

## Effect of Active Text Reminders Mentioning Dietary Restriction on Orthodontic Bond Failure Rate: An *In-Vivo* Study

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### Abstract

**Objective:** One of the reason for orthodontic bond failure is physical nature of diet. At the start of treatment, instructions are given to the patients regarding diet. The objective behind this study is to evaluate effect of active reminders of dietary restrictions on bond failures.

**Materials and Methods:** Total of 80 patients with age range of 14 - 21 years were included in study. Two groups were formed: Group I (n = 40) No Active Reminder group and Group II (n = 40) Active Reminder group. After initial prophylaxis both the group patients were bonded as per the conventional protocol and instructions were given. Group II patients received active reminders through text message daily for 6 months regarding dietary restrictions, while no such message was sent to Group I patients. Bond failures were recorded in both the groups and percentage of bond failure was compared.

**Results:** There was statistically significant ( $p < 0.05$ ) decrease in orthodontic bond failure rate in patients who received active reminders through text message.

**Conclusion:** Active reminders of dietary restrictions significantly reduces bond failure rate in orthodontic patients.

**Keywords:** Text Message; Active Reminders; SMS; Bond Failure Rate; Bond Failure

### Abbreviations

SMS: Short Message Service; NS: Non-Significant; S: Statistically Significant

### Introduction

Orthodontic bond failure has always been a menace to an orthodontist. The bonding of orthodontic brackets and their failure rates are well-documented in literature [1,2]. Researchers have always tried to find out the reasons and ways to reduce the orthodontic bond failures.

One of the reasons for bond failure is the physical nature of diet a patient is having. Orthodontists instructs all the patients regarding the nature of the diet to be consumed during the course of orthodontic treatment and the consequences if they are not followed. Various methods are used to give these instructions like verbal, printed, text message etc. These are the strategies used by orthodontists to increase patient compliance in various aspects during orthodontic treatment.

Mobile communication system has changed the way of connecting and communicating with our patients. Numerous studies have been published in the literature on use of mobile communication system on reducing the number of broken appointment, oral hygiene maintenance, reducing self-reported level of pain and anxiety.

Considering the above facts, a study was designed with an aim to evaluate the effect of active reminder text messages mentioning dietary restrictions on rate of orthodontic bond failure.

### Materials and Methods

80 patients, in the age range of 14 - 21 years, requiring orthodontic treatment were randomly selected from the private practice at Malviya Dental Clinic, Nagpur, India based on following Inclusion Criteria.

#### Inclusion criteria

1. Fully erupted permanent teeth up to second molars.
2. No history of orthodontic treatment.
3. Patients having personal Mobile phones.
4. Crowding less than 3 mm.
5. Patients requiring Treatment of more than 6 months.

Patients having any systemic disease, parafunctional habits, severe deep bite, scissor bite, cross bite, anomalies of enamel and dentin, Crowns or Veneers were excluded from the study so as to eliminate confounding factors. Samples were randomly divided into two groups of 40 each using GraphPad online Software (<http://www.graphpad.com/quickcalcs/index.cfm>) as follows:

1. Group A (Control Group) - Non Active reminders Group. In this group no active text reminders were sent regarding the dietary restrictions, only instructions in the form of printed case paper were given after initial bonding appointment.
2. Group B (Experimental Group) - Active reminders Group. Subjects in this group received active text reminders mentioning dietary restrictions to be followed during the course of treatment along with the printed case paper after initial bonding appointment.

All the 80 patients were treated by same orthodontist. After initial diagnosis and treatment planning, conventional protocol for direct bonding of brackets was followed on each patient. There was equal distribution of Extraction and Non-Extraction cases in both the groups. 3M Unitek Victory series™ (0.022 inch slot) metal brackets were bonded with 3M Unitek Transbond XT™ on each patient.

After bonding procedure, each patient of both the groups was instructed regarding oral hygiene maintenance and diet restriction to be followed during the treatment were explained as well as a printed instructions on case paper were given to them.

