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ORIGINAL ARTICLE

The Impact of Orthodontic fixed appliance and clear plastic aligner in periodontal health; A comparative clinical study

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ABSTRACT

Objective: To find out the periodontal health of patients with fixed orthodontic and clear aligner treatment with a follow-up of three months supportive periodontal therapy.

Study Setting: After receiving approval from the hospital's ethical committee the study was conducted at Department of Dentistry Faryal Dental College, Sheikhupura from September 2021 to February 2022.

Material and Methods: For this study 40 individuals were selected and divided them into 2 different groups regarding age and mode of treatment. In Group E, 20 individuals were of age in between 15-30 years and they used multi-bracket fixed therapy while in Group F, 20 individuals of age in between 15- 30 years were used treatment with clear aligners.

Results: Results of current study were significant (P < 0.05) regarding logistic regression model of descriptive statistics of dependent variables measured for periodontal therapy after 3 month follow-up respectively. Percentage standard mean deviation (Mean±SD) levels of recovery rate, patient compliance, probing depth, plaque index, bleeding on probing and gingival recession for fixed appliance brackets and clear aligners were (56.21± 11.11, 31.14± 11.11, 13.04± 10.01, 26.10± 3.10, 15.21± 10.12, 01.12± 13.11),(59.22± 1.01, 43.11± 01.10, 14.01± 11.21, 22.10± 3.10, 6.11± 10.11, 06.12± 14.11) noted respectively.

Conclusion: The results of current study were significant (P < 0.05) regarding logistic regression model of descriptive statistics of dependent variables measured for periodontal therapy after 3 month follow-up respectively. Patient compliance with clear aligner treatment was higher than fixed appliance brackets.

Key words: Fixed orthodontic appliance, clear aligner, periodontal diseases

INTRODUCTION

Periodontal health is defined by absence of clinically detectable inflammation. Periodontal diseases affect adults, adolescents and children in large numbers. Periodontal disease affected more than 55% of primary school students[2]. Furthermore, it has been noted that the prevalence of aggressive and advanced types of periodontitis ranges from 10% to 14%, with the prevalence increasing with age from 35 to 44 years[1]. As a result, more than 70% of adult people have periodontal disease. It has concluded that there are 4 levels of periodontal health based on periodontium state its treatment outcomes. These are 1) pristine periodontal health, defined as a total absence of clinical inflammation and physiological immune surveillance on a periodontium with normal support (no attachment or bone loss), 2) clinical periodontal health, characterized by an absence or minimal levels of clinical inflammation in a periodontium with normal support; 3) periodontal disease stability in a reduced periodontium; 4) periodontal disease remission/control in a reduced periodontium[16].

Now -a-days the most commonly used appliance for orthodontic treatment is fixed orthodontic appliance. The influence of fixed appliances on daily living is unlikely to diminish as the patient proceeds through therapy[3]. It has seen in different studies that the acceptance of fixed appliance in younger patients is higher than other in daily life. These references are very helpful and useful to motivate and educate new coming patients[11]. Different researchers proved through their studies that large amount of bacteria containing plaque accumulated near brackets. In another study it has seen that because of fixed orthodontic appliance treatment the chances of enamel decalcification and white spot lesions were increased among patients[5].

The invisible aligners or clear aligners made up by transparent plastic and used to give support and strength to the teeth and it is a type of orthodontic treatment. It is removable alternative to braces and make easy and flexible for patients[4]. In the last few decades, clear aligner treatment has been developed to meet the aesthetic and comfort needs of adult orthodontic patients. With passage of time changes appeared in adjusted clear aligners mostly in children and to understand its effectiveness is so difficult[6,13]. Clinical trials suggested that clear aligners is more comfortable and effective in moderate crowding of front teeth. Clear aligner technology is a valuable progress in the field of orthodontic treatment and its mechanical properties are so satisfactory for patients[7,12].

The results of different studies indicated that periodontal indices and quality and quantity of plaque was better in clear aligner treatment than fixed orthodontic treatment among patients. Dental hygiene is so important and it provide satisfactory oral compliance to the patient[14]. It has seen in different studies clinically that for development of patient oral hygiene skills during orthodontic treatment dental hygienists have a primary role and clear aligners are best than fixed appliance[15]. Clinical results and scientific evidence stated that individualized education, patient intervals of recall and doctor motivational strategies for patient after periodontal treatment are so important and good source of awareness.

MATERIAL AND METHODS

After receiving approval from the hospital's ethical committee the study was conducted at Department of Dentistry Faryal Dental College, Sheikhupura from September 2021 to February 2022.

For this study 40 individuals were selected and divided them into 2 different groups regarding age and mode of treatment. In Group E, 20 individuals were of age in between 15-30 years and they used multi-bracket fixed therapy while in Group F, 20 individuals of age in between 15- 30 years were used treatment with clear aligners. Recovery rate, patient compliance, probing depth, plaque index, bleeding on probing and gingival recession was measured for periodontal therapy after 3 month follow-up. Descriptive statistics model of 2000 of given parameters i.e. recovery rates, patient compliance, probing depth, plaque index, bleeding on probing and gingival recession were measured. The logistic regression model of dependent variable for different treatment method was applied and levels of statistical significance were considered as $p < 0.05$.

