except for Jeju Island ( $p < 0.01$  or  $< 0.05$ ). The incidence showed increasing trends ( $p < 0.01$ ) in all income quintiles apart from the highest quintile. The edentulism incidence was highest in the lowest income group (the first quintile). Their data showed that the incidence of edentulism among the elderly showed an increasing trend from 2013 to 2018. This result provides a basis for future epidemiological studies on the incidence of edentulism in the older Korean population.

Aloaibi YA et al.<sup>27</sup> conducted a study to evaluate the prevalence of malocclusion and the necessity for orthodontic treatment within a sample from Jeddah, Saudi Arabia. This cross-sectional descriptive research was carried out in 2017, involving 3,016 participants (1,507 females and 1,509 males) who were selected through a stratified random sampling method. The study included Saudi students aged 14 to 18 years, excluding those with craniofacial deformities or syndromes, as well as individuals who had previously undergone orthodontic treatment. Malocclusion was evaluated using the modified Bjork et al. system and Angle's classification, while the need for orthodontic intervention was assessed using the Index of Orthodontic Treatment Need (IOTN) Dental Health Component (DHC). Statistical analyses, including one-way ANOVA, Chi-square, and Fisher's exact tests, were employed to examine descriptive statistics, associations, and gender differences. Data analysis was performed using STATA version 13.0 (StataCorp, College Station, Texas, USA), with statistical



significance established at  $P < 0.05$ . The findings indicated that approximately 12% of participants exhibited normal occlusion, while 57% presented with Class I malocclusion, 17% with Class II malocclusion, and 14% with Class III malocclusion. The most frequently observed malocclusion traits were displacement and crossbite. According to the IOTN results, 26% of participants demonstrated a slight need for orthodontic treatment ( $n = 795$ ), 39% had a moderate/borderline need ( $n = 1,166$ ), and 35% exhibited a great need ( $n = 1,055$ ). Notably, Class II and III malocclusions, overjet discrepancies, reverse overjet, scissor bite, open bite, midline discrepancies, and crowding were significantly more prevalent in males compared to females ( $P < 0.05$ ). Overall, the study revealed a high prevalence of malocclusion and a substantial need for orthodontic treatment, with Class I malocclusion being the most common type and moderate to borderline treatment needs being the most frequently identified.

Geleto A et al<sup>28</sup> investigated the prevalence of dental caries and associated factors among patients visiting Shashamane Comprehensive Specialized Hospital (SCSH). A hospital-based cross-sectional study was conducted among 288 patients who visited SCSH dental clinic from March 1, 2021, to April 15, 2021. A questionnaire was employed to collect the background characteristics of the participants. Dental caries was confirmed as per World Health Organization guidelines. Data were analyzed using SPSS version 24. Bivariable and multivariable logistic regression were used to determine predictors of dental caries. A p-value less than 0.05 was taken as a cut point to determine a significant association. The overall prevalence of dental caries was 64.6% with 95% CI (58.8–70.1). The mean of Decayed, Missing, and Filled Teeth was 1.33. Dental caries was significantly higher among respondents who did not brush their teeth (AOR = 3.589, 95% CI:1.756–7.334), who consumed sugary food (AOR = 3.650, 95% CI: 1.747–7.628), those with monthly a income of less than 5000.00 Ethiopian Birr (AOR = 2.452, 95% CI (1.193–5.042), and those who had poor oral hygiene status (AOR = 1.826, 95% CI: 0.901–3.700). This study revealed a high prevalence of dental caries among patients visiting the dental clinic. Tooth brushing habits, consumption of sugary food, and poor oral hygiene were significantly associated with dental caries.

## Conclusion

On the basis of the results of this study, it can be concluded that the success rate of root canal treatment, dental implants and myofunctional appliances for the treatment of grossly carious teeth, edentulism and malocclusion, respectively was 90%, 86.6% and 96.6%.

## References

1. Alhabdan YA, Albeshr AG, Yenugadhathi N, Jradi H. Prevalence of dental caries and associated factors among primary school children: A population-based cross-sectional study in Riyadh, Saudi Arabia. *Environ Health Prev Med.* 2018;23:60.
2. Alsuraim BS, Han DH. Effect of globalization on global dental caries trend. *Medicine (Baltimore)* 2020;99:e21767.
3. Punitha VC, Amudhan A, Sivaprakasam P, Rathanaprabu V. Role of dietary habits and diet in caries occurrence and severity among urban adolescent school children. *J Pharm Bioallied Sci.* 2015;7:S296–300.
4. Kidd EA, Banerjee A. What is absence of caries? In: Albrektsson TO, Bratthall D, Glantz PJ, Lindhe JT, editors. *Tissue Preservation in Caries Treatment*. 3rd ed. Great Britain: Quintessence Publication Co. Ltd.; 2001. p. 69.
5. Clementino MA, Gomes MC, Pinto-Sarmento TC, Martins CC, Granville-Garcia AF, Paiva SM. Perceived impact of dental pain on the quality of life of preschool children and their families. *PLoS One.* 2015;10:e0130602.
6. Sharma V, Gupta N, Arora V, Gupta P, Mehta N. Caries experience in permanent dentition among 11–14 years old school children in Panchkula district (Haryana) India. *Int J Sci Study.* 2015;3:112–5.
7. Massler M, Frankel JM. Prevalence of malocclusion in children aged 14 to 18 years. *Am J Orthod.* 1951;37:751–68.
8. Altemus LA. Prevalence of malocclusion in American Negro children. *Quar Nat Dent A.* 1960;18:31.
9. Enrich RE, Brodie AG, Blayney JR. Prevalence of class 1, class 2 and class 3 malocclusion in an urban population. An epidemiological study. *J Dent Res.* 1965;44:947–53.



