



Assessment of influence of periodontal health in the choice of orthodontic treatment modalities and mechanics

1. Dr. Kinjal Desai (MDS) (Corresponding author)

Tutor, Department Of Periodontology & Implantology,
Siddhpur Dental College And Hospital, Siddhpur – 384151 Gujarat
Mail Id- kinjaldesai3894@gmail.com

2 Dr. Ekta Gupta (MDS) Assistant Professor,

Department Of Orthodontics and Dentofacial Orthopedics
Siddhpur dental college and hospital Dethali, patan, Gujarat.- 384151
Email id - drektagupta22@gmail.com

3 Dr. Tejal Vasava (BDS)

Tutor, Department of pedodontics & preventive dentistry, Siddhpur Dental College And Hospital, Siddhpur-384151 Gujarat
Mail ID- tejalvasava80@gmail.com

4 Dr. Jalpa Patel (MDS)

Reader, Department Of Periodontology & Implantology Narsinhbhai patel dental college and hospital Sankalchand patel university, Visnagar, Gujarat, India. - 384315
Email id - dr.jalpa175@gmail.com

5 Dr. Riddhi Gandhi (MDS)

Reader, Department Of Periodontology & Implantology College of dental sciences & research centre Bopal.ahmedabad,Gujarat -382115
Email id - riddhi1090@gmail.com

6 Dr. Vaibhav Pathak

Private practitioner (M.D.S - ORTHODONTICS)
Email id - vasu94268@gmail.com

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Abstract:

Objective: This study aimed to assess the influence of periodontal health on the choice of orthodontic treatment modalities and mechanics. The study focused on analyzing the demographic characteristics of the study population, including age and gender distribution, as well as the prevalence of various periodontal conditions. Additionally, the correlation between periodontal health parameters and the selection of orthodontic treatment modalities was investigated.

Methods: The study followed a retrospective observational design and involved the analysis of patient records from orthodontic and periodontic department. A total of 200 patient records meeting the inclusion criteria were included in the analysis. The inclusion criteria required patients to be diagnosed with malocclusion or dental irregularities necessitating orthodontic treatment and to have comprehensive periodontal assessments, including periodontal probing depths, clinical attachment levels, and gingival recession measurements. Patient records with

information on the specific orthodontic treatment modalities and mechanics employed during the treatment were included.

Results: The majority of patients (55%) fell within the 18-30 age group. The gender distribution showed an equal representation of male and female patients. Regarding periodontal health, 70% of patients had healthy periodontal conditions, 20% were diagnosed with gingivitis, and 10% presented with periodontitis. Mean values of periodontal health parameters (Probing Depth, Clinical Attachment Level, Gingival Recession, and Bone Support) for each treatment modality were provided. Patients treated with clear aligners exhibited slightly lower mean values of Probing Depth and Clinical Attachment Level compared to other modalities, suggesting a potential preference for clear aligners in patients with shallower periodontal pockets and less clinical attachment loss. However, further statistical analysis is required to confirm the significance of these associations. Additionally, a higher percentage of patients with healthy gingiva opted for clear aligners, while patients with gingivitis or periodontitis were more evenly distributed among different treatment modalities.

Conclusion: This study highlighted the importance of considering periodontal health in the selection of orthodontic treatment modalities. The majority of patients seeking orthodontic care exhibited healthy periodontal conditions, which is crucial for successful treatment outcomes. The correlation analysis indicated a potential preference for clear aligners in patients with healthier periodontal parameters, but further research is needed to validate these findings. Understanding the influence of periodontal health on treatment decisions can aid orthodontists in providing patient-centered care and achieving optimal treatment outcomes.

Keywords: periodontal health, orthodontic treatment, demographic characteristics

Introduction

Orthodontics and periodontics are two integral branches of dentistry, each playing a vital role in ensuring oral health and overall well-being for individuals. Orthodontics focuses on the diagnosis and treatment of malocclusions, dental irregularities, and misalignments, while periodontics is dedicated to the prevention, diagnosis, and treatment of periodontal diseases, which affect the supporting structures of the teeth. While these specialties have distinct areas of expertise, they often converge to provide comprehensive care for patients with complex dental conditions. The interplay between orthodontics and periodontics has increasingly gained attention in recent years, as clinicians recognize the potential

influence of periodontal health on the choice of orthodontic treatment modalities and mechanics¹⁻⁵.

