

# Does Text Messaging Reminder Help in the Orthodontic Compliance of Patients to Maintain their Oral Hygiene

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## Abstract

**Objective:** To determine if text messaging reminders regarding oral hygiene have any influence on the level of compliance with an orthodontic population.

**Material & Method:** 50 orthodontic patients were considered out of which 25 patients' parents were assigned text message group & 25 parents of patients were assigned in the non-text message group, which did not receive a reminder text message (control group). Message was sent once a week for 4 months. Oral hygiene compliance was measured using, plaque index (PI), and visual examination of white spot lesion (WSL). 1<sup>st</sup> appointment after two month (T0); 2<sup>nd</sup> appointment after three months (T1); 3<sup>rd</sup> appointments after four months (T2); 4<sup>th</sup> appointment after five months (T3).

**Results:** The average plaque index is significantly higher in Control group compared to Text-messaging group at 3 and 4 months post-messaging follow-ups while incidence of white spot lesions is significantly higher in control group compared to the text-messaging group at 3 months and 4 months post-messaging follow-ups.

**Conclusion:** A text message reminder system explaining the importance of oral hygiene sent to patients once weekly is an effective way to improve oral hygiene compliance in orthodontic patients.

**Keyword:** Text message; Reminder therapy; Oral hygiene maintenance; Orthodontic patients

## Introduction

Orthodontists are constantly pursuing effective strategies to improve patient compliance. Compliance in a number of areas is important during orthodontic treatment but compliance with a proactive oral hygiene protocol is one of the most important factors that can be directly controlled by the patient [1,2]. Previous studies have shown that the initial period after bonding is associated with a rapid decline in oral hygiene compliance followed by an increase in oral hygiene compliance by the fifth month of orthodontic treatment as judged by plaque and gingival indices. Other studies have demonstrated that oral hygiene compliance is the lowest at the end of orthodontic treatment as measured by plaque index. Oral hygiene compliance is one of the most important factors controlled by the patient during orthodontic treatment. Excessive plaque retention around brackets is the cause of White Spot Lesion (WSL) formation during orthodontic therapy [3]. Inadequate pretreatment oral hygiene and poor oral hygiene during orthodontic therapy are associated with greater incidence and severity of WSLs [4]. These undesired side effects can lead to unsatisfactory results or premature termination of orthodontic therapy. Mobile communication systems have become one of the most important areas in the field of telecommunications and it is expected that within the next decade a considerable portion of our activities will become partially or completely wireless [5,6]. Short Message Service (SMS) was created during the late 1980s to work with a digital technology called GSM (global system for mobile communications), which is the basis for most modern cell phones [7]. Different reminder techniques such as appointment reminder, medicine reminders, were used by the mobile phone by various types of software [8]. Hence we want to find out whether any software would help us to remind our patient regarding oral hygiene maintenance. The aim of this study was to determine if there is a relationship between reminding patients of

the importance of oral hygiene via weekly text message reminders sent to their parents/guardians and improvement in the oral hygiene.

## Materials and material

For this prospective, randomized, clinical trial, subjects were required to be in active treatment at M.A.Rangoonwala Dental College, Department of Orthodontics, Pune, with full fixed appliances in both arches. The age limit was considered between of 13 and 19 years, without any significant medical/dental history, and living fulltime with a parent/guardian who owned a cellular telephone with text messaging services. Patients were excluded if they had health risks associated with periodontal probing or if their parents were not comfortable reading or speaking English. During the consent/assent process, parents were notified that they would receive one text message each week for the duration of the study if their child was randomly assigned to the text message group. It was also made clear to them that their children would not receive study text messages. Additionally, parents and patients were made aware that their participation was voluntary and that they could freely withdraw at any time without any penalty or loss of benefits to which they were otherwise entitled. At the start of treatment, all patients were given standardized oral hygiene instructions. One Plaque Index (PI) measurement was recorded for the buccal surface of each Ramfjord tooth according to the Turesky modification on the Quigley-Hein PI scoring system [9].

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### Score Presentation

0-No plaque

1-Discontinuous band of plaque at gingival margin

2-Up to 1 mm continuous band of plaque at gingival margin

3-Band of plaque wider than 1 mm but less than 1/3 of surface

4-Plaque covering between 1/3 and 2/3 of surface

5-Plaque covering 2/3 or more of surface

Oral hygiene instruction and study measurements were performed by the same examiner every month at time interval mentioned below T0, T1, T2, T3. The examiner calibrated the readings on the chart made to record the readings in the Department. One parent/guardian of each patient assigned to the text message group received a text message once weekly ON SUNDAY morning at 8.00AM from a cellular telephone that was only used for study text messages. Text message sent was “Good oral hygiene starts at home with regular brushing for 3 minutes daily & appropriate diet”. Text messages were sent by one of the staff member who had subscription for “PRACTO SOFTWARE”. Parents/guardians of patients assigned to the control group did not receive study text messages.

