ORIGINAL RESEARCH

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Assessment of relationship between different communication methods and treatment compliance in orthodontic patients during Covid-19 pandemics

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Abstract

Objective: The aim of this study was to minimize impairment in oral hygiene and failure of brackets; therefore, effects of pandemic on treatment duration, by communicating our patients using 4 different methods during Covid-19 pandemic.

Method: In the study, 227 patients undergoing fixed orthodontic treatment were included. Five groups were designed: WhatsApp group, short message service (SMS) group, Teledentistry group, e-mail group and control group. During quarantine period, patients were contacted for 4 times and same text was sent to patients. After pandemics, the patients were assessed using mucogingival index (MGI), orthodontic plaque index (OPI) and failure of brackets was determined.

Results: In MGI, percentage of patients with healthy result were as follows: WhatsApp group, 83.7%; SMS group, 87.8%; Teledentistry group, 83.7%; E-mail group, 77.5%; control group, 72.2% and no significant difference was found ($p>0.05$). The OPI scores were as follows: 1.12±1.24 in WhatsApp group; 1.27±1.28 in SMS group; 1.24±1.38 in Teledentistry group; 1.00±1.22 in E-mail group; and 1.61±1.25 in the control group and no significant difference was found ($p>0.05$). The mean number of brackets broken was 0.47±0.88 in WhatsApp group, 0.39±0.83 in SMS group, 0.51±1.00 in Teledentistry group, 0.40±0.67 in E-mail group and 0.44±0.86 in the control group and no significant difference was found ($p>0.05$).

Conclusion: It was determined that communicating with patients in different ways did not make any difference in terms of the subjects investigated in the study. It was concluded that it would be more appropriate to conduct new studies including social and psychological evaluations.

Keywords: Telemedicine, Orthodontics, Compliance, Covid-19, Communication

INTRODUCTION

In December, 2019, a novel coronavirus was identified in China, which rapidly spread worldwide. It was initially denoted as novel coronavirus pneumonia; which was, in turn, termed as novel coronavirus 2019 (2019 nCoV or Covid-19) (1). The virus has become a major concern due to its high infectivity and morbidity as well as ability to evolve to a potentially fatal interstitial pneumonia (2). In many countries, preventive hygiene measures including social distancing, isolation or quarantine were taken in order to prevent varying degrees of viral spread (3). In January, 2020, the World Health Organization (WHO) declared Covid-19 as an international public health emergency (4).

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All dental procedures including professional hygiene sessions which cause droplet formation or time spent in waiting room can increase the spread of infection; so dental clinics are classified in high-risk category (5). Thus, there is an urgent need for strict and effective hygiene protocols to control infection in dental offices in order to prevent infection in dentists and patients (6). It is highly important to use personal protective equipment to prevent cross-infection between healthcare providers and patients during clinical practice (7, 8). In addition, it is thought that it will be important to avoid unnecessary visits for healthcare providers while maintaining follow-up for treatment outcomes and health status (6).

The successful orthodontic treatment requires patient compliance in many aspects of treatment including oral hygiene, diet, use and care of appliances and compliance to visits (9-12). Previous studies showed that missed visits, bond failure of brackets and behavioral factors such as poor oral hygiene may considerably prolong duration of orthodontic treatment. These factors can be explained by poor patient compliance (13, 14-18). Thus, it has become an important issue to relieve these factors, which are also important for oral health, in the orthodontics (19).

During pandemic, we aimed to minimize impairment in oral hygiene and failure of brackets; therefore, effects of pandemic on treatment duration, by communicating our patients using 4 different methods. The null hypothesis of this study was that there was no statistically significant difference between different communication methods in terms of oral hygiene and failure of braces.

METHOD

The study was approved by Ethics Committee on Clinical Trials of Hatay Mustafa Kemal University (approval: 2020/71) and informed consent was obtained from all participants. In this study, patient compliance was assessed in first visit after pandemics in patients in whom scheduled visits could not be realized and 4 different communication methods were used during pandemic. Five groups were designed: WhatsApp group, in which WhatsApp application was used for communication; short message service (SMS) group, in which SMS was used for communication; teledentistry group; in which phone interview was used for communication; e-mail group; electronic mail was used for communication; and control group, no communication was established.

Initially, gingival health in five study groups were compared using Modified Gingival Index (MGI). In priori power analysis by Gpower software using Chi-square test, effect size was estimated as medium (d=0.30), indicating need for 40 observations in each group. First, we screened files of 446 patients with ongoing treatment in our clinic. Among these, we included patients who were considered to be healthy according to MGI in last session and able to attend first control visit after pandemic. Also it was confirmed that, in patients included, no missing brackets were observed in last visit before pandemics. Patients were excluded if they [1] considered as unhealthy regarding periodontal aspect at baseline and during treatment, [2] had a history of previous periodontal treatment, [3] undergoing lingual orthodontic treatment, [4] undergoing second orthodontic treatment, [5] treated with aligners and ceramic brackets, had a systematic disease or medications and smoking. Patient allocation for groups was performed using a computer-generated randomization program.