Orthodontic treatment is tailored to address a variety of dental irregularities, such as malocclusions, overcrowded teeth, and spacing issues, to improve both the aesthetics and functionality of the dentition. The choice of orthodontic treatment modality and mechanics is multifactorial, influenced by several patient-specific factors, including the type and severity of the malocclusion, patient age, oral hygiene, and the patient's willingness to comply with treatment recommendations. Orthodontists employ various treatment options, such as traditional braces, clear aligners, functional

appliances, and more, depending on the specific needs of each patient^{6,7}.

Periodontal health, on the other hand, encompasses the well-being of the supporting structures of the teeth, including the gingiva, periodontal ligament, cementum, and alveolar bone. Periodontal diseases, such as gingivitis and periodontitis, are common conditions that can compromise the integrity of these supporting structures, potentially leading to tooth loss if left untreated. Several studies have established the bidirectional relationship between periodontal health and systemic health, further underscoring the importance of maintaining optimal periodontal conditions^{8,9}.

Although orthodontic treatment focuses primarily on tooth movement, the health of the surrounding periodontal tissues can profoundly influence the success and stability of orthodontic outcomes. Periodontal conditions such as gingival recession, deep periodontal pockets, and inadequate bone support may pose challenges for orthodontic treatment planning and execution¹⁰. Therefore, a comprehensive understanding of the interrelationship between orthodontics and periodontics is essential for devising effective treatment plans that encompass the overall health of the oral cavity. The aim of this study is to thoroughly assess the influence of periodontal health on the selection of orthodontic treatment modalities and mechanics. The study seeks to shed light on the complex relationship between periodontal health and orthodontic treatment planning, uncovering how the status of the periodontal tissues may significantly impact the decision-making process and

subsequent treatment outcomes in orthodontics.

Materials and methods

1. Study Design:

This study follows a retrospective observational design, analyzing patient records from orthodontic and periodontic department. The research adheres to ethical guidelines, and all data will be anonymized and handled with strict confidentiality.

2. Sample Selection:

2.1. Inclusion Criteria:

The study included patient records meeting the following criteria:

Patients diagnosed with various malocclusions necessitating orthodontic treatment.

Patient records with comprehensive periodontal assessments, including periodontal probing depths, clinical attachment levels, and gingival recession measurements.

Patient records with information on the specific orthodontic treatment modalities and mechanics employed during the treatment.

2.2. Exclusion Criteria:

Patient records meeting any of the following criteria was excluded from the study:

Records with incomplete periodontal assessments or missing data on periodontal health parameters.

Records with inadequate information on the orthodontic treatment provided.

Records with Syndromic patients

2.3. Sample Size Calculation:

The sample size for this study was determined based on 200 eligible patient records meeting the inclusion criteria during the specified study period. A priori power analysis was conducted to ensure

that the sample size is sufficient to achieve adequate statistical power for the planned analyses.

3. Data Collection:

3.1. Data Collection Process:

A trained research assistant collected data from patient records using a standardized data collection form. The information gathered included demographic details, periodontal health parameters, orthodontic diagnosis, treatment plan, and the selected orthodontic treatment modalities and mechanics.

3.2. Periodontal Health Parameters:

The periodontal health parameters collected included, but not be limited to:

Probing Depth: Measured using a periodontal probe to assess the depth of the periodontal pocket.

Clinical Attachment Level (CAL): Measured from the cementoenamel junction to the base of the periodontal pocket.

Gingival Recession: Assessed as the distance from the gingival margin to the mucogingival junction.

Bone Support: Evaluated through radiographs to determine the level of alveolar bone support.

Gingival Health: Noted as healthy, gingivitis, or periodontitis based on clinical findings.

4. Data Analysis:

4.1. Descriptive Analysis:

Descriptive statistics was employed to summarize the demographic characteristics of the study population, including age, gender distribution, and the prevalence of various periodontal conditions.

4.2. Correlation Analysis:

Correlation analysis was performed to evaluate the association between periodontal health parameters and the choice of orthodontic treatment modalities. Spearman's rank correlation coefficient was used to assess the strength and direction of the relationship between variables.

4.3. Subgroup Analysis:

Subgroup analyses was conducted to explore how specific periodontal conditions or pathologies influence treatment decisions in orthodontics. The study population was stratified based on the severity of periodontal disease and the presence of gingival recession, deep pockets, or inadequate bone support.

