ORIGINAL ARTICLE

EFFECTIVENESS OF TEXT MESSAGE INSTRUCTIONS ON ORAL HYGIENE FOR ORTHODONTIC PATIENTS

[1]JAVED IQBAL, [2]RABIA AWAN, [3]AKHTAR PARVEZ, [4]ARFAN UL HAQ ZAHID, [5]ALIZEH ABBAS GARDEZI, [6]SAMEEN IRFAN

ABSTRACT

Background: Several studies have recently demonstrated that active communication to explain the importance of oral hygiene can improve the oral health of orthodontic patients. The main objective of this study was to evaluate the effects of a structured text message communication on orthodontic patient's oral hygiene compliance for tooth brushing, plaque control and gingival health. This Randomized clinical trial was conducted on 100 patients of both sex with age range between 15-25 years recruited from orthodontics department de,Montmorency College of Dentistry, Lahore. All participants were undergoing fixed orthodontic appliance therapy. Participants were randomized in to text message and control group. Pre, during and post-trial examinations were carried out by author her-self using blind and calibrated methodology using plaque, bleeding and modified gingival indices. Results showed that text message group expressed a statistically significant (P<0.001) decrease in Bleeding Index score, Plaque Index score and Modified Gingival Index score from 0-60 days as compared to control group. This was concluded that text message reminder system is effective for improving oral hygiene compliance in orthodontic patients. Bleeding Index, Plaque Index and Modified Gingival Index scores were significantly lower in the text message group than control group. There is a need of clinical trial with longer duration on large number of subjects in the age range of 15–40.

Key Words: *Dental Plaque, Bleeding Index, Modified Gingival Index, Text Message.*

INTRODUCTION

Oral hygiene protocol is one of the most important factors that can be directly controlled by the patient during orthodontic treatment.[1] Previous studies have shown that the initial period after bonding is associated with a rapid decline in oral hygiene compliance as judged by plaque and gingival indices. Inadequate pretreatment oral hygiene and poor oral hygiene during orthodontic therapy are associated with greater incidence and severity of white spot lesions (WSLs).[2,3] Other studies have also demonstrated that oral hygiene problems are highest at the end of orthodontic treatment, demonstrating the challenge in obtaining sustained and acceptable oral hygiene during orthodontic therapy. These undesired side effects can lead to unsatisfactory results or premature termination of orthodontic treatment.[4] Effective plaque control and oral hygiene compliance have been important concerns for orthodontists. It is well known that oral hygiene compliance can be challenging with the orthodontic treatment.[5]

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. 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. Different reminder techniques such as appointment reminder, medicine reminders, were used on the mobile phone using various types of software.[6,7] A 2009 systematic review regarding influence of text messages on behavior changes in the medical field demonstrated positive behavior changes in 13 of the 14 studies that met the authors' inclusion criteria, including smoking

[1] Dr Javed Iqbal, MPhil (Oral Biology), Assistant Professor, Oral Biology, Dental Section, Faisalabad Medical University, Faisalabad Email: drjavediqbal32@gmail.com Cell: 0333-4211705

[2] Dr Rabia Awan, BDS, MCPS, Assistant Professor Orthodontics, Email: rabiaawandr@gmail.com Cell: 0301-4406406

[3] Dr Muhammad Akhtar Parvez, MBBS, MSc (Public Health), MSc (Community Health and Nutrition), PGD (Nutrition), Assistant Professor Community Medicine
Email: dr_akhtarp@hotmail.com Cell: 0324-7629005

[4] **Corresponding Author:** Prof Dr Arfan ul Haq, BDS, MDS, FCPS (Orthodontics); MCPS (OperD), Dean of Dentistry/ Head of Orthodontic Department, Dental Section, Faisalabad Medical University, Faisalabad Email: ortho.irfanulhaq@gmail.com Cell: 0333-4207669

[5] Dr Alizeh Abbas Gardezi, FCPS-II Trainee, Department of Orthodontics, de,Montmorency College of Dentistry, Lahore
Email: dr_alizehgardezi@hotmail.com: Cell: 0334-4121087

[6] Dr Sameen Irfan, BDS, Demonstrator, Sharif Medical and Dental College Lahore Email: sisameen@gmail.com Cell:0331-4951577

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cessation therapy, diabetes self-management, and anti-obesity behavior.[8] In dentistry, text message, postal, and automated telephone reminders were effective in reducing appointment no-show rates.[7,9,10,11] Follow-up text message reminders sent from an orthodontic office following initial appliance placement resulted in patient's compliance in oral hygiene, elastic wear and also lower levels of self-reported pain.[12,13] Other studies showed that text message reminders to parents and/ or orthodontic patients were shown to be an effective way to improve oral hygiene.[14,15] This type of study was never attempted in Pakistan. The objective of this study was to evaluate the effects of a structured text message communication on orthodontic patient's oral hygiene compliance for tooth brushing, plaque control and gingival health. The results of this study will introduce a landmark for oral hygiene improvement of patients undergoing orthodontic treatment.