If it is possible, contact details of patients were used, if contact with patient is not possible contact details of legal guards were used. Patients not using WhatsApp or electronic mail were excluded. 227 patients undergoing fixed orthodontic treatment with brackets in all teeth were randomized. Chart 1 presents inclusion process of the patients.

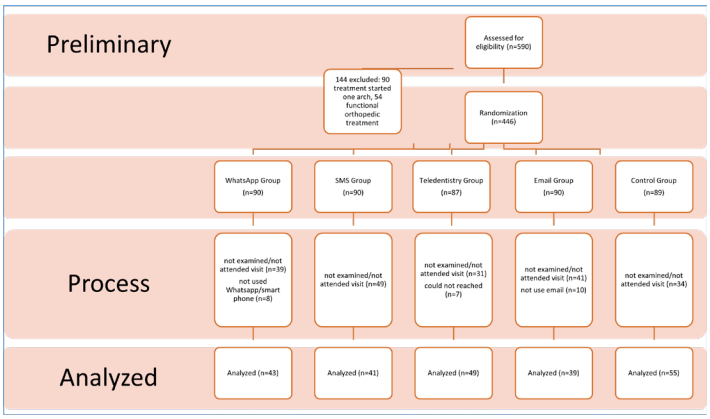

Chart 1. Inclusion process of the patients

All patients underwent orthodontic treatment using 3M Gemini MBT metal brackets (3M Unitek Orthodontic Products, Monrovia, CA, USA). The 3M Transbond XT light cure adhesive paste (3M Unitek Orthodontic Products, Monrovia, CA, USA) was used for bracket adhesion while the 3M Transbond XT light cure adhesive primer (3M Unitek Orthodontic Products, Monrovia, CA, USA) was used as bond. It was confirmed that,

in patients included, no missing brackets were observed in last visit before pandemics.

During quarantine period, patients were contacted for 4 times and same text was sent to patients. The text was sent as a message in E-mail, WhatsApp and SMS groups while it was read to patients in Teledentistry group. The text was as follows: "Please give attention to oral care in this period where visits could not be realized due to coronavirus pandemics. Please do not forget to brush your teeth after every meal. Please avoid acidic beverages and sticky foods that may harm our teeth. If fixed treatment is ongoing, please take care to use inter-dental brush and solid foods that may harm brackets. If you use an appliance or elastics, continue to use as recommended by your clinician". In acknowledgment message, we emphasized importance of tooth brushing and oral care, foods with risk for caries and careful consumption of foods to avoid loss of intraoral appliances. Patients were not asked for feedback regarding whether the message was read or not.

In the first control visit after pandemics, the patients were assessed using mucogingival index (MGI) (20) (Figure 1) and orthodontic plaque index (OPI) (21) (Figure 2) and failure of brackets was determined. Mucogingival scores are as follows: 0, no inflammation; 1, mild discoloration or slight changes in gingiva; 2, mild inflammation in gingival tissue surrounding tooth; 3, moderate inflammation in gingival tissue surrounding tooth; 4, severe inflammation in gingival tissue surrounding tooth. When assessing patients according to mucogingival index, scores 0 and 1 were defined as healthy while scores 2, 3 and 4 were defined as unhealthy. Orthodontic plague index was rated as follows: 0, if no visible plaque; 1, if there is plaque formation at one lateral of bracket; 2, if there is plaque formation at two lateral of brackets; 3, if moderate plaque formation at two lateral and cervical regions of brackets; 4, if one-third of area between bracket and gingiva is covered with plaque. Number of broken brackets was determined for each group.