- Oral hygiene compliance was measured using, plaque index (PI), and visual examination of white spot lesion (WSL).
- 1<sup>st</sup> appointment after two months (T0).
- 2<sup>nd</sup> appointment after three months (T1).
- 3<sup>rd</sup> appointments after four months (T2).
- 4<sup>th</sup> appointment after five months (T3).

### Results

Fifty patients that matched the inclusion/exclusion criteria, with their parents’ consent were selected to participate in the study. Out of this 50 patients, there were 30 female & 20 male following consent/assent, 25 subjects were randomly assigned to the text message group. The primary aims of the study were to compare the change in the plaque index, and the presence of white spot lesions across time in the text message and control groups. Of 50 consecutive patients that matched the inclusion and exclusion criteria, his/her parents understood the requirements of the study and actively participated in the study. After consenting to the study, these 50 subjects were randomly assigned to either the text message or control group. Out of 30 females, 15 were assigned to text message group and out of 20 male, 10 were assigned to non-text message group. As the intent-to-treat principle indicates, all subjects randomized to treatment were included in all analyses and all data values for each subject were analyzed. Since a previous study has shown that the initial decline in oral hygiene compliance after bonding is followed by an increase in compliance by the fifth month of treatment, patients were enrolled after they were provided with time to adjust to oral hygiene compliance with orthodontic appliances. Patients were enrolled in this study an average of 2 months after bonding of fixed appliances which indicates that this protocol was followed. There were totally 1 message was sent once in a week on Sunday morning, that is collectively 4 messages per month. According to this, there were in all 16 messages sent in 4 months period time. Readings were evaluated after 4 months of follow up.

### Plaque Index

- The average plaque index is significantly higher in Text-messaging group compared to Control group at baseline and 2 months post-messaging follow-up (P-value<0.05 for all) (Table 1 and Figure 1).
- The average plaque index is significantly higher in Control group compared to Text-messaging group at 3 and 4 months post-messaging follow-ups (P-value<0.05 for all) (Table 1 and Figure 1).

### White Spot Lesions

- The incidence of white spot lesions did not differ significantly between two study groups at baseline and 2-months post-messaging follow-up (P-value>0.05 for all) (Table 2 and Figure 2).
- The incidence of white spot lesions is significantly higher in control group compared to the text-messaging group at 3 months and 4 months post-messaging follow-ups (P-value<0.05 for all) (Table 2 and Figure 2).

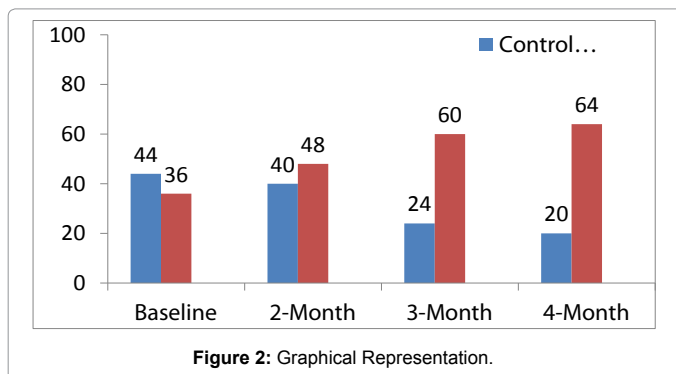
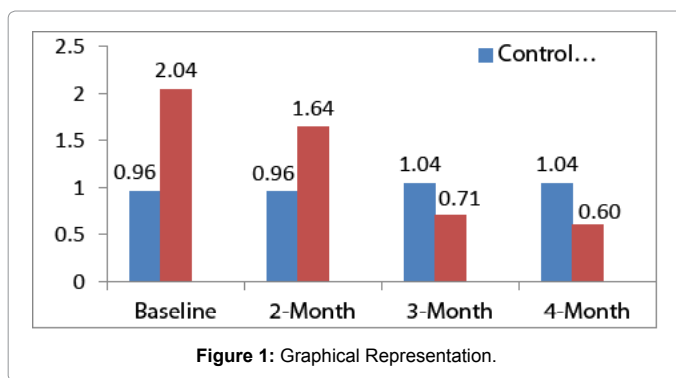
### Discussion

Poor oral hygiene compliance has been most commonly observed during the orthodontic treatment [1,2]. However, previous studies have proved that there is initial decline in oral hygiene followed by

Plaque Index	Control Group (n=25)	Text Message Group (n=25)	P-value
Baseline Mean ± SD	0.96 ± 0.81	2.04 ± 0.84	0.001 (Significant)
2 Month Mean ± SD	0.96 ± 0.89	1.64 ± 0.91	0.010 (Significant)
3 Months Mean ± SD	1.04 ± 0.73	0.71 ± 0.53	0.038 (Significant)
4 Months Mean ± SD	1.04 ± 0.73	0.60 ± 0.52	0.025 (Significant)

Values are Mean ± SD of Plaque Index. P-values by independent sample t test. P-value<0.05 is considered to be statistically significant

Table 1: Between Group Comparison of Plaque Index at each Follow-up.



White Spot Lesion		Control Group (n=25)	Text Message Group (n=25)	P-value
Baseline	Score 0	11 (44.0)	9 (36.0)	0.113 (Non-Significant)
	Score 1	9 (36.0)	15 (60.0)	
	Score 2	5 (20.0)	1 (4.0)	
	Score 3	0	0	
2 Month	Score 0	10 (40.0)	12 (48.0)	0.363 (Non-Significant)
	Score 1	11 (44.0)	12 (48.0)	
	Score 2	4 (16.0)	1 (4.0)	
	Score 3	0	0	
3 Months	Score 0	6 (24.0)	15 (60.0)	0.031 (Significant)
	Score 1	12 (48.0)	9 (36.0)	
	Score 2	6 (24.0)	1 (4.0)	
	Score 3	1 (4.0)	0	
4 Months	Score 0	5 (20.0)	16 (64.0)	0.002 (Significant)
	Score 1	12 (48.0)	8 (32.0)	
	Score 2	8 (32.0)	1 (4.0)	
	Score 3	0	0	

Values are n (%). P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant

**Table 2:** Between Group Comparison of Plaque Index at each Follow-up.

fixed appliances therapy. There was improvement in oral hygiene compliance at the fifth month of treatment [1]. In order to allow patients to become comfortable with oral hygiene practice wearing fixed appliances, patients were allowed to participate in the study only after their second adjustment appointment follow by fixed appliances. The enrollment for study subjects was 2 months after bonding of full fixed appliances with upper & lower arch. Plaque indices have been used for measuring oral hygiene compliance in orthodontic patients [10]. This study examined a weekly text message reminder emphasizing the importance of oral hygiene compliance that was sent to parents of patients and its effect on oral hygiene compliance measured by plaque index, and development of white spot lesions on the tooth surface. At baseline (T0), the text message and control groups were not significantly difference noted in any of the measurement indices. Also, at time point T1, the text message and control groups were not significantly different in any of the measurement indices. However, the text message group demonstrated significantly lower PI scores at time point T2, which represented a time point that was four orthodontic adjustment appointments after baseline and an average of 4 months after baseline (T0). SMS text message reminder system helped to cause a positive change in behavior in individuals for smoking cessation therapy, diabetes self-management, anti-obesity behavior modification, asthma self-management, and hypertension medication compliance [7,11]. The most relevant finding of people by sending a reminder postcard for their orthodontic consultation and they returned the confirmation slip, they were almost twice as likely to attend their appointment as if they did not receive a reminder [12]. Some studies suggest that a text message reminder sent to parents of patients is effective in improving oral hygiene compliance; the true effect may have been caused by the Hawthorne effect [5]. It is possible that the weekly text message maintained the awareness of the text message group that they were in the study and influenced their oral hygiene to improve with time. Although white spot lesion development has been reported to occur in as little as 3 to 4 weeks after plaque accumulation in bucco-gingival areas of the teeth, in this 4 months of clinical trial, significant differences in gingival indices lead to a significant differences in white spot lesion development [13]. Despite this, white spot lesion development in the

control group showed a sharply increasing trend between time point T1 (mean time after baseline=2 months) and time point T2 (mean time after baseline=3 months). Therefore, studies measuring the development of white spot lesions should be conducted for longer than 6 month time periods to determine at what point significant differences in oral hygiene compliance would translate into differences in white spot lesion development. Poor oral hygiene leading to the development of white spot lesions could have a negative impact on an orthodontic practice Hamdan et al. [14] reported that more than one-third of general dentists indicated that if one of their patients had severe WSLs after orthodontic treatment, it could have a negative effect on their perception of the treating orthodontist. The results of this study indicate that a text message reminder therapy is an effective way of improving oral hygiene compliance in orthodontic patients with fixed appliance. While directly text messaging parents of patients weekly to remind their children to maintain a proper oral hygiene protocol may not be reasonable in a private practice, several orthodontic communication companies provide text message reminder services. For the category of communication between health services and consumers, SMS reminders have modest benefits in increasing clinic attendance and appear similar in their effects to other forms of reminder [15]. New applications for smart phones have been developed to remind patients to brush, floss, wear retainers, wear elastics, etc. Providing reminder services for patients will maintain good communication between the orthodontist and the patient and show that the orthodontist is concerned about each patient's well-being. Based on the pre-and-during orthodontic treatment examination, this study showed a high incidence of new WSL (75.6%) in patients treated with comprehensive orthodontics [16]. Studies have clearly indicated that the age of the patient does not play a role in the prevalence of the WSLs. This is suggestive of the fact that the process of enamel demineralization is not dependent on the subject's age. Fluoride is an important tool in the prevention of dental caries. It has been shown that fluoride may reduce the number of WSLs developing during orthodontic treatment. The daily use of a 5000 ppm fluoride gel along with a fluoride dentifrice or a 5000 ppm fluoride dentifrice used twice daily was effective in preventing demineralization [17]. The use of fluoride mouthwash was not suggested to the patient who may have led to the white spot lesion in the Indian population [18].

## Conclusion

- A text message reminder system explaining the importance of oral hygiene sent to parents of patients once weekly is an effective way to improve oral hygiene compliance in orthodontic patients over a 4 month period.
- Orthodontists should add an active reminder system of the importance of oral hygiene compliance to their typical protocol during treatment.

## References

1. Al-Jewair TS, Suri S, Tompson BD (2011) Predictors of adolescent compliance with oral hygiene instructions during two-arch multibracket fixed orthodontic treatment. *Angle Orthod* 81: 525-531.
2. Cantekin K, Celikoglu M, Karadas M, Yildirim H, Erdem A (2011) Effects of orthodontic treatment with fixed appliances on oral health status: A comprehensive study. *J Dent Sci* 6:235-238.
3. O'Reilly MM, Featherstone JD (1987) Demineralization and remineralization around orthodontic appliances: an in vivo study. *Am J Orthod Dentofacial Orthop* 92: 33-40.
4. Chapman JA, Roberts WE, Eckert GJ, Kula KS, González-Cabezas C (2010)

- Risk factors for incidence and severity of white spot lesions during treatment with fixed orthodontic appliances. *Am J Orthod Dentofacial Orthop* 138: 188-194.
5. Feil PH, Grauer JS, Gadbury-Amyot CC, Kula K, McCunniff MD (2002) Intentional use of the Hawthorne effect to improve oral hygiene compliance in orthodontic patients. *J Dent Educ* 66: 1129-1135.
  6. Roth J, Kula T, Claros A, Kula K (2004) Effect of a Computer-Generated Telephone Reminder System on Appointment Attendance. *Semin Orthod* 10:190-193.
  7. Hussein WI, Hasan K, Jaradat AA (2011) Effectiveness of mobile phone short message service on diabetes mellitus management; the SMS-DM study. *Diabetes Res Clin Pract* 94: e24-26.
  8. Zailinawati AH, Ng CJ, Nik-Sherina H (2006) Why do patients with chronic illnesses fail to keep their appointments? A telephone interview. *Asia Pac. J. Public Health* 18: 5-10.
  9. Indices for prevalence & incidences of periodontal diseases (1959). *J Period* 30:51.
  10. Tufekci E, Casagrande ZA, Lindauer SJ, Fowler CE, Williams KT (2008) Effectiveness of an essential oil mouthrinse in improving oral health in orthodontic patients. *Angle Orthod* 78: 294-298.
  11. Fjeldsoe BS, Marshall AL, Miller YD (2009) Behavior change interventions delivered by mobile telephone short-message service. *Am J Prev Med* 36: 165-173.
  12. Can S, Macfarlane T, O'Brien KD (2003) The use of postal reminders to reduce non-attendance at an orthodontic clinic: a randomised controlled trial. *Br Dent J* 195: 199-201.
  13. Lundström F, Krasse B (1987) Caries incidence in orthodontic patients with high levels of *Streptococcus mutans*. *Eur J Orthod* 9: 117-121.
  14. Bos A, Hoogstraten J, Prahj-Andersen B (2005) Failed appointments in an orthodontic clinic. *Am J Orthod Dentofacial Orthop* 127: 355-7.
  15. Caroline Free, Gemma Phillips, Louise Watson, Leandro Galli (2013) The Effectiveness of Mobile-Health Technologies to Improve Health Care Service Delivery Processes: A Systematic Review and Meta-Analysis. *PLoS Med* 10: e1001363.
  16. Tufekci E, Dixon JS, Gunsolley JC, Lindauer SJ (2011) Prevalence of white spot lesions during orthodontic treatment with fixed appliances. *Angle Orthod* 81: 206-210.
  17. Alexander SA, Ripa LW (2000) Effects of self-applied topical fluoride preparations in orthodontic patients. *Angle Orthod* 70: 424-430.
  18. Nandikolla Sagarika, Sundaramoorthy Suchindran, SC Loganathan, Velayutham Gopikrishna (2012) Prevalence of white spot lesion in a section of Indian population undergoing fixed orthodontic treatment: An in vivo assessment using the visual International Caries Detection and Assessment System II criteria. *Journal of Conservative Dentistry* 15: 104-108.