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Investigating the effect of Covid-19 pandemic on treatment and visit sessions of patients undergoing orthodontic treatment in Sari

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Abstract---Introduction: The spread of Covid-19 disease resulted in major public health problem around the world and the closure of dental clinics. Thus, millions of orthodontic patients were unable to complete their treatment. The present study aimed to investigate the problems of patients undergoing orthodontic treatment in Sari during the Coronavirus pandemic in 2021. Methods: This descriptive-analytical cross-sectional study was conducted on all patients who underwent active orthodontic treatment and referred to the dental clinics in Sari in 2021. The sample size was 200 people who were included in the study by a convenience sampling method. Data were collected by a standard questionnaire based on a Boostati study and analyzed in SPSS-22 software. Results: A total of 200 patients undergoing orthodontic treatment were included in the study. Among them, 153 patients (76.5%) were female and their mean age was 18.92

± 7.23 years. Seventy patients (35%) did not receive orthodontic treatment during the Covid-19 pandemic and 58 patients (82.9%) missed their visit for one or two months. There was no problem for 11 patients (5.5%) with removable orthodontic appliances. However, in patients with fixed orthodontic appliances, the highest frequency was related to protrusion of the wire from the end with 38 cases (60.3%) and the solution selected mostly was contact with the orthodontist in 27 patients (41.5%). There was no significant difference between age and gender based on missed visit sessions ($P > 0.05$). Also, no significant difference was observed between age and gender based on the problems ($P > 0.05$). Conclusion: The Covid-19 pandemic had a significant effect on orthodontic treatment, so that some patients were forced to cancel their visits and solve their problems by calling the orthodontist when needed.

Keywords---*Pandemic, Covid-19 disease, Orthodontics, Delayed treatment.*

Introduction

Coronavirus caused an pandemic around the world that affected the entire population despite protective measures such as quarantine, social distancing, use of personal protective equipment, disinfectants, and etc. (1, 2, 3). Since the onset of the Covid-19 pandemic, previously scheduled dental visits were suddenly disrupted and millions of patients were affected (4). Guidelines and consolidated information were developed by medical officials to prevent the spread of infection, so that dentists could not provide routine medical and orthodontic care unless it was emergency treatment (5). In Romania, the treatment of orthodontic patients was delayed for two months during quarantine, so that they were not allowed to visit their orthodontist monthly (6). Some of these patients experienced even more delays in treatment due to acute respiratory syndrome or direct contact with the positive case of Covid-19 and the need for quarantine for at least two weeks. Delays in treatment were also observed in several European countries (7).

In orthodontics, emergencies, such as failure of appliances, brackets, or tubes were not life-threatening, but it was recommended to address them immediately and avoid prolonging treatment, reducing patient motivation, and loss of patients' trust (8). Lack of regular visits, orthodontic problems and long periods of suspension of dental services had a significant impact on the lives and treatment of orthodontic patients (9). Thus, it was necessary for orthodontists to be aware of the patients' mental and physical condition to prioritize orthodontic dental services after reopening (8). Owing to the characteristics of dental procedures, such as face-to-face contact, droplet and aerosol production methods, and inflected surfaces, patients and dentists are exposed to high levels of pathogenic microorganisms and high risks of cross-infection (11). Moreover, standard precautions are not sufficient to protect physicians and patients against Covid-19 infection, which poses major challenges for dental services during this period (12). Thus, the present study aimed to investigate the visits and problems of orthodontic patients in Sari during the Coronavirus pandemic in 2021.

Methods

This descriptive-analytical cross-sectional study was conducted on all patients underwent active orthodontic treatment and referred to dental clinics of Sari. After receiving permission from the ethics committee of Mazandaran University of Medical Sciences, the researcher identified patients based on the inclusion criteria. Inclusion criteria were patients underwent active orthodontic treatment in all age groups and had consent to participate in the study. Patients treated in other dental service clinics were excluded from the study. According to the number of missed visits and orthodontic problems reported in previous studies (13) and by using the formula (1) and with a confidence interval of 0.95, the number of samples was calculated at 200 people. They were included in the study based on a convenience sampling method.

$$n = \frac{Z_{1-\frac{\alpha}{2}}^2 P(1-P)}{d^2}$$

Data were collected by a standard questionnaire based on a Boostati study (14). This questionnaire includes 4 parts. The first part is related to the demographic information of age, gender and also the type of orthodontic appliance (fixed or removable). The second part includes a question whether you missed an orthodontic visit during the coronavirus and if the patient is positive, he or she will enter the third part of the questionnaire. Finally, the fourth part of the questionnaire is related to the problems created for patients during this period and ways to solve it.

Boostati first used the opinions of an experienced orthodontist to validate the questionnaire. Reliability was also tested by a test-retest method which was confirmed. In the present study, the researcher provided a questionnaire to five orthodontists to evaluate the validity and after confirming the validity, the test-retest method was used to assess the reliability and the questionnaire was presented to 30 patients undergoing orthodontic treatment. The validity of the questionnaire with CVR and CVI indices was obtained at 0.87 and 0.91, respectively. The ICC index was 0.97. Therefore, the validity and reliability of the questionnaire were approved. Also, the internal consistency of the questionnaire questions using Cronbach's alpha coefficient was obtained at 0.78. Then, the researcher identified and selected the patients using a convenience sampling method, and after receiving their contact number, he sent them a message via WhatsApp messenger and explained the necessary explanations about the objectives of the study. Then, he asked them to answer the questionnaire questions if they were willing to participate in the study.

Data were collected in SPSS-22 software and analyzed at a significance level of less than 0.05. Mean and standard deviation were used to describe quantitative data and frequency distribution and percentage were used to describe qualitative variables. Mann-Whitney and Chi-square tests were used to analyze the data.

Finally, the patients were assured that their data and information would remain confidential and the researcher will not use them in another study.

Results

A total of 200 patients undergoing orthodontic treatment were included in the study. Among them, 153 (76.5%) were female and 47 (23.5%) were male. The mean and standard deviation of their age was 18.92 ± 7.23 years and their age range was from 8 to 40 years. Also, 189 patients (94.5%) used fixed appliances and 11 patients (5.5%) used removable appliances for treatment. Seventy patients (35%) did not receive orthodontic treatment during the coronavirus pandemic, so that 58 patients (82.9%) missed their visit for one or two months and 12 patients (17.1%) for more than two months.

Table 1 shows the frequency distribution (percentage) of lack of visiting dentist.

Table No. (1)
Frequency distribution (percentage) of lack of visiting dentist

Variables		Frequency distribution	Frequency percentage
Reason to stop visiting orthodontist	Closure of clinic	15	4.21
	Concerns about the spread of coronavirus disease	28	40
	Both reasons	17	38/6
Frequent contact with an orthodontist	I did not communicate	45	3.24
	Once or twice	8	3.64
	More than twice	17	4.11
The way of communicating with an orthodontist	clinic phone	46	8.86
	SMS	4	5.7
	social network	3	7.5
The most important concern during this period	Extend my treatment period	36	4.51
	Returning of my teeth to their previous state	34	6.48
Agree to close the clinic to prevent coronavirus disease	Yes	51	9.72
	No	19	1.27

Based on the results obtained (Table 1), the most important concern after cancelling the patients' visits was the extension of treatment in 36 patients (51.4%). Out of the 53 people who contacted their orthodontist, 46 (86.8%) agreed to close the clinic via phone, and out the 70 people who stopped their treatment, 51 (72.9%) agreed to close the clinic.

Table 2 shows the frequency distribution (percentage) of different types of problems and their solutions when using appliances.

Table No. (2)
Frequency (percentage) distribution of various problems and their solutions when using appliances

Solutions / Problems	protrusion of the wire from the end	Fall brackets of	Gingivitis	Fall of Orthog	Pain	Total
Contact with an orthodontist	19	8	5	1	12	275). (41
Ignoring the problem	12	3	4	0	7	187). (27
Orthodontic wax	15	7	6	2	14	213). (32
Send a photo to the orthodontist	1	0	0	2	0	36). (4
visiting the most available dentist	0	1	0	0	1	15). (1
Sending an emergency visit request	5	6	2	1	4	98). (13
Search for solutions to problems on the Internet	1	1	2	0	3	57). (7
total	3) 38.(60	6) 18.(7	115).(17	38). (4	263). (41	

Based on results (Table 2), there was no problem for patients with removable orthodontic appliances. However, in patients with fixed orthodontic appliances, the highest frequency was related to protrusion of the wire from the end with 38

cases (60.3%) and the highest the solution selected in this regard was contact with the orthodontist in 27 patients (41.5%).

As seen, regarding the protrusion of wire from the end, the highest frequency of solutions was related to contact with the orthodontist in 19 people, the highest solution in case of pain was the use of orthodontic wax in 14 people.

Table 3 shows age and gender based on missed visits.

Table (3)
Age and gender based on missed visits

variables		Missing visits		Mann-Whitney test
		no	yes	
age	Number	130	70	Z=1.85 P=0.064
	Standard deviation $\pm$ mean	9.7 $\pm$ 7.18	9.4 $\pm$ 5.19	
	Median	16 (9)	5 (8).18	
	(min-max)	(8-40)	(10-35)	
gender	female	8) 30.(63	2) 17.(36	χ^2 =0.04 P=0.848
	male	100 4).(65	6) 53.(34	

According to the results (Table 3), the mean age of people who missed their sessions was 2 and a half years older than those who did not miss their sessions, but the two groups did not show significant difference in terms of age ($P > 0.05$). Also, there was no significant difference between gender and miss of visit ($P > 0.05$).

Table (4) presents age and gender based on the problems.

Table (4)
Age and gender based on problems

Problem type		N	Standard deviation $\pm$ mean	median	(min-max)	Mann-Whitney test
protrusion of the wire from the end	no	27	9.1 $\pm$ 5.19	18 (9)	(10-31)	Z=0.45 P=0.650
	yes	38	7.7 $\pm$ 5.19	20 (7)	(12-35)	
Fall of brackets	no	47	9.6 $\pm$ 5.19	20 (8)	(10-35)	Z=0.20 P=0.843
	yes	18	5.2 $\pm$ 5.19	5 (8).17	(12-30)	
gingivitis	no	53	2.8 $\pm$ 6.19	20 (9)	(10-35)	Z=0.71 P=0.477
	yes	12	18 $\pm$ 3	5 (5).18	(14-23)	
Fall of O-ring	no	62	9.4 $\pm$ 5.19	5 (8).18	(10-35)	Z=0.55 P=0.603
	yes	3	5.3 $\pm$ 1.20	20 (0)	(19-22)	
pain	no	39	2.1 $\pm$ 6.20	20 (8)	(10-35)	T=1.07

	yes	26	9.5±4.18	18 (7)	(11-31)	P=0.286
Problem type		gender				Fisher's exact test
			male	female	total	
protrusion of the wire from the end	no		1) 3.(23	2) 24.(46	5) 27.(41	$\chi^2=2.28$ P=0.131¥
	yes		9) 10.(76	8) 28.(53	5) 38.(58	
Fall of brackets	no		5) 8.(61	(75) 39	3) 47.(72	P=0.489
	yes		5) 5.(38	(25) 13	7) 18.(27	
gingivitis	no		3) 12.(92	8) 41.(78	5) 53.(81	P=0.432
	yes		7) 1.(7	2) 11.(21	5) 12.(18	
Fall of O-ring	no		(100) 13	2) 49.(94	4) 62.(95	p>0.99
	yes		0	8) 3.(5	6) 3.(4	
pain	no		8) 7.(53	5) 32.(61	(60) 39	$\chi^2=0.26$ P=0.613¥
	yes		2) 6.(46	5) 20.(38	(40) 26	

According to the results (Table 4), 65 people missed their visit sessions and had problems. The mean age of people who had one of the types of problems did not show a statistically significant difference with the mean age of people who did not have that problem ($P > 0.05$). Males and females who had problems did not show a statistically significant difference in terms of any of the problems ($P > 0.05$).

Discussion

A total of 200 patients undergoing orthodontic treatment were included in the study. Among them, 153 patients (76.5%) were female and their mean age was 18.92 ± 7.23 years. Also, 70 patients (35%) did not receive orthodontic treatment during the coronavirus and 58 patients (82.9%) missed their visit for one or two months. There was no problem for 11 patients (5.5%) with removable orthodontic appliances. However, in patients with fixed orthodontic appliances, the highest frequency was related to protrusion of the wire from the end with 38 cases (60.3%) and the solution selected mostly was contact with the orthodontist in 27 patients (41.5%). There was no significant difference between age and gender based on missed visit sessions ($P > 0.05$). Also, no significant difference was observed between age and gender based on the problems ($P > 0.05$).

In a study conducted by Xiong et al. (2020) in China, 558 patients (104 males and 354 females) with a mean age of 24 to 78 years were examined. The results showed that missed visits were higher among female patients than male ones. More than one third of orthodontic patients experienced mental distress during coronavirus disease. Various factors such as the type of orthodontic appliance, the duration of the last dental visit and the way of communicating with the orthodontist (15) were influential in the level of anxiety of patients (15). In the present study, the number of females was more than males.

Dhanasekaran (2021) investigated 263 people in a study in India. The results revealed that 64.6% of orthodontists performed their orthodontic emergencies via phone (16), which was consistent with the results of the present study. Hariclea (2021) in Romania examined 105 patients. Orthodontists stated that status of 9.52% of patients was exacerbated due to lack of maxillary elastics, bracket fractures, fractures of removable orthodontic appliances, etc. (17). Finally, the highest level of personal protection and limiting treatment to emergencies was recommended during the Covid-19 outbreak. Surface disinfection, adequate ventilation, and disinfection of tools and equipment as well as adhering to guidelines were needed. Although infection in dental settings was minimized, dentists in all fields, including orthodontists, should be constantly aware of emerging infectious threats and updated infection control guidelines.

Conclusion

The results of present study revealed that the closure of dental clinics was a good decision for orthodontic patients and did not affect their treatment. Also, using the phone and communicating with the orthodontist was very helpful in this regard.

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