METHODOLOGY

This randomized controlled clinical trial was performed on 100 selected patients with age range 15-25 years recruited from Department of Orthodontics, de,Montmorency College of Dentistry, Lahore. 65 females and 45 males constituted the total sample of 100 patients. Duration of study was one year from January 2016 to December 2016. An informed consent was taken from the participant subjects.

Inclusion criteria: Both sexes (male and female) Age; 15-25 years Subjects having good general health, not using any medication for past 3 months No history of known sensitivity of oral mucosal tissue reaction to toothpaste not having used any mouth wash/ herbal dentifrices full mouth bonded orthodontic appliance, willing to follow the instructions.

Exclusion criteria: Patients with advanced periodontitis, probing depth >4 mm, pregnant women.

All 100 patients selected according to inclusion criteria were equally randomized to text message group (50; 35 females and 15 males) and control group (50; 30 females and 20 males). Patients included in both groups were instructed about home care oral hygiene with proper brushing and use of mouth wash. All patients were provided with same brands home care oral prophylaxis kit containing tooth brush, interproximal brush, tooth paste and mouth wash. Patients assigned to the text message group received text message reminder once each week while no text message reminder to control group.19 Patients were called after one month for baseline oral health evaluation. Oral hygiene compliance was evaluated using bleeding index (BI), modified gingival index (MGI), and plaque index (PI), at baseline (T0), 30 days after baseline (T1), and 60 days after baseline (T2). 14 All evaluations were carried out by author her-self using blind and calibrated methodology.

Text message example

It's important to keep ur teeth squeaky clean. Give them a scrub, keep them healthy! TY 4 being so gr8 today! N Oral hygiene alert! How long to brush? 2 min! Did you know the avg toothbrush has over 2500 bristles? Put those bristles to work! N Brush & floss? We want no white spots or cavities. Remember 2 brush after every meal & your results will B fantastic. C U soon! N U can't spend 2 much time brushing those teeth, they're the only 1s you have. After the braces are off their [sic] going to look great. N Remember the 2 F's. Fluoride -Brush W/fluoride toothpaste & Frequency-Remember 2 brush after every meal! Don't forget to brush! N Ur next appt is soon. If uv been slacking on brushing, its not 2 late to get on it b4 your appt. Keep up the good work! C U soon! N YOUR SMILE IS THE FIRST THING PEOPLE SEE!! KEEP THOSE TEETH CLEAN and SHU Orthodontics will get them straight.

Statistical Analysis Data were entered in XPSS 20. Variables of text message group were compared with control group using standard student 't' test. $P<0.05$ was considered as significant.

RESULTS

Compared to the control group, the text message group showed statistically significant ($P<0.001$) decrease of PI score at 30 (T1) and 60 days (T2) (Table 4).

TABLE 1: BLEEDING INDEX (BI) MEASUREMENTS

Score	Presentation
0	Absence of bleeding after 30 seconds
1	Bleeding observed after 30 seconds
2	Immediate bleeding

TABLE 2: MODIFIED GINGIVAL INDEX (MGI) MEASUREMENTS

Score	Presentation
0	Absence of inflammation
1	Mild inflammation (marginal or papillary unit)
2	Mild inflammation (entire marginal and papillary unit)
3	Moderate inflammation
4	Severe inflammation

TABLE 3: PLAQUE INDEX (PI) MEASUREMENTS

Score	Presentation
0	No plaque
1	Discontinuous band of plaque at gingival margin
2	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

In comparison of control group, the text message group showed statistically significant (P<0.001) improvement of B1 score after 30 days (T1) and 60 days (T2) (Table 5). In comparison of control group, the text message group showed statistically significant (P<0.001) improvement of MG1 score after 30 days (T1) and 60 days (T2) (Table 6). For the whole study period (0– 60 days), the text message group showed a statistically significant (P<0.001) improvement in PI, B1 and MGI scores when compared base line value (T0) with the post- trial value (T2) (Table 7).

