



TURKISH REPUBLIC OF NORTHERN CYPRUS  
NEAR EAST UNIVERSITY  
INSTITUTE OF GRADUATE STUDIES

**The Powerful Effects of Social Media Platforms on Orthodontic  
Patient Knowledge's Improving and Attitude**

MOHAMMED H.R. ALSLAKHI

PhD THESIS

DEPARTMENT OF ORTHODONTICS

Prof. Dr. ULAŞ ÖZ

2021-NICOSIA





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**NEAR EAST UNIVERSITY**  
**THESIS APPROVAL**  
**Directorate of Institute of Health Sciences**

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## LIST OF ABBREVIATIONS

BI.....	Bleeding Index
MGI .....	Modified Gingival Index
PI.....	Plaque Index
PLI.....	Plaque Index Scores
PD.....	Depth Measures
B.....	Buccal Surface
M.....	Mesial Surface
D.....	Distal Surface
L.....	Lingual Surface



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## ÖZET

**Amaç:** Bu araştırmanın amacı, ortodonti hastalarının ortodontik tedavi hakkındaki bilgilerini geliştirmek için bilgi kaynağı olarak sosyal medya sitelerini kullanmasının faydalarını araştırmak ve ayrıca ortodonti kliniklerinin finansal gelirini artırmada bu platformların faydalarını analiz etmektir.

**Yöntem:** Bu çalışmada anket çalışması ve klinik çalışma olmak üzere iki yöntem kullanılmıştır. Çalışmaya 250 hasta dahil edilmiştir. 150 hasta anket çalışmasına, 100 hasta klinik çalışmaya dahil edilmiştir. Anket çalışmasında hastalar anket formlarını doldurmuştur. Klinik çalışmaya dahil edilen hastalar rastgele kontrol grubu ve deney grubu olarak ikiye ayrılmıştır. Deney grubuna her gün instagram platformu üzerinden görsel-işitsel bilgi talimatlarında bulunulmuş, ortodontik aparey kullanımı hakkında bilgilendirici videolar iletilmiştir. Bunun yanında yine instagram platformu üzerinden randevu devamlılığı sağlanması adına hatırlatıcı mesajlar gönderilmiştir. Kontrol grubuna ise seans sırasındaki genel bilgi aktarımı yapılmıştır.

**Bulgular:** instagram uygulaması ortodonti alanında bilgi edinmek için en çok kullanılan platform olmuştur. Hastaların %74'ü ortodontik tedaviye başlamanın ana nedeninin sosyal medya siteleri olduğunu doğrulamış ve %73'ü ortodontik bilgi almak için sosyal medya sitelerini kaynak olarak kullanmıştır. Hastaların %69'u sosyal bir platformdaki ortodonti sayfasının takipçi sayısı ile ortodontistin işinin kalitesi arasında bağlantı kurmuştur. Ayrıca sosyal medya sitelerinin hasta-doktor işbirliği ve maddi gelir üzerine olumlu bir etkisi olduğu saptanmıştır.

**Sonuç:** Sosyal medyanın hastanın tedavisi sırasında doktoruyla işbirliğini artırmada ve ortodontistlerin maddi gelirine katkı sağlamada önemli ve etkili bir role sahip olduğu görülmüştür. Sosyal medya sayfaları üzerinden görsel-işitsel bilgi aktarımı ortodonti tedavisi gören hastaların tedavi bakımı hakkında bilgisinin artmasına yardımcı olmaktadır.

Anahtar Kelimeler: Ortodonti, Finansal gelir, Sosyal Medya, Hasta İşbirliği, Hasta bilgisi.

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## **ABSTRACT**

**Objective:** The point of this investigation was progressively impacting the benefits of utilizing social media sites as a wellspring of information to orthodontic patients for improving their knowledge about orthodontic care and treatment, therefore increase patient cooperation. Furthermore, analyze the benefits of these platforms in increasing the financial income of orthodontic clinics.

**Method:** This study contained two parts; the first part was a questionnaire study, the second part clinical study. 250 patients were included in this study. 150 patients taken a questionnaire study, while 100 patients were included in clinical study. We randomly selected patients and divided them into experimental group and a control group. The experimental group received daily audio-visual information and instructions, received messages to remind them to use the orthodontic appliance, and orthodontic appointments throughout our page on Instagram. The second group received conventional instructions.

**Results:** Instagram was the most used program to get orthodontic information. 73 % of patients using social media sites as a source to get orthodontic information. 74 % of patients confirmed social media sites were the main factor to start orthodontic treatment. 69 % of patients linked between follower's numbers on a social platform and the quality of the orthodontist's work. A positive result was found through the effect of these sites on patient cooperation and financial income.

**Conclusion:** Social media has an essential and influential role in increasing patient's cooperation and improving orthodontists' financial income; the use of audio-visual information leads to improve knowledge of patients related to orthodontic care.

**Keywords:** Orthodontics, Financial income, Social Media, Patient Cooperation, Patient knowledge.

## 1.INTRODUCTION

Over the past few years, and especially in the last decade, social media has become very popular at the individual and community levels (Kaplan et al., 2010). Social media platforms are interactive platforms through which the user can publish or modify some publications and share them with other people worldwide (Korhonen et al., 2012). Because of this rapid development and continuous change in the internet communication have affected positively. That contributed to the introduction of social networks to all societies and individuals of different ages and cultures (Cao et al., 2018). It became an inseparable part of our daily life, which caused a revolution in the interaction between people through these platforms (Picazo et al., 2012). Social media is defined; as a group of applications based on the internet that allows the exchange or reception of contents between participants (Lovejoy et al., 2012). Or it is also known as techniques and methods that individuals can use to share opinions, perspectives, and experiences quickly and smoothly. As a result of this spread, millions of people worldwide have become using social media sites (McCarroll et al., 2013). Social media has become an essential part of our society that cannot be tolerated or dispensed with. On the other hand, social networks have provided the opportunity for individuals to conduct dialogue and discussions from and to any place in the world (Smailhodzic et al., 2016). Consequently, several people are using social media to create content and communicate with organizations for marketing or interaction to sell some product, and therefore many organizations are increasingly using social media to be able to attract the most significant number of stakeholders (Lin et al., 2012). This platform provides an accessible, simple, and most importantly, low-cost way to market a product or to spread specific information compared to other usual means (Mesko et al., 2012). Recently, the use of social media platforms has significantly been applied in the field of health care. This has allowed doctors to give advice and information to patients in simple manners and has been positively reflected on patients (Randeree.,2009). Through these platforms, it is also possible to establish reliable channels communication rooms through which doctors can discuss and give information, especially in cases that need rapid intervention, lead to increasing the patient's health (McCarroll et al., 2014).