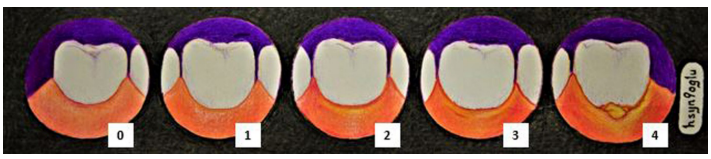

Figure 1: Mucogingival index

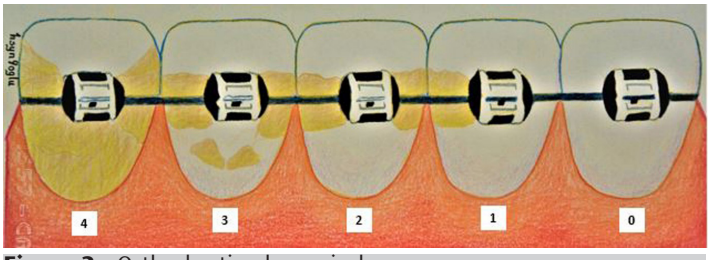

Figure 2: Orthodontic plaque index

Statistical Analysis

Shapiro-Wilk test was used to assess normality of data. Student's t test was used to compare data with normal distribution while Mann Whitney U test to compare data with skewed distribution between 2 independent groups. The correlations between categorical variables were analyzed using Pearson's correlation tests and Exact Chi-square test. Descriptive statistics are presented as mean± standard deviation for numeric data whereas count and percent for categorical data. All statistic analyses were performed using SPSS for Windows version 23.0. A p value <0.05 was considered as statistically significant.

RESULTS

Overall, 227 patients who suspended treatments between 13, March 2020 and 1, June 2020 were assessed in the study.

In MGI, percentage of patients with healthy result were as follows: WhatsApp group, 83.7%; SMS group, 87.8%; Teledentistry group, 83.7%; E-mail group, 77.5%; and control group, 72.2% (Table 2)._When groups were assessed, SMS group had best result in MGI (87.8%) while WhatsApp and Teledentistry groups had comparable results (83.7% in both groups) with higher percentage of patients with unhealthy results when compared to SMS group. These groups were followed by E-mail (77.5%) and control groups (72.2%). No significant difference was found among groups regarding MGI results (p>0.05).

Table 1. Distribution of general properties

		Min-Max	Mean ± SD
Age (year)		8-46	16.8±3.83
Treatment time (month)		6-43	11.65±6.36
Failure of bracket		0-4	0.44±0.86
OPI		0-4	1.27±1.28
		n	%
Gender	**Male**	78	34.4
	Female	149	65.6
MGI	**Healthy**	183	80.6
	Unhealthy	44	19.4
Group	**Whatsapp**	43	18.9
	SMS	41	18.1
	Teledentistry	49	21.6
	Email	40	17.6
	Control	54	23.8

SD: Standard deviation, OPI: Orthodontic plaque index, MGI: Mucogingival index

The OPI scores were as follows: 1.12±1.24 in WhatsApp group; 1.27±1.28 in SMS group; 1.24±1.38 in Teledentistry group; 1.00±1.22 in E-mail group; and 1.61±1.25 in the control group (Table 2). When groups were assessed, the best OPI result (lowest OPI score) was found in E-mail group (1.00±1.22); followed by WhatsApp group (1.12±1.24), Teledentistry group (1.24±1.38), SMS group (1.27±1.28) and control group (1.61±1.25). No significant difference was found among groups regarding OPI results (p>0.05).

Table 2. Examination of outcomes in groups

	Whatsapp		SMS		Teledentistry		E-Mail		Control		p-value
MGI	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Healthy	36	83.7	36	87.8	41	83.7	31	77.5	39	72.2	0.332
Unhealthy	7	16.3	5	12.2	8	16.3	9	22.5	15	27.8	
Gender											
Male	13	30.2	10	24.4	17	34.7	13	32.5	25	46.3	0.231
Female	30	69.8	31	75.6	32	65.3	27	67.5	29	53.7	
Failure of bracket (mean±sd)	0.47±0.88		0.39±0.83		0.51±1.00		0.40±0.67		0.44±0.86		0.986
OPI (mean±sd)	1.12±1,24		1.27±1.28		1.24±1.38		1.00±1.22		1.61±1.25		0.055
Treatment time (mean±sd)	11.30±5.36		11.73±4.84		11.00±6.88		10.45±5.28		13.33±8.00		0.137
Age	16.07±2.83		16.44±3.13		17.59±4.07		16.66±3.07		17.16±5.05		0.547

MGI: Mucogingival index, SD: Standard deviation, OPI: Orthodontic plaque index

The mean number of brackets broken was 0.47±0.88 in WhatsApp group, 0.39±0.83 in SMS group, 0.51±1.00 in Teledentistry group, 0.40±0.67 in E-mail group and 0.44±0.86 in the control group (Table 2). When groups were assessed, the SMS group had best result (0.39±0.83); followed by E-mail (0.40±0.67), control group (0.44±0.86), WhatsApp group (0.47±0.88) and Teledentistry group (0.51±1.00). No significant difference was found among groups regarding number of brackets broken (p>0.05). Table 2 demonstrates the outcomes of the study.