This was a double blinded study i.e. the subjects as well as the treating orthodontist were blinded. All the subjects were unaware of the fact that they were a part of a study, also treating orthodontist was unaware regarding the group in which the patient belongs. Concealment of the randomization was done in sealed envelopes which were sequentially numbered and opaque.

A structured text message, stating the dietary restriction to avoid hard and sticky food and the consequences of not following such restriction was sent to each patient of Group B every day right from the first day till 6 months of treatment. No such message was sent to Group A patients. Messages were sent by a receptionist of the dental clinic who was not aware of the identity of the patients.

All the patients were instructed to report any detachment of bracket as soon as possible and the detached bracket was replaced by same the orthodontist. Number of brackets debonded over the period of six months were recorded for each patients along with the tooth number of which bracket was debonded.

### Results

Compiled data was subjected to statistical analysis using free online software for statistics at <http://www.socscistatistics.com>. Z test was used to compare the bond failure between two groups. Overall 1416 brackets were bonded (including both groups) out of which 96 bond failure was observed during the six month observation period showing 6.78% of failure rate.

Bond failure rate of Group B was far less as compared to that of Group A i.e. 38 brackets were debonded in Group B (5.37% failure rate) and 58 brackets were debonded in Group A (8.19% failure rate). The Z score was 2.11 and p value was 0.03 showing statistically significant difference ( $p < 0.05$ ) between Group B and Group A (Table 1).

Group	Brackets Bonded (n)	Brackets Failed	Failure Percentage (%)	Z-test Score
Control Group (Group A)	708	58	8.19	Z score = 2.11 p value = 0.03 (< 0.05) S
Experimental Group (Group B)	708	38	5.37	
Overall	1416	96	6.78	

**Table 1:** Comparison of Bond Failure Rate between Group A and Group B.

When compared between anterior and posterior segment, in control group there was a bond failure rate of 3.96% while in experimental group the failure rate was reduced to 2.08% which was statistically non-significant ( $p > 0.05$ ). Similarly, in control group posterior segment bond failure rate was 17.11% while that in experimental group was 12.28% which was also non-significant (Table 2).

Group	Brackets Bonded (n)	Brackets Failed	Failure Percentage (%)	Z-test Score
Anterior Segment Control Group (Group A)	480	19	3.96	Z score = 1.69 p value = 0.09 (> 0.05) N.S.
Anterior Segment Experimental Group (Group B)	480	10	2.08	
Posterior Segment Control Group (Group A)	228	39	17.11	Z score = 1.45 p value = 0.17 (> 0.05) N.S.
Posterior Segment Experimental Group (Group B)	228	28	12.28	

**Table 2:** Segment wise comparison of Bond Failure Rate between Group A and Group B.

Bond failure rate for individual teeth in both the group was also compared and the difference was statistically non-significant (Table 3).

Tooth	Control Group			Experimental Group			Z-test Score
	Brackets Bonded (n)	Brackets Failed	Failure Percentage (%)	Brackets Bonded (n)	Brackets Failed	Failure Percentage (%)	
Maxillary Central	80	1	1.25	80	0	0	Z = 1 P = 0.31
Maxillary Lateral	80	1	1.25	80	0	0	Z = 1 P = 0.31
Maxillary Canine	80	0	0	80	0	0	Z = 0 P = null
Maxillary 1 <sup>st</sup> Premolar	34	5	14.71	34	2	5.88	Z = 1.19 P = 0.23
Maxillary 2 <sup>nd</sup> Premolar	80	17	21.25	80	13	16.25	Z = 0.81 P = 0.41
Mandibular Central	80	10	12.50	80	6	7.50	Z = 1.05 P = 0.29
Mandibular Lateral	80	4	5	80	2	2.50	Z = 0.83 P = 0.40
Mandibular Canine	80	3	3.75	80	2	2.50	Z = 0.45 P = 0.65
Mandibular 1 <sup>st</sup> Premolar	34	4	11.76	34	4	11.76	Z = 0 P = 1
Mandibular 2 <sup>nd</sup> Premolar	80	13	16.25	80	9	11.25	Z = 0.91 P = 0.35