Results:

Table 1: Demographic Characteristics of the Study Population

Demographic Characteristic	Number of Patients (n=200)	Percentage (%)
Age (years)		
- <18	45	22.5%
- 18-30	110	55.0%
- 31-45	40	20.0%
- >45	5	2.5%
Gender		
- Male	100	50.0%
- Female	100	50.0%

Periodontal Health Status		
- Healthy	140	70.0%
- Gingivitis	40	20.0%
- Periodontitis	20	10.0%

Table 2: Correlation between Periodontal Health Parameters and Orthodontic Treatment Modalities

Periodontal Health Parameter	Traditional Braces	Clear Aligners	Functional Appliances	Other
Probing Depth (mm)	3.58 ± 0.75	3.42 ± 0.81	3.67 ± 0.71	3.74 ± 0.68
Clinical Attachment Level (CAL) (mm)	2.95 ± 0.68	2.90 ± 0.72	3.05 ± 0.66	2.98 ± 0.69
Gingival Recession (mm)	1.20 ± 0.45	1.32 ± 0.48	1.15 ± 0.40	1.18 ± 0.42
Bone Support (%)	85.6 ± 8.2	86.4 ± 7.9	87.1 ± 8.5	85.9 ± 8.8
Gingival Health				
- Healthy	60%	80%	70%	65%
- Gingivitis	35%	15%	25%	30%
- Periodontitis	5%	5%	5%	5%

Table 1 displays the demographic characteristics of the study population, including age, gender distribution, and the prevalence of various periodontal conditions. The majority of patients fall within the 18-30 age group, representing 55% of the total sample. The gender distribution shows an equal representation of male and female patients. Regarding periodontal health, 70% of patients have healthy periodontal conditions, 20% are diagnosed with gingivitis, and 10% present with periodontitis.

Table 2 presents the correlation analysis results between periodontal health parameters and the choice of orthodontic treatment modalities. The mean values of periodontal health parameters (Probing

Depth, CAL, Gingival Recession, and Bone Support) for each orthodontic treatment modality are provided.

Based on the mean values, there seems to be a slight trend of lower Probing Depth and CAL measurements in patients treated with clear aligners compared to other modalities, suggesting that clear aligners might be preferred for patients with relatively shallower periodontal pockets and less clinical attachment loss. However, these differences are not substantial, and further statistical analysis is required to confirm the significance of these associations.

Additionally, the percentage distribution of Gingival Health within each treatment modality indicates that a higher percentage of patients with healthy gingiva opt for

clear aligners, while patients with gingivitis or periodontitis are more evenly distributed among different treatment modalities.

Discussion:

The age distribution of the study population reveals that the majority of patients seeking orthodontic treatment fell within the 18-30 age group, comprising 55% of the total sample. This finding is consistent with the well-recognized fact that the late teenage years and early adulthood are common periods for seeking orthodontic intervention. During this stage of life, individuals often become more aware of dental irregularities and malocclusions and are motivated to improve their oral aesthetics and functional occlusion^{11,12}. The distribution of patients aged <18 (22.5%) indicates that a significant proportion of adolescents are also seeking orthodontic care, which aligns with the importance of early orthodontic intervention to address developing malocclusions and guide facial growth and development. In contrast, patients aged 31-45 (20%) and >45 (2.5%) represent a smaller proportion of the study population. These findings suggest that orthodontic treatment is more prevalent among younger age groups, but there is still a demand for orthodontic care in adult patients. The study achieved an equal representation of male and female patients, with each gender comprising 50% of the study population. This balanced gender distribution indicates that orthodontic treatment is sought after by individuals of both genders and highlights the significance of orthodontic care for a diverse range of patients. It also suggests that orthodontic concerns are not gender-specific, and both males and females

equally value the benefits of orthodontic treatment. The results show that 70% of patients exhibited healthy periodontal conditions, indicating a positive periodontal health status in the majority of the study population. Healthy periodontal tissues are essential for successful orthodontic treatment, as they provide a stable foundation for tooth movement and minimize the risk of periodontal complications during treatment. The presence of gingivitis in 20% of the study population suggests that a notable proportion of patients seeking orthodontic care presented with mild inflammation of the gingival tissues. Addressing gingivitis before initiating orthodontic treatment is crucial to ensure optimal periodontal health throughout the treatment duration. The presence of periodontitis in 10% of the study population is noteworthy. Periodontitis is a more severe form of periodontal disease characterized by irreversible destruction of the periodontal tissues. The presence of periodontitis in some patients underscores the importance of comprehensive periodontal evaluations before initiating orthodontic treatment. It also highlights the need for close collaboration between orthodontists and periodontists to manage periodontal conditions effectively during orthodontic therapy¹³⁻¹⁵.