In health care, Fisher conducted a study that talks about the importance and significant role that these platforms play in the health field and the extent of their impact on patients. This study reported that 83% of patients constantly use social platform programs to get information about their treatment. About 56% of the patients participating in this study are looking forward to contacting their treating physicians to have quick conversations and get medical advice quickly through these networks (Fisher et al., 2009). Systematic reviews of the literature on social networks in the field of health care indicated that 72% of the studies examined supported the use of social networks in health care as a tool for communication between health workers and patients (Belt et al., 2015). In oral and dental medicine, the use of social networks has increased significantly by dentists or patients. A survey conducted in the United States of working dentists revealed that 52% of dental practitioners use social networks continuously and mainly for marketing and communicating with their patients (Craig et al., 2015). Duggan et al., In 2013, conducted a massive variety of information that talks about orthodontics on social media platforms. This information has a profound impact on the process of forming orthodontic patients' opinions. Therefore, orthodontists must get acquainted intensively with these platforms (Ajwa et al., 2018). A recent qualitative analysis of the publications related to orthodontics was conducted. This analysis revealed that many orthodontic patients had used the social networking site to transmit positive and negative opinions about orthodontic treatment (Rachel et al., 2014). Although the creation of social media platforms was initially for personal use, it has become effectively used by everyone and has become an important center for advertising and marketing (Ajwa et al., 2018). It has become, in our time, more effective and less costly compared to traditional advertising methods, especially that many people spend a long time browsing these platforms (Stephen et al., 2012). Dental researchers have suggested using social media for marketing to reach hundreds of new patients with less time and cost (Azark et al., 2010; Baker et al., 2010). Research by Edwards and others shows that the main factor in choosing an orthodontist is a good reputation (Edwards et al., 2009). Besides, several recent reports talking about the perceived quality of care among orthodontists in health care centers, where the results showed that the doctor's hearing ranked higher than the cost of treatment and the doctor's experience, where the results as follows: 66% of the doctor, the cost of treatment, 28%, and the orthodontist's expertise 40%, from this logic, social media is an essential and central tool for managing reputation (Tu et al., 2008).

Using these platforms allows patients to share their experiences during orthodontic treatment with the public (Van et al., 2015).

Modern literature claims that about 30% of internet users use social media platforms to access orthodontics health information. Because these platforms provide information visually and audibly, which facilitates comprehension over the counterpart of other traditional means of receiving information (Papadimitriou et al ., 2020), thus, the orthodontist can benefit from these platforms in several areas, which will be positively reflected in orthodontic treatment (Rachel., 2015).

On the other hand, these sites have become platforms for sharing pictures related to the daily life of an orthodontic patient with those who follow them (Henzell et al., 2013). Some orthodontists use social media sites to increase the educational awareness of orthodontic patients by sharing information, instructions or sharing some orthodontic cases that have undergone orthodontic treatment to encourage people to start orthodontic treatment. This, which will lead to an increase in the financial income of the clinic (Cox et al., 2014). There is no doubt that the knowledge and skills of the orthodontist play a fundamental role in the success of orthodontic treatment and the achievement of the desired results. Still, other essential factors are no less important: the extent of the patient's cooperation for treatment, commitment to the appointments, and the patient's interest in oral care and hygiene (Al-Silwadi et al., 2015).

The orthodontist can take advantage of the social networks to create a direct communication link between the orthodontist and the patient, which orthodontist can send and share some audio and visual information and advice to the patient to increase the patient's health awareness and reduces the harmful effects of orthodontics, thus reducing the duration of orthodontic treatment (Henzell et al., 2013).

## **2. GENERAL INFORMATION**

Influence of social media site on orthodontic treatment

### **2.1. Social media platforms influence orthodontic treatment through three main points:**

- **Impact on orthodontic treatment time.**
- **Its effect on oral hygiene.**
- **Its effect on marketing and increasing the financial income of the clinic.**

When starting orthodontic treatment for any patient, the first question that patients ask: How long will I need to wear orthodontic braces or device?

When will I remove the braces, or when will I finish orthodontic treatment?

All patients or parents prefer to finish orthodontic treatment in the shortest time (Richter et al., 1998). But several main factors contribute to orthodontic treatment time. In all cases, a shorter treatment time is best for both the patient and the orthodontist (Skidmore et al., 2006). The patient's how to finish their treatment on time or more concisely than the specified time will be more grateful and more likely to refer additional patients. For orthodontist's complete treatment in shorter time allow more accurate prediction of costs and make more time to treat more patients (Fink et al., 1992).

Many studies examine the orthodontic treatment time, but one of the most important studies conducted by Beckwirth et al., 2009, they conducted intensive research and found that the average treatment time is 28.6 months where they found the study that orthodontic treatment time depends on several essential variables, which can be divided into four broad categories: patient cooperation, sociodemographic characteristics, malocclusion characteristics, and treatment methods.

#### **Impact on orthodontic treatment time**

One of the necessary things for successful results during orthodontic treatment and reduce orthodontic treatment time is patient cooperation or compliance (Pfeil., 2009). This is based on the method of providing instructions to patients regarding punctuality in maintaining appointments, oral hygiene, the use of elastic, and the correct use of orthodontic devices (Beckwith et al., 1999).



If the patient does not follow these instructions, this may increase the time required for orthodontic treatment (Richter et al., 1998).

Also, the treatment results may be compromised. In cases, the orthodontist may have to end the treatment urgently, and premature termination of treatments becomes necessary to prevent tissue damage or prevent enamel decalcification (Davies et al., 1991). Many studies and research have been conducted that focused on studying the best ways to improve patient's behavior and make them comply with the instructions given by the orthodontist. One of these suggested the best ways to improve patient's behavior, and cooperation is through a reward program (Grady et al., 1988; Gross et al., 1882; Drbman et al., 1973). Still, these methods were not good enough for a lot of patients. Especially those at a young age were not able to fundamentally understand the instructions given by orthodontists (Hammerslag et al., 2014). So, the instructions must be given to them in an easy, smooth, and modern way, like sending some educational clips that talk about caring for oral and dental health during orthodontic treatment, reminding patients of the appointment's times assigned to them on an ongoing basis, communicating with patients continuously, and establishing a positive communication link between the orthodontist and the patient (Wang et al., 2007). Thus, the patient's feeling of importance will be reflected positively in the patient's behavior and psychology (Palaiologou et al., 2020).

### **Its effect on oral hygiene**

Dental oral hygiene is essential to maintain the teeth and the oral mucosa tissue in healthy condition. Still, it may become complicated and face some difficulty after the fixed orthodontic treatment begins. The percentage of teeth exposure to decay and gingivitis increases significantly following the placement of fixed orthodontic devices (Zachrisson et al., 1972; Huser et al., 1990). There is a lot of researches found a significant loss of gingival attachment, increasing in pH buffer capacity, plaque index scores (PLI) and lactobacilli level in saliva after the start of fixed orthodontic treatment and significant increase of the plaque index (PI), bleeding index (BI), and pocket depth (PD) measure (Paolantonio et al., 1997). During the first six months of treatment, a significant change in the oral microbiota was observed in subjects with fixed appliances. Such a result suggests that the risk of gingivitis was high during the therapy, and the risk of periodontitis could not be excluded. (Petti et al., 1997).