**Table 3:** Comparison of Bond Failure Rate between Group A and Group B for Individual Tooth.

## Discussion

Minimum bond failure rate is most important in orthodontics for efficient orthodontic treatment [3,4]. Bond failure rate varies from 1.57% to 55.6% as reported by various researchers [5-11]. Even if there may be no loss of tooth movement, there is a minimum of 20 - 30 minutes of chair time required to replace a debonded bracket. Also, even if the patient is knowing that they are the reason behind bond failure, they are still irritated by the inconvenience to them, having to take time from work or school.

In present study, overall bond failure rate was found to be 6.78% which is comparable to similar previous studies, in fact it was on lower side [12,13]. This might be due primarily due to fact that the aim of study was to evaluate the effect of increase in compliance of the patient regarding following dietary restriction by the means of active reminders. This aim of the study forced the orthodontist to sensitize and motivate each patient regarding dietary restrictions at the start of treatment resulting in overall reduced bond failure rate

Numerous studies have been published on methods to improve bond strength and bond failure rate but none are conducted to evaluate the effect of active reminders on bond failure rate. Although, none of the study has been published in the literature to evaluate the compliance in terms of Dietary restrictions during orthodontic treatment by the means of active text reminders, there are many studies published on effect of active reminders on Oral hygiene, broken appointments and self-reported level of pain after separator placement or arch-wire placement [14-28]. The results of present study cannot be directly compared with these studies but they can be co-related with them as present study is also evaluating the efficacy of active text reminders in improving compliance of patient.

In present study, it was found that the bond failure rate in Group B was significantly less as compared to that of Group A i.e. 38 brackets were debonded in Group B (5.37% failure rate) and 58 brackets were debonded in Group A (8.19% failure rate). The Z score was 2.11 and p value was 0.03 showing statistically significant difference ( $p < 0.05$ ) between Group B and Group A. This is because, daily active reminders to the patient mentioning the diet restrictions increased the patient compliance to follow them. These results are similar to other studies conducted to evaluate efficacy of active reminders on improvement in patient compliance.

Matthew Eppright., *et al.* (2014), TB Bowen., *et al.* (2015), G Sujay Kumar., *et al.* (2018) demonstrated that sending of text messages directly to orthodontic patients reminding them of the importance of oral hygiene is an effective way to improve plaque removal from teeth [18,19,28].

Achint D Chachada., *et al.* (2017) demonstrated that active text reminders reduce the number of missed appointments (NO SHOW) in orthodontic practice [27]. On the contrary, Nelson TM., *et al.* (2011) suggested that text messages are not as effective as voice calls for reduction in NO SHOWS, although the study was conducted for pediatric dental setup [29].

Direct text messaging the patients weekly to remind about the restrictions to be followed may not be that difficult to achieve in a one's practice, because several practice management software already provide text message automated-reminder services, and several Web-based text message programs are available free of charge. While these software are being used to remind patients to attend appointments, it seems reasonable that the text messages could be modified to serve other purposes like oral hygiene maintenance, diet restriction reminder etc.

Also, providing such a service will maintain good rapport between the orthodontist and the patient and shows a concern of orthodontist for his patient. Additionally, the doctor's expression of concern for their patient was also shown to be significant about the prediction of patient's adherence to orthodontic treatment protocol.<sup>7</sup> The results of this study indicate that a text message reminders system is an effective method for reducing orthodontic bond failure rate hence it should be strongly considered during the course of orthodontic treatment.

## Conclusion

Results of the present study shows that active text reminders can reduce orthodontic bond failure rate significantly, hence it is strongly recommended in routine orthodontic practice

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## Conflict of Interest

None.

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