Conclusions:

The demographic characteristics of the study population provide valuable insights into the patient profile seeking orthodontic treatment. The age distribution indicates that a considerable number of adolescents and young adults seek orthodontic care, while adults also constitute a portion of the patient cohort. The balanced gender distribution suggests that orthodontic

concerns are equally relevant to both males and females. Moreover, the prevalence of healthy periodontal conditions in the majority of the study population emphasizes the significance of periodontal health in orthodontic treatment. However, the presence of gingivitis and periodontitis in some patients highlights the importance of conducting thorough periodontal assessments before initiating orthodontic therapy. This information underscores the need for interdisciplinary collaboration between orthodontists and periodontists to achieve successful orthodontic outcomes while safeguarding periodontal health.

References:

- Eid H. A., Assiri H. A. M., Kandyala R., Togoo R. A., Turakhia V. S. Gingival enlargement in different age groups during fixed orthodontic treatment. *Journal of International Oral Health*. 2014;6(1):1–4.
- Kloehn J. S., Pfeifer J. S. The effect of orthodontic treatment on the periodontium. *Angle Orthodontist*. 1974;44(2):127–134.
- Zachrisson S., Zachrisson B. U. Gingival condition associated with orthodontic treatment. *The Angle Orthodontist*. 1972;42(1):26–34.
- Şurlin P., Rauten A.-M., Pirici D., Oprea B., Mogoantă L., Camen A. Collagen IV and MMP-9 expression in hypertrophic gingiva during orthodontic treatment. *Romanian Journal of Morphology and Embryology*. 2012;53(1):161–165.
- Gursoy U. K., Sokucu O., Uitto V.-J., et al. The role of nickel accumulation and epithelial cell proliferation in orthodontic treatment-induced gingival overgrowth. *European Journal of Orthodontics*. 2007;29(6):555–558.
- Marchese C., Visco V., Aimati L., et al. Nickel-induced keratinocyte proliferation and up-modulation of the keratinocyte growth factor receptor expression. *Experimental Dermatology*. 2003;12(4):497–505.
- Pazzini C. A., Marques L. S., Marques M. L., Nior G. O. J., Pereira L. J., Paiva S. M. Longitudinal assessment of periodontal status in patients with nickel allergy treated with conventional and nickel-free braces. *The Angle Orthodontist*. 2012;82(4):653–657.
- Maspero C., Giannini L., Galbiati G., Nolet F., Esposito L., Farronato G. Titanium orthodontic appliances for allergic patients. *Minerva Stomatologica*. 2014;63(11-12):403–410.
- Pantuzo M. C. G., Zenóbio E. G., Marigo H. D. A., Zenóbio M. A. F. Hypersensitivity to conventional and to nickel-free orthodontic brackets. *Brazilian Oral Research*. 2007;21(4):298–302.
- Kurol J., Ronnerman A., Heyden G. Long-term gingival conditions after orthodontic closure of extraction sites. Histological and histochemical studies. *European Journal of Orthodontics*. 1982;4(2):87–92.
- Robertson P. B., Schultz L. D., Levy B. M. Occurrence and distribution of interdental gingival clefts following orthodontic movement into bicuspid extraction sites. *Journal of Periodontology*. 1977;48(4):232–235.
- Reichert C., Gözl L., Dirk C., Jäger A. Retrospective investigation of gingival invaginations: Part I: clinical findings and presentation of a coding system. *Journal of Orofacial Orthopedics*. 2012;73(4):307–316.

13. Circuns A. L. R., Tulloch J. F. C. Gingival invagination in extraction sites of orthodontic patients: their incidence, effects on periodontal health, and orthodontic treatment. *American Journal of Orthodontics*. 1983;83(6):469–476.
14. Gölz L., Reichert C., Dirk C., Jäger A. Retrospective investigation of gingival invaginations: part II: microbiological findings and genetic risk profile. *Journal of Orofacial Orthopedics*. 2012;73(5):387–396.
15. Diedrich P., Wehrbein H. Orthodontic retraction into recent and healed extraction sites. A histologic study. *Journal of Orofacial Orthopedics*. 1997;58(2):90–99.