But these risks can be minimized if the patient maintains continuous and proper oral hygiene and abide by the instructions given by the orthodontist.

### **Its effect on marketing and increasing the financial income of the clinic**

Marketing using social media has many benefits and is newly seen in healthcare, the main tactic in the orthodontic area. Marketing using social platform sites is a cost-effective way to reach hundreds or perhaps thousands of new patients seeking a clinician's care and service (Ajwa et al., 2018). Social media is a powerful tool to advertise and attract new patients with less time, cost, and effort. A lot of studies reported that the most critical factor in selecting an orthodontist is reputation. Some studies reported and explained the benefits of using social platform sites in orthodontics to establish a good channel for communication and build friendly relationships with patients, establish a reputation, and thus attract new patients (Gupta et al., 2015; gensen et al., 2015).

### **2.2. Risks of using social media**

There is no doubt that social media has very great importance daily basis, and it is beneficial to individuals and society (Meshi et al., 2020). These platforms are equally a double-edged sword that can be misused or mismanaged, negatively affecting the user or the recipient (Ventola., 2014). Therefore, these platforms need to be constantly monitored continuously, and any negative messages or comments that can harm others need to be resolved (Cao et al., 2018). Anyone can create an account on one of these platforms and share false information or advice about orthodontics care and treatment that does not correspond to reality, which leads to the formation and creation of wrong thinking about orthodontic treatment among patients (Svela et al., 2012). On the other hand, some dentists who have not received proper training that allows them to perform orthodontic treatment may publish pictures or information that can be correct and maybe wrong to attract several new patients. In some cases, some dentists violate professional ethics and the confidentiality of patient information, and they share pictures of patients on these websites without obtaining the patient's consent, which causes embarrassment to many patients.

### **3. OBJECTIVE**

The study aims to investigate the impact effects of social networks on orthodontic.

We investigated the impact of these platforms on the patient's knowledge. Therefore, we explored how distributed audio-visual media information improves patient participation, cooperation, oral hygiene, and bracket bonding failure, thus reducing the duration of orthodontic treatment. We have given patients a audio-visual instructions to minimize any adverse effects of orthodontic treatment during the period in which clinics were closed due to the COVID-19 pandemic by using social media sites (Instagram). On the other hand, we must investigate how orthodontic patients utilize social media destinations to share their treatment-related encounters and mentalities towards supports. Furthermore, it was essential to investigate the possible benefits of social platforms in advertising to expand the budgetary pay of orthodontic facilities (Edwards et al., 2008).

### **4. SETTING / SAMPLE POPULATION AND METHOD**

The present study contained two-part (questionnaire and clinical examination). The first part is a prospective questionnaire study. One hundred fifty orthodontic patients were recruited as participants from the orthodontic clinic at the Near East University (North Cyprus). A specialized team of orthodontists working at the Near East University wrote the questions included in the questionnaire, taking into account that these questions were simple, free of complexity, and comprehensive of the topic in all areas. The average duration of answering this questionnaire does not exceed five minutes.

This study contained patients of multiple nationalities and a broad range of social levels. The patients were 12 years and over from both sexes. Patients were excluded if they were not users of social media sites, had a history of previous orthodontic treatment, craniofacial syndrome, systemic diseases. The questionnaire was carried out during June, July, August, September, and October 2020. During that period, all eligible patients visiting the orthodontic clinic were approached by the clinic's receptionist and invited to participate in the survey. The questionnaire was anonymously answered in the clinic's waiting room with taking all protective measures

to prevent the spread and transmission of COVID 19 virus infection, usually before the patient's scheduled appointment. This study obtained ethical approval from a committee specialized in ethical affairs at the Near East University, where all the procedures that were implemented and worked out in this study were under the ethical standards of the institutional research committee. Consent of all patients who underwent this study was obtained while maintaining the strict confidentiality of the personal information of the participants in this study. For patients who are less than 18 years of age, we have also obtained the consent of their parents.

The questionnaire was prepared in two languages (English, Turkish) and divided into three sections (Figure 4.1, 4.2.). One of the orthodontists working with us gave the questionnaire to the patients and left them alone to have the freedom to answer and prevent influencing them. The first section contained basic sociodemographic information (e.g., age, gender) and the stage of orthodontic treatment (before, after, or during the treatment). The second section of the survey included questions assessing the information of patients about their cases and the role of social sites in the decision to go for orthodontic treatment. Additionally, this part was concerned with identifying orthodontic pages or social media sites that each patient used to rely upon to gain information related to orthodontic treatment, contains questions related to using social media as a source to acquire information related to orthodontic care and treatment, and it includes questions to compare the evaluation awareness of patients who use social media as a source to gain information continuously with other patients who do not use social media to gain information. The last section focused on how orthodontic patients communicate their treatment experiences and attitudes through social media sites (Facebook, Instagram, Twitter).



**NEAR EAST UNIVERSITY**  
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İletişim ve teknoloji araçlarındaki büyük gelişme nedeniyle, internet bilgi edinmede en sık başvurulan kaynak olmuştur. Hızı ve iletişim pratikliği sayesinde hayatımızda vazgeçilmez bir yere sahip olan internet, sosyal medya araçlarıyla tüm alanlarda bilgi edinme ve yaymada önemli rol üstlenmiştir. İnsanlar sosyal medyada paylaştıkları fotoğaf ve bilgilerle etkileşim halinde olarak diğer insanlar üzerinde etkili olmaktadır. Bu anketin amacı, sosyal medya kullanımının ortodontik tedavi ile ilgili bilgilerin edinilmesi ve yayılması üzerindeki etkisini araştırmaktır. Araştırmaya katılım gönüllülük esasına dayanmakla birlikte; elde edilen veriler bilimsel amaç haricinde kullanılmayacaktır. Bu çalışmaya katkı sağlayabilmek adına, ortalama 5 dk süren anketimize katılmanız rica olunur.

Aşağıdaki sorular ortodonti bölümü tarafından yürütülen bir çalışmanın parçasıdır. Bu çalışmaya katılmayı kabul ediyor musunuz?

Evet

Hayır

<b>İsim</b> .....		
<b>Yaş</b>		
<input type="checkbox"/> 10 - 18	<input type="checkbox"/> 18 -25	<input type="checkbox"/> 25'ten büyük
<b>Cinsiyet</b>		
<input type="checkbox"/> Erkek	<input type="checkbox"/> Kadın	
<b>Ortodontik tedavi aşaması</b>		
<input type="checkbox"/> önce	<input type="checkbox"/> sonra	<input type="checkbox"/> sırasında

Figure 4.1.1. Questionnaire form in Turkish language

1. Sosyal medya , ortodontik tedaviye baslama kararınızı etkiledi mi?

Evet

Hayır

2. Ortodontik tedavi hakkında paylaşım yapan site, sosyal medya hesap veya sayfalarını takip ediyor musunuz?

Evet

Hayır

3. Bir önceki soru için eğer cevabınız evet ise, bu sayfa veya hesapların size faydalı olduğunu düşünüyor musunuz?

Evet

Hayır

Bir önceki soru için hayırı cevapladım

4.Ortodontik tedaviyle ilgili bilgi almak istediğinizde, bu bilgiye ulaşmak için sosyal medya kullanır mısınız?