DISCUSSION

The primary purpose of this study was to find the effect of messaging instruction on plaque index (PI),

TABLE 4: CHANGES IN MEAN PLAQUE INDEX (PI) SCORE OF THE TEXT MESSAGE GROUP AS COMPARED TO CONTROL GROUP VALUES ARE EXPRESSED AS MEAN±SD

Time (days)	Text message group (50)	Control group (50)	P value
Base line (T0)	1.5±0.55	1.63±2.31	>0.05
After 30 days (T1)	1.08±0.52	1.39±0.41	<0.001
After 60 days (T2)	0.64±0.54	1.67±0.53	<0.001

p>0.005= non-significant; p<0.001= significant

TABLE 5: CHANGES IN AVERAGE BLEEDING INDEX (BI) SCORE OF THE TEXT MESSAGE GROUP AS COMPARED TO CONTROL GROUP VALUES ARE EXPRESSED AS MEAN±SD

Time (days)	Text message group (50)	Control group (50)	P value
Base line (T0)	1.00±0.39	0.93±9.34	>0.05
After 30 days (T1)	0.69±0.39	1.07±0.34	>0.05
After 60 days (T2)	0.37±0.36	1.32±0.40	<0.001

p>0.005= non-significant; p<0.001= significant

TABLE 6: CHANGES IN MEAN MODIFIED GINGIVAL INDEX (MGI) SCORE OF THE TEXT MESSAGE GROUP AS COMPARED TO CONTROL GROUP VALUES ARE EXPRESSED AS MEAN±SD

Time (days)	Text message group (50)	Control group (50)	P value
Base line (T_0)	1.74±0.59	1.77±0.79	>0.05
After 30 days (T1)	1.22±0.60	1.93±0.73	<0.001
After 60 days (T2)	0.56±0.54	2.34±0.12	<0.001

p>0.005= non-significant; p<0.001= significant

TABLE 7: INTER GROUP COMPARISON OF PLAQUE 1NDEX, BLEEDING INDEX AND MODIFIED GINGIVAL INDEX SCORES VALUES ARE EXPRESSED AS MEAN±SD

Time (days)	P1	B1	MG1
Base line (T_0)	1.5±0.55	1.00±0.39	1.74±0.59
After 60 days (T2)	0.64±0.54	0.37±0.36	0.56±0.54
P value	<0.001	<0.001	<0.001

p>0.005= non-significant; p<0.001= significant

bleeding index (BI) and Modified gingival index (MGI) score in a group of orthodontic patients and compare these scores with controls. All subjects including text message and controls completed the 60-day study period. At baseline, there was no significant difference between both the groups for plaque, bleeding and gingivitis.

Dental plaque is the main cause for gingival inflammation and dental caries. Chronic gingival inflammation may lead to tissue damage, and if not treated, may progress into the more destructive stages of periodontitis. Present study observed that at 60 days, both control and text message groups showed 17.96% and 39.75% reduction of bleeding, respectively. Reduction of bleeding was statistically significant in both the groups at 30 days and 60 days (P <0.001).A study found that a tooth paste containing antibacterial agent may be responsible for 18.6% and 15.8% reduction in whole mouth plaque and gingival scores around teeth. Same study also noted that bleeding decreased by 20% around teeth at the end of 3 months and 6 months.[16] The paste containing antibacterial agent may be responsible for significant reduction of plaque index, gingival Index and bleeding on probing. These antibacterial agents may have ability to remove 90% of target micro-organisms including P. melaninogenica, A.actinomycetemcomitans, Solobacterium, C. rectus and T. forsythia.[16,17] According to our study there is statistically significant decrease in whole mouth plaque, gingival index and bleeding scores (19.87%, 15.9% and 17.96% respectively) in text message group.

At the completion of 60 days trial, both text message and control group showed 35.6% and 19.87% reduction of plaque, respectively. Reduction of plaque was statistically significant in both the groups at 30 and 60 days (P <0.001). Our study also found that at the end of the study (60 days), both text message and control group showed 38.7% and 15.9% reduction of modified gingival index (MGI) respectively with statistically significant difference at (P <0.001). According to a study conducted by Harish et al, the text message group was found to have statistically significant reduction in plaque when compared to that of the control group with p <0.001 and there was significant improvement in oral health.18 Another study conducted by T.Bent Bowen et.al on 50 orthodontic patients found a significant reduction in plaque as compared to control.[19] The study of Matthew Eppright and co-workers showed significant decrease in BI, MGI and PI of text message group as compared to controls.[14] Their results are in line with our study in which there was statistically significant decrease in PI, BI, and MGI. Limitations of the study were the small sample size and shorter duration.

CONCLUSION

A text message reminder system is effective for improving oral hygiene compliance in orthodontic patients. BI, MGI and PI scores were significantly lower in the text message group compared to control group. There is a need of clinical trial with longer duration on large number of subjects in the age range of 15-40. This may improve the effectiveness of tooth brushing to reduce plaque, gingivitis and bleeding in patients undergoing orthodontic treatment.

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CONTRIBUTIONS BY AUTHORS

1	**Javed Iqbal:**	Results compilation.
2	**Zubair Abbasi:**	Final editing.
3	**Akhtar Parvez:**	Statistical analysis.
4	**Arfan ul Haq Zahid:**	Article writing and final compilation.
5	**Alizeh Abbas Gardezi:**	Data collection.
6	**Sameen Irfan:**	Proof reading.