10. Grewe JM, Cervenka J, Shapiro BL, Witkop CJ., Jr Prevalence of malocclusion in Chippewa Indian Children. *J Dent Res.* 1968;47:302–5.
11. Garner LD, Butt MH. Malocclusion in black Americans and Nyeri Kenyans. An epidemiologic study. *Angle Orthod.* 1985;55:139–46.
12. Baek SH, Moon HS, Yang WS. Cleft type and Angle's classification of malocclusion in Korean cleft patients. *Eur J Orthod.* 2002;24:647–53.
13. Lauc T. Orofacial analysis on the Adriatic islands: An epidemiological study of malocclusions on Hvar Island. *Eur J Orthod.* 2003;25:273–8.
14. Ciuffolo F, Mnzoli L, Attilio DM, Tecco S, Muratore F, Festa F, et al. Prevalence and distribution by gender of occlusal characteristics in a sample of Italian secondary school students: A cross-sectional study. *Eur J Orthop.* 2005;27:601–6.
15. Gábris K, Márton S, Madléna M. Prevalence of malocclusions in Hungarian adolescents. *Eur J Orthop.* 2006;28:467–70.
16. Perillo L, Masucci C, Ferro F, Apicella D, Baccetti T. Prevalence of orthodontic treatment need in southern Italian schoolchildren. *Eur J Orthop.* 2010;32:49–53.
17. Borzabadi-Farahani A, Borzabadi-Farahani A, Eslamipour F. Malocclusion and occlusal traits in an urban Iranian population. An epidemiological study of 11 to 14-year-old children. *Eur J Orthop.* 2009;31:477–84.
18. Mtaya M, Brudvik P, Astrom AN. Prevalence of malocclusion and its relationship with socio-demographic factors, dental caries, and oral hygiene in 12 to 14-year-old Tanzanian schoolchildren. *Eur J Orthod.* 2009;31:467–76.
19. Dos Santos R.R., Nayme J.G., Garbin A.J., Saliba N., Garbin C.A., Moimaz S.A. Prevalence of malocclusion and related oral habits in 5-to 6-year-old children. *Oral Health Prev. Dent.* 2012;10:311–318.
20. Mtaya M., Brudvik P., Astrøm A.N. Prevalence of malocclusion and its relationship with socio-demographic factors, dental caries, and oral hygiene in 12- to 14-year-old Tanzanian schoolchildren. *Eur. J. Orthod.* 2009;31:467–476.
21. Khan M., Fida M. Assessment of psychosocial impact of dental aesthetics. *J. Coll. Physicians Surg. Pak.* 2008;18:559–564.
22. Lew K.K., Foong W.C., Loh E. Malocclusion prevalence in an ethnic Chinese population. *Aust. Dent. J.* 1993;38:442–449.
23. Gelgör I.E., Karaman A.I., Ercan E. Prevalence of malocclusion among adolescents in central anatolia. *Eur. J. Dent.* 2007;1:125–131.
24. Soh J, Sandham A, Chan YH. Occlusal status in Asian male adults: Prevalence and ethnic variation. *Angle Orthod.* 2005;75:814–20.
25. Gauba K, Ashima G, Tewari A, Utreja A. Prevalence of malocclusion and abnormal oral habits in North Indian rural children. *J Ind Soc Ped and Prev Dent.* 1998;16:26–30.
26. Go H, Kim EK, Jung HI, Ahn SV, Shin H, Amano A, Choi YH. Incidence of edentulism among older adults using the Korean National Health Insurance Service database, 2013-2018. *Epidemiol Health.*
27. Alogaibi YA, Murshid ZA, Alsulimani FF, Linjawi AI, Almotairi M, Alghamdi M, Alharthy H, Hassan AA. Prevalence of malocclusion and orthodontic treatment needs among young adults in Jeddah city. *J Orthod Sci.* 2020 Feb 12;9:3.
28. Geleto A, Sinba E, Ali MM. Dental caries and associated factors among patients visiting Shashamane Comprehensive Specialized Hospital. *PLoS One.* 2022 Mar 3;17(3):e0265000.