Evet

Hayır

5. Sosyal medyada ortodontik tedaviyle ilgili yayınlanan bilgilerin doğru olduğunu düşünüyor musunuz?

Evet

Hayır

6.Eğer bir ortodontistin sosyal medyada çok fazla takipçisi varsa, bu size iyi bir ortodontist olduğunu mu düşündürür?

Evet

Hayır

7. Ortodonti hakkındaki bilgilerinize göre, ortodontik tedavinin çocuklarda ergenlik öncesi ve ergenlik sonrasında yapılması arasında fark olduğunu düşünüyor musunuz?

Evet

Hayır

Figure 4.1.2. Questionnaire form in Turkish language

8. Ortodonti hakkındaki bilginize göre, eğer çene kemiği gelişimi ile ilgili bir problem varsa ortodontik tedavinin bu problemi erken yaşta çözebileceğini düşünüyor musunuz?

Evet

Hayır

9. Ortodonti tedavisi hakkında bilgi elde etmek için, en çok kullandığınız sosyal medya uygulaması nedir?

Twitter

Facebook

Instagram

Youtube

diğer

Bilgi almak için sosyal medyayı  
Kullanmamak

**Bu bölümde, ortodontik tedavinizle ilgili sosyal medya sitelerinde etkileşiminizi inceleyeceğiz**

1. Hiç bir sosyal medya platformunda ortodontik tedaviniz hakkında fotoğraf veya videolar paylaştınız mı?

Evet

Hayır

Henüz ortodontik tedaviye başlamadım

Bu anket ile ilgili tüm cevaplar ve kişisel bilgiler tamamen gizli tutulacak ve bu konudan sorumlu olanlar tarafından görülmeyecektir.

işbirliğiniz için teşekkürler ve iyi günler

Figure 4.1.3. Questionnaire form in Turkish language



Because of the great development in the means of communication and technology, the Internet has become a major player in the acquisition of information, and the means of social communication have become an important and central role in the acquisition and dissemination of information in all fields. The aim of this questionnaire is to know the extent of the impact of social media sites the acquisition and dissemination of information related to orthodontic treatment. You are kindly requested to participate in our survey, which takes an average of 5 minutes.

The following questions will be part of a study conducted by the Department of Orthodontics. Do you agree that you will be included in this study?

Yes

No

Name .....		
Age		
<input type="checkbox"/> 10 - 18	<input type="checkbox"/> 18 -25	<input type="checkbox"/> Bigger than 25
Gender		
<input type="checkbox"/> Male	<input type="checkbox"/> Female	
Stage of orthodontic Treatment		
<input type="checkbox"/> Before	<input type="checkbox"/> During	<input type="checkbox"/> After

Figure 4.2.1. Questionnaire form in the English language



**1. Was social media a reason in making your decision to start dental orthodontic treatment?**

Yes

No

**2. Do you follow accounts or pages on social networking sites that talk about orthodontic treatment?**

Yes

No

**3. If your answer was yes to the previous question, were these pages or accounts helpful in your opinion?**

Yes

No

I answered no to the previous question

**4. If you want to get information related to orthodontic treatment, do you use social media to get this information?**

Yes

No

**5. Do you think that information being posted on social media related to orthodontic treatment is correct?**

Yes

No

**6. Did you believe that if orthodontic has many followers in social media good orthodontic?**

Yes

No

**7. In your knowledge about orthodontic do you think orthodontic treatment for children before puberty is similar to after puberty?**

Yes

No

Figure 4.2.2. Questionnaire form in the English language

**8. In your knowledge about orthodontic, if there is a problem in the jawbones (maxilla and mandible), do you think that orthodontic treatment can solve this problem at an early age?**

**Yes**

**No**

**9. What social media application do you use most to obtain information about your orthodontic treatment?**

**Youtube**

**Instagram**

**Facebook**

**Twitter**

**Others**

**Not use social media to obtain**

**information**

**In this section, we will study your interaction on social media sites related to your orthodontic treatment**

**1. Have you ever used social networking sites as a platform to share photos or videos related to your orthodontic treatment?**

**Yes**

**No**

**I didn't start orthodontic treatment yet**

All answers and personal information regarding this questionnaire will be kept strictly confidential. We thank you and have a good day.

Figure 4.2.3. Questionnaire form in the English language

In the other part of this study, we created a page on social networking site (Instagram). We had chosen the Instagram social networking program from other social networking programs for several reasons because it is more popular than other programs and for ease use and dealing with it (Cao et al., 2018). It can be by sending pictures or audio clips and publishing them through it (Thomas et al ., 2020). Patients who participated in the questionnaire were asked to follow it. We have excluded those patients who have finished treatment or are in the final stage of orthodontic treatment. This page aimed to raise awareness of orthodontic patients about their orthodontic treatments and to create a platform for communication between patients and their orthodontists, to reduce the problems that may occur during orthodontic treatment, and to give the necessary instructions and advice to patients who undergo orthodontic treatment. Thus, reduce the adverse impact that may arise due to the inability of patients to come to the clinic.

Further, 100 patients had been selected from our orthodontic clinic characterized by a lack of cooperation (lack commitment) to appointments, dropped many braces, bad oral hygiene, and those who were not committed to putting elastic. Those patients were divided into two groups, the first one (experimental group) and the second one (control group); each group contained N=50 patients. Patients in the experimental group received daily audio-visual information and instructions about orthodontic care and oral hygiene. Shared information related to orthodontic care and treatment sent to this group of patients. (Figure 4.3,4.4). This multimedia contains uncomplicated and straightforward information about the correct and ideal way to clean the teeth during orthodontic treatment how to deal with problems that may arise during orthodontic treatment and also contain motivational videos and simple questions to increase the interaction between the patient and the therapist orthodontist (Figure 4.5, 4.6). Thus, to create a positive environment and favorable patient for orthodontic treatment. They received messages and notifications to remind them to use the orthodontic elastic and remind the patients about orthodontic appointments throughout our page on Instagram (Figure 4.7) . Over three and half months, periodically, and daily. The second group received conventional instructions and information at orthodontic clinics.



Figure 4.3. Clips explaining the best way to eat during orthodontic treatment.



Figure 4.4. Clips were explaining how to take care of oral hygiene during orthodontic treatment properly.