DISCUSSION

In our study, patients with interrupted visits were contacted using four different communication methods. The communication is highly important for quality and continuity of treatment in procedures such as orthodontic treatment which requires long-term treatment and follow-up. In healthcare industry, technological resources are employed in various areas for similar purposes. By widespread use of cell phones, technical tools such as SMS (short message services) have been widely attempted to use in healthcare services such as patient education and management of outpatient management (22,23). It was suggested that SMS support markedly improved treatment compliance in acquired immune deficiency syndrome (AIDS) patients and that it optimized blood pressure control in patients with hypertension (24,25). In dentistry, it was shown that attendance to visits can be considerably improved by sending a reminder of any kind (26-31). Similarly, reminders and educational messages are effective in improving oral hygiene and patient knowledge (32-36). Our study was conducted in 3-months of extraordinary period of Covid-19 pandemic where clinic control visits could not be maintained. In this period, main goals include to maintain oral hygiene, brackets and successful treatment outcomes. When groups were assessed, it was seen that an improvement was achieved in MGI and OPI indexes in study groups when compared to controls while number of brackets broken was higher in WhatsApp and Teledentistry groups than controls. However, the results did not reach statistical significance. Therefore, the null hypothesis of this study was accepted. In a similar study, oral hygiene was successfully improved in orthodontic patients. In the study, WhatsApp application was used as a social tool rather than reminders and educational messages and patients were encouraged to talk with each other in a chat room (37). In addition, a favorable effect was observed on oral hygiene in studies using SMS reminders (32, 33). We attributed comparable data obtained from groups to standardized procedures used in our facility. In our clinic, a strict oral hygiene education is provided to patients before starting treatment and treatment is postponed in patients considered as unhealthy according to mucogingival index. In case of periodontal problems occurring treatment period, treatment is withdrawn until the patient being healthy. The problems that may be caused by incompliance are explained to patients and patients are verbally acknowledged that they should contribute to treatment process in the start of treatment and each session. In several studies, it has been suggested that successful orthodontic treatment requires patient compliance in many issues such as oral hygiene, diet, use and maintenance of appliances and adherence to prescheduled visits (1-4).

In a study using reminders and informative message via a messenger application from start to end of treatment, no significant difference was found in baseline and post-treatment OPI and MGI values between study and control groups in agreement with our study. However, authors found that there was less bracket loss in the study group when compared to controls on contrary to our study where no significant difference was found in the number of brackets broken during study period (19).

The primary difference is that 3-months of pandemic was evaluated where treatments were withdrawn in our study while whole orthodontic treatment period was evaluated in the above-mentioned study.

Before pandemics, visits were scheduled by 4 or 5 weeks intervals in our clinic. In the study, communication was maintained by 2 weeks intervals since it is thought that message, mail or teledentistry communication will be less effective than warnings given during normal sessions. In a similar study, reminders about tooth brushing and solid foods were sent by twice weekly while educational messages about how tooth brushing will be performed or how periodontal pain will be relieved were sent once or twice weekly (19). We did not increase frequency of messages and teledentistry calls as in the above-mentioned study not to cause desensitization in our patients. The optimum frequency of communication with patients remains to be elucidated and requires further studies.

The fact that the study was performed during pandemics and that communication was established with patients during this period provided positive feedback in many aspects. Relieving patients concerns enhanced their trust to our clinicians. This is an issue that should be investigated by studies using psychological assessments. In our clinic, it is planned to implement such processes in addition to routine treatment procedure. The limitations of this study are that the bonding process and treatments of the patients were performed by different clinicians.

CONCLUSION

The communication is a highly important issue in the orthodontic treatment. According to the results of our study, particularly in extraordinary periods such as pandemic, it was required to communicate with patients to maintain normal therapeutic process. And also, oral hygiene monitoring can be performed via remote communication in any situation where patient control cannot be done. However, it was determined that communicating with patients in different ways did not make any difference in terms of the subjects investigated in the study. Despite this, it was verbally stated in the feedback that the trust of the patients in the institution increased. It was concluded that it would be more appropriate to conduct new studies including social and psychological evaluations.

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Peer-Review

Both externally and internally peer reviewed.

Conflict of Interest

The authors declare that they have no conflict of interests regarding content of this article.

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Ethical Declaration

Ethical approval was obtained from Hatay Mustafa Kemal University Clinical Research Ethical Committee with date 2020 and number 2020/71, and Helsinki Declaration rules were followed to conduct this study.

Informed consent was obtained from the participant and Helsinki Declaration rules were followed to conduct this study.

Authorship Contributions

Concept: HY, Design: HY, Supervising: FBZ, Financing and equipment: HY, Data collection and entry:İBK, Analysis and interpretation: FBZ, Literature search: İBK, Writing: HY, Critical review: FBZ

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