RESULTS

The results of this study were significant (P < 0.05) regarding logistic regression model of descriptive statistics of dependent

variables measured for periodontal therapy after 3 month follow-up respectively. Percentage standard mean deviation (Mean±SD) levels of recovery rate, patient compliance, probing depth, plaque index, bleeding on probing and gingival recession for fixed appliance brackets and clear aligners were (56.21± 11.11, 31.14± 11.11, 13.04± 10.01, 26.10± 3.10, 15.21± 10.12, 01.12± 13.11),(59.22± 1.01, 43.11± 01.10, 14.01± 11.21, 22.10± 3.10, 6.11± 10.11, 06.12± 14.11) noted respectively.

The intra-group comparisons of patient compliance and bleeding on probing (31.14± 11.11, 15.21± 10.12), (43.11± 01.10, 6.11± 10.11) showed statistically significant ($P < 0.05$) decreases in both groups. It was noted in clear aligner group that percentage mean standard deviation of above both parameters significant difference. All results graphically represented in Fig-1 and Fig-2.

Group E: Individuals with multi-bracket fixed appliance Periodontal therapy, n=20 age=15-30years

S. No	Parameters	Percentage (Mean±SD)	P value (P < 0.05.)
1	Recovery rate	56.21± 11.11	0.00
2	Patient compliance	31.14± 11.11	0.00
3	Probing depth	13.04± 10.01	0.00
4	Plaque index	26.10± 3.10	0.00
5	Bleeding on probing	15.21± 10.12	0.00
6	Gingival recession	01.12± 13.11	0.00

Group F: Individuals with clear aligner treatment Periodontal therapy, n=20 age=15-30years

S. No	Parameters	Percentage (Mean±SD)	P value (P < 0.05.)
1	Recovery rate	59.22± 1.01	0.00
2	Patient compliance	43.11± 01.10	0.00
3	Probing depth	14.01± 11.21	0.00
4	Plaque index	22.10± 3.10	0.00
5	Bleeding on probing	6.11± 10.11	0.00
6	Gingival recession	06.12± 14.11	0.00

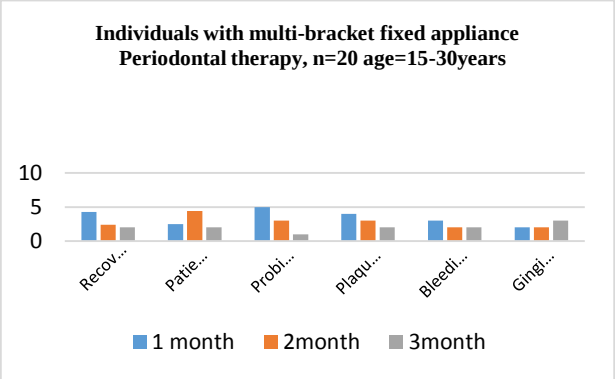

Fig-1 Individuals with multi-bracket fixed appliance periodontal therapy

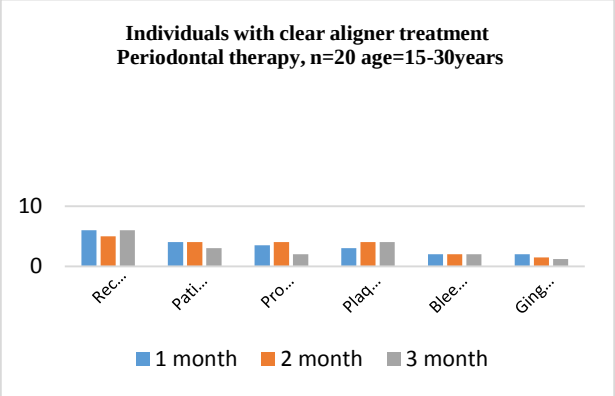

Fig-2: Individuals with clear aligner treatment periodontal therapy

DISCUSSION

Kassebaum *et al*, 2014 stated in their study that results confirm a significant difference in the applications and awareness of both technologies i.e. fixed appliance brackets and clear aligners for the treatment of periodontal health**.** A significant difference was observed in the periodontal health of Group E and Group F how patients followed dental treatment hygiene for 3 months. Therefore the findings of many other studies showed that with the applications of these two modern techniques the appearance and health of teeth become improved [17]. It was also noted that the instructions and awareness about fixed appliance brackets and clear aligners by hygienist has a key role in there acceptably.

The comparison in different studies showed that both fixed appliance brackets and clear aligner orthodontic treatments are in favour of patient periodontal health [18]. In both cases awareness about orthodontic treatment classification and adequate information about it handling is so important [19]. The supportive role of dentist and hygienist can make these two techniques so effective and useful for patients. In a study results claimed that with proper oral hygiene instructions and motivations patient confidence and compliance can be increased during treatment of periodontal health [20].

The present study represented a clear and significant changes in recovery rate, patient compliance, probing depth, plaque index, bleeding on probing and gingival recession parameters in Group F (59.22± 1.01, 43.11± 01.10, 14.01± 11.21, 22.10± 3.10, 6.11± 10.11, 06.12± 14.11) as compared to Group E (56.21± 11.11, 31.14± 11.11, 13.04± 10.01, 26.10± 3.10, 15.21± 10.12, 01.12± 13.11) respectively. Age, professional hygiene, motivation, training, monitoring gingival health and regular check-ups of patients can change mean standard deviation percentage levels.

CONCLUSION

The results of current study were significant ($P < 0.05$) regarding logistic regression model of descriptive statistics of dependent variables measured for periodontal therapy after 3 month follow-up respectively. Patient compliance with clear aligner treatment was higher than fixed appliance brackets.

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