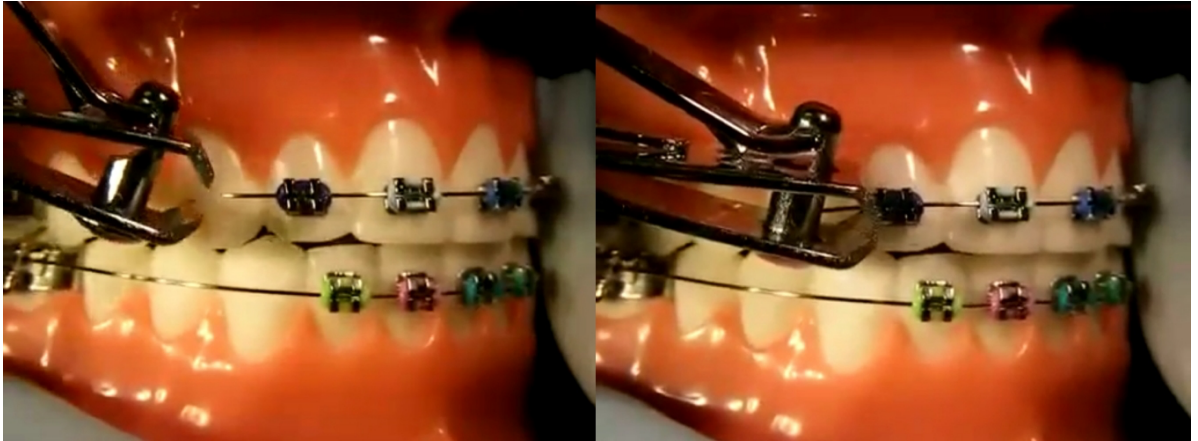


Figure 4.5. How to deal with an emergency situation that may arise during orthodontic treatment



Figure 4.6. How to deal with an emergency situation that may arise during orthodontic treatment

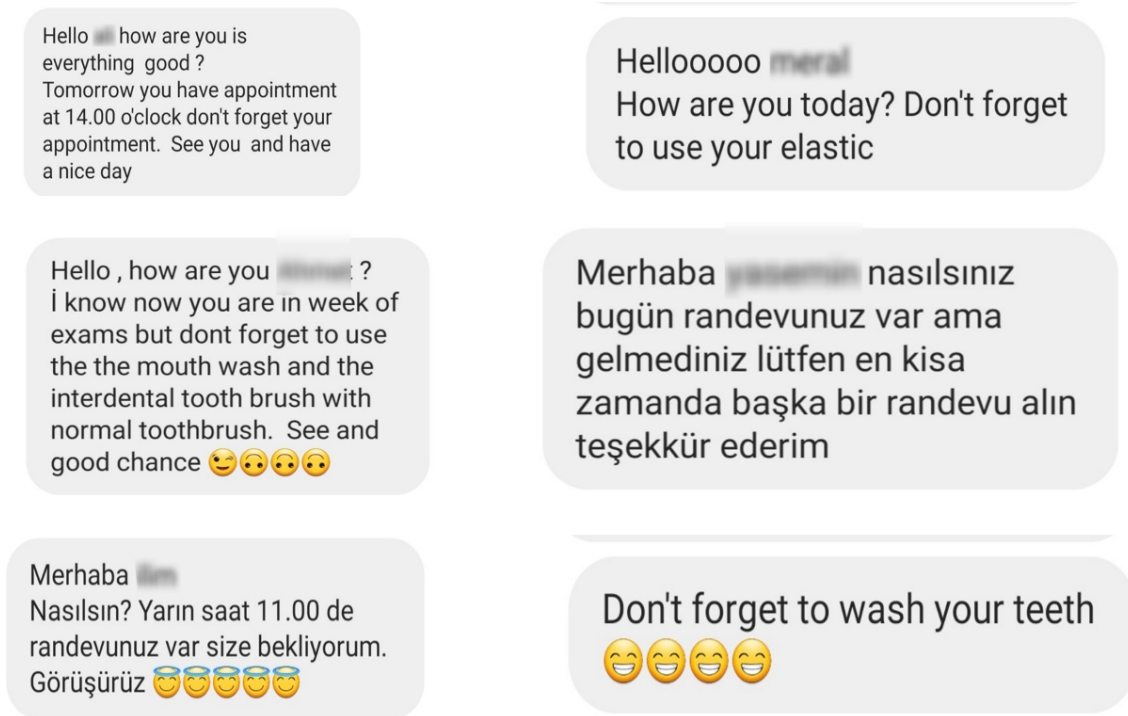


Figure 4.7. Reminding and motivation messages sent to patients

**4.1 The study duration of the last section was fifty weeks, with five appointments. Both groups were evaluated continuously and every three weeks. The methods of assessing patient compliance were used in this study is divided into three points;**

4.1.1. Oral hygiene

4.1.1.1. Modified Gingival Index (MGI)

4.1.1.2. Plaque index (Silness and Loe )

4.1.2. Appointment punctuality

4.1.3. Appliance maintained

#### 4.1.1.1. Modified Gingival Index (MGI)

This method was developed by Lorene, Waterford, Ross, Lamm, and Menaker in 1986. It is a simple method to assess gingival tissue and evaluate the prevalence and severity of gingivitis (He et al., 2018; Rebelo et al., 2011). It was strictly based on a noninvasive approach, just visual examination only without any probing. Uses a rating score between zero and four, with zero indicating a tooth with healthy gums and four the most severe inflammation with spontaneous bleeding (Table 4.1) (Tobias et al., 2020).

We obtained MGI by examining the lingual and labial surfaces of the gingival margins and the interdental papilla for all erupted teeth except 3rd molar and scored it in the fifth appointment (Figure 4.8).

Score	Inflammation
0	Normal (absence of inflammation)
1	Mild inflammation (slight change in color, little change in texture) of any portion of the gingival unit
2	Mild inflammation of the entire gingival unit
3	Moderate inflammation (moderate glazing, redness, edema, and/or hypertrophy) of the gingival unit.
4	Severe inflammation (marked redness and edema/hypertrophy, spontaneous bleeding, or ulceration) of the gingival unit.

Table 4.1. Modified Gingival Index (MGI)

## HEALTHY SITES PROVIDE MORE CLINICALLY RELEVANT MEASUREMENTS

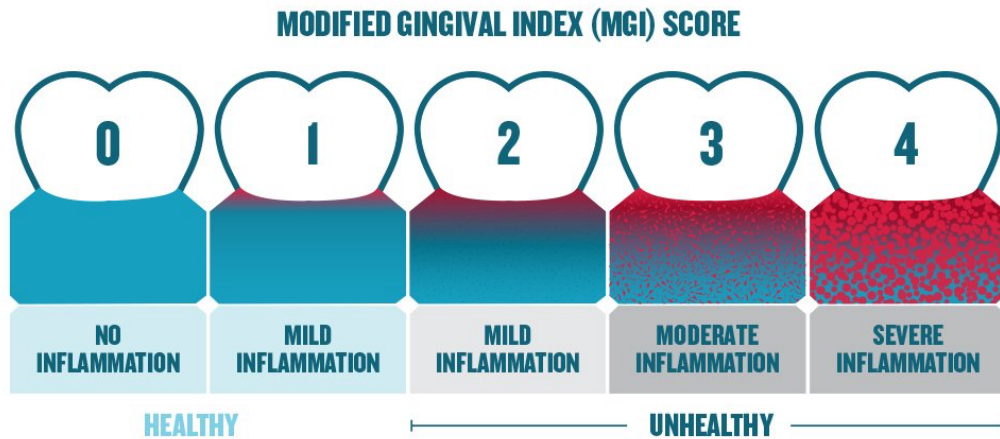


Figure 4.8. Modified Gingival Index (MGI)

### 4.1.1.2 Plaque index (PI)

Silness and Loe developed this method in 1964 to assesses the thickness of plaque at the cervical margin of the tooth closest to the gum. By examining the four surfaces of the upper anterior teeth mesial, distal, lingual, and labial surface (Mander et al ., 1980).

The plaque index for each surface should be between 0 to 3 (Table 4.2) (Figure 4.9).

Score	Accumulation of plaque
0	The gingival area of the tooth surface is free of plaque. The surface is tested by passing a pointed probe across the surface of the tooth surface at the entrance to the gingival crevice after the tooth has dried thoroughly. If there is no soft tissue adhering to the tip of the probe, the area is considered clean.
1	No plaque is visible in situ to the naked eye, but plaque is visible at the tip of the probe after it has moved over the tooth surface at the entrance to the gingival crevice. Disclosing Solution was not used in the original examination but may be useful.
2	The gingival area is covered with a thin to moderately thick layer of plaque. The deposit is visible to the naked eye.
3	Heavy accumulation of soft matter, the thickness of which fills the niche formed by the gingival margin and the tooth surface. The interdental area is clogged with soft debris.

Table 4.2. Plaque index (PI)



Plaque index of the tooth: We calculated the plaque of each tooth from the four surfaces and divided it into four.

Plaque index for individual = We have collected the plaque index of the tooth for all upper anterior teeth and divided it into six (number of teeth).

Plaque index for group = Plaque index for all individuals divided by the number of persons (Bendoraitienė et al .,2017).

Interpretation of plaque index (Silness and Loe )

0..... Excellent

0.1-0.9..... Good

1.0-1.9..... Fair

2.0-3.0..... Poor

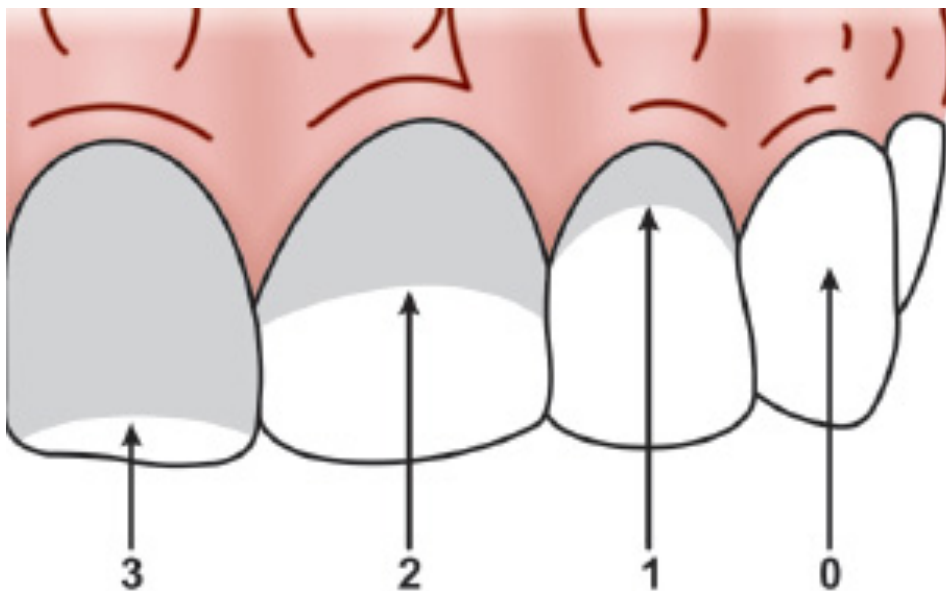


Figure 4.9. Plaque index (PI )

#### 4.1.2. Appointment punctuality

We calculated a punctual appointment for patients quickly and straight forwardly as over five appointments for each patient, the output of all appointments would be 250 appointments per group. We divided patients' appointment commitments into three sections: 1. Committed 2. Uncommitted 3. semi-committed. Based on this, we calculated the extent to which patients committed their appointments in both groups.

### 4.1.3. Appliance maintained

We also assess this by calculating the number of broken brackets or loose bands for each group separately. We calculated this during the usual time for each patient, over five appointments. This analysis shows the effectiveness of giving instructions to patients in an audio-visual way and comparing them with the traditional method of giving instructions. Therefore, we compared the results for each group.

## 5. RESULTS

In the first part of this study, one hundred fifty patients participated in this survey. This sample included numerous nationalities and human races. Still, most of the participants were of Cypriot citizenship, 50% females and 50% males. The age groups of the patients who participated were as follows: 12-18 years (28%), 18-25 years (45.3%), older than 25 years (26.7%) (Table 5.1).

The ages of the patients who participated in the questionnaire	Number of patients who participated in the answer	Percent of patients who participated in the answer	Cumulative Percent
Between 12-18 year	42 persons	28.0%	28. %
Between 18-25 year	68 persons	45.3%	73.3%
Over than 25 year	40 persons	26.7%	100%
Total of patients	150 persons	100%	

Table 5.1. The ratio between the ages of those who participated in the questionnaire

Most participants (97.3%) were in treatment, with no significant differences between them and those who had either not yet started or completed treatment. About 74% N= 111 of participants (predominantly female) confirmed that social networks were the main trigger for their decision to go to the orthodontist and start orthodontic treatment. While N = 39, they answered that the primary reason to begin orthodontic treatment is not a social media site (Table 5.2).

Social media participation in decision making to start orthodontic treatment	The number of patients who participated in the answer	Percent of patients who participated in the answer
Answered yes	111 patients	74%
Answered no	39 patients	26%
Total of patients	150 patients	100%

Table 5.2. Effect of social media to decide to start orthodontic treatment; participants response

Approximately 73% N= 110 of the respondents reported using social media sites as a source of information regarding orthodontic treatments, especially in the age group between (18- 25 years) N= 68 patients, (12-18 years) N=42 patients, over than 25 N=40. In comparison, about 40 patients not using social media sites as a source of information regarding orthodontic treatments (Table 5.3).

Social media sites as a source to obtain orthodontic information	The number of patients who participated in the answer	Percent of patients who participated in the answer
Answered yes	110 patients	73.0%
Answered no	40 patients	26.7%
Total of patients	150 patients	100.0%

Table5.3. Social media sites as a source for obtaining information; participants response

Among the patients who participated in the questionnaire, Instagram was the most frequently used program with 32.7% N= 49; the second was YouTube with 24.0% N = 36, then Facebook with 15.3% N= 23 and Twitter 5.3% N= 8. (Figure 5.1).

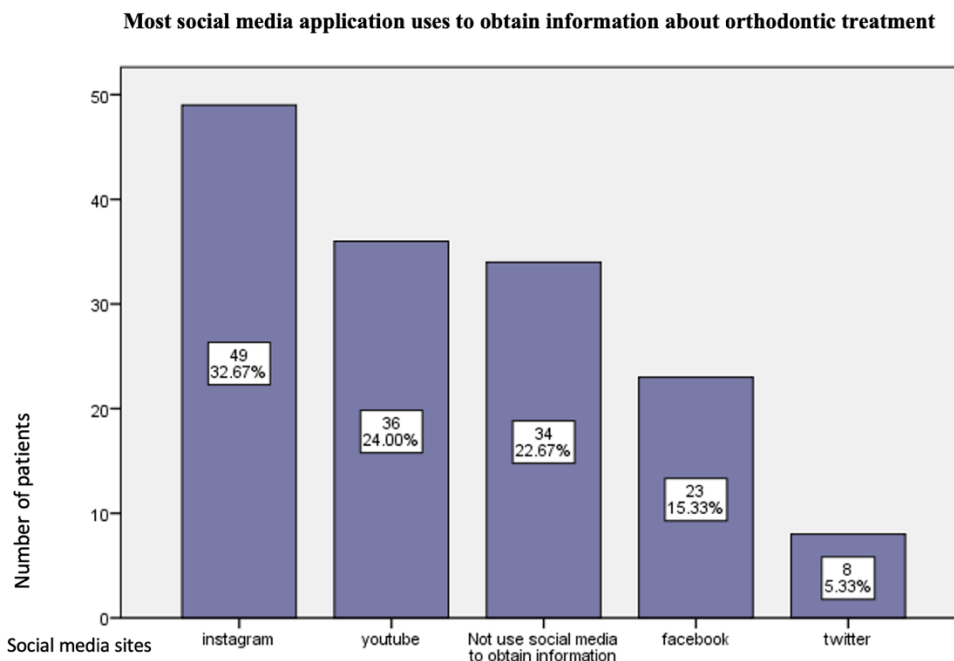


Figure 5. 1. Comparison between the main social media sites that use to obtain information related to orthodontic treatment

A large number of participants, 69.3%, N=104 patients, were linked flanked by the number of followers on social platform sites and the quality of the orthodontist's work. They believed that the more significant number of followers is a solid indicator of a reliable & competent orthodontist, While N=46 patients considered no relationship (Table5.4).

Too many followers mean good orthodontist	The number of patients who participated in the answer	Percent of patients who participated in the answer
Answered yes	104	69.3
Answered no	46	30.7
Total of patients	150	100.0

Table 5.4. Too many followers mean good orthodontist: participants response

Few participants (8.7%) N= 13 patients used social networking sites as a platform to share photos or videos related to orthodontic treatment preferred by females over males. (Table 5.5).

Social networking sites a platform to share pictures or videos related to orthodontic treatment	The number of patients who participated in the answer	Percent of patients who participated in the answer
Answered yes	13 patients	8.7%
Answered no	132 patients	88.0%
I didn't start orthodontic treatment yet	5 patients	3.3%
Total	150 patients	100%

Table 5.5. Social Networking Sites as A Platform to Share Photos or Videos Related to Orthodontic Treatment; participants response

We conducted a test that included questions related to orthodontic treatments. We found that a significant number of people who use social websites as a source to get information related to orthodontic treatments have much more information and knowledge compared to those who do not use social media or do not follow accounts associated with this topic.

92% of the people who use social media to gain information related to orthodontics answered correctly, while only 15% of those who do not use social media to gain information answered correctly.

Finally, a very positive result was found through our page we created on the social media site (Instagram) to increase patient cooperation and reduce the orthodontic treatment time.

We found that giving instructions and advice to patients in a graphic and audio format has a very positive and beneficial effect compared to the traditional methods of providing information. We also found that creating a communication link between the patient and the orthodontist outside the framework of the orthodontic clinic has a beneficial effect on the cooperation of patients, and this is what we noticed in this study that was conducted between two patients groups.

After approximately five appointments, we found a positive effect and improvement in oral hygiene of the patients in the experimental group compared to the other group, through using the modified gingival index and plaque index for oral hygiene assessment.

We found modified gingival index results as follows in the experimental group; N=26 had mild gingival inflammation 52% , N=21 had mild gingival inflammation of the entire gingiva unit 42% , N=3 had moderate gingival inflammation 6%.

We also found the modified gingival results as follows in the control group; N=4 had mild gingival inflammation 8%, N=24 had mild gingival inflammation of the entire gingiva unit 48%, N=18 had moderate gingival inflammation 36%, N=4 had severe gingival inflammation 8%.

We found the plaque index results in experimental group Good = 0,518 and control group fair =1.75.

In terms of patients' commitment to assigned appointments, the results were as follows in the experimental group 205 appointments out of 250 throughout the study 82%, Accurate commitment was shown, but 30 appointments were observed delaying the patient's arrival from 15 to 30 minutes 12%, while 15 appointments were missed entirely 6%.

In the control group, 143 appointments out of 250 throughout the study 57.2%, an accurate commitment was shown, but 21 appointments were observed, delaying the patient's arrival from 15 to 30 minutes 8.4%, while 86 appointments were missed entirely 34.4%.

On the appliance maintenance side, the patients in the experimental group were more interested in maintaining orthodontic brackets and dental bands. The total of the brackets and bands over the course of the study that was either broken or lost was 9. In contrast, in the other group, the number of brackets and bands that were broken or lost was much more significant; it was 49 brackets and a band.

Finally, concerning the financial return of the clinic. We made a statistic about all new patients who came to the orthodontic clinic of the Near East university between June - October, where we found that out of every ten new patients wanting to start orthodontic treatment, four new patients came as a result of the ads that we placed on our page on Instagram. This positively affected the clinic's income, as these social networking sites showed a force that cannot be underestimated in marketing without commission.

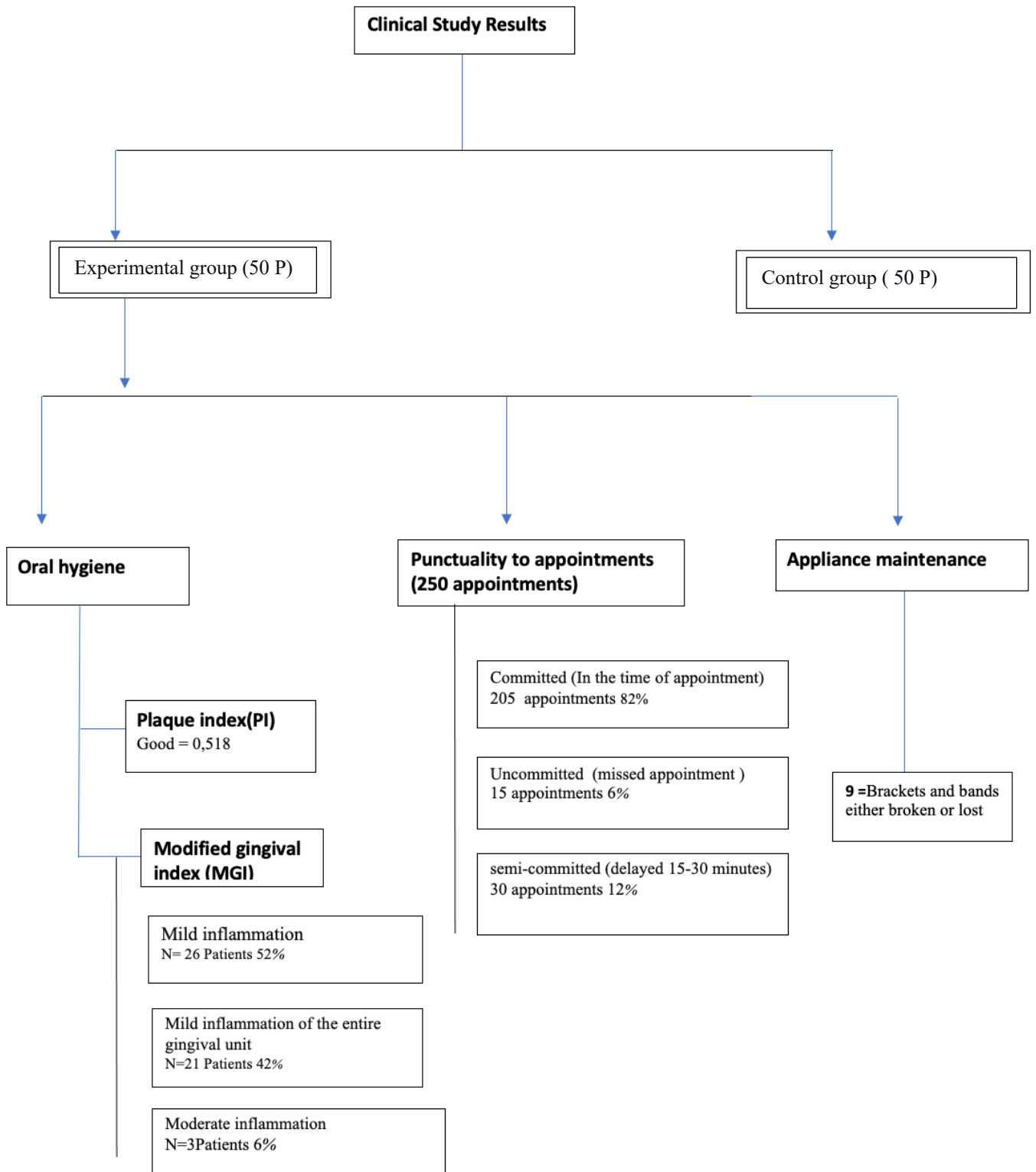


Figure 5.2. Comparison of the clinical results between experimental and control group

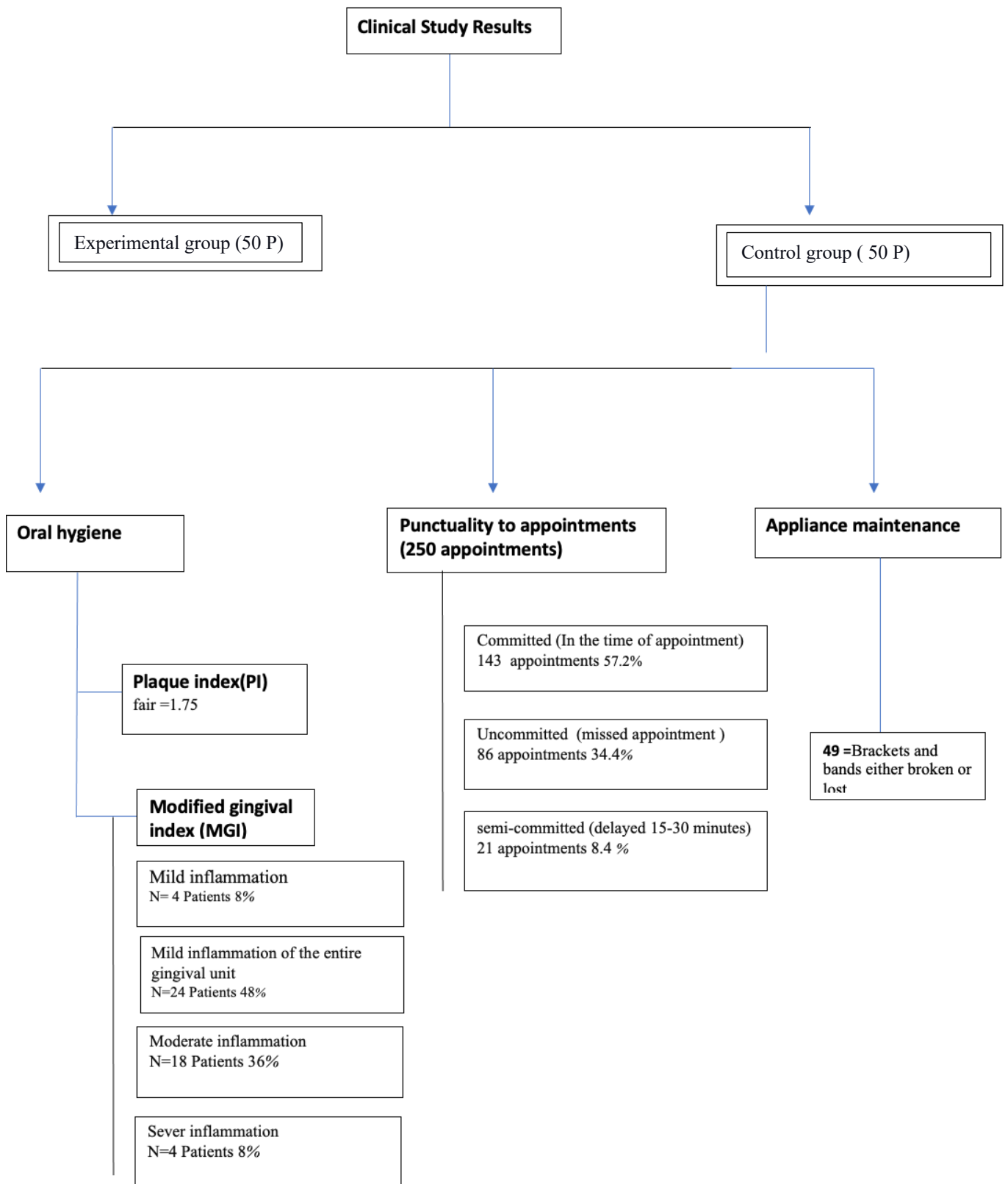


Figure 5.3. Comparison of the clinical results between experimental and control group



## 6.DISCUSSIONS

The outcomes resulting from any orthodontic treatment depend on many factors; the clinician factor has a significant impact and plays an essential role. Still, patient factors, for example, patient knowledge and cooperation, are progressively being perceived as crucial for accomplishing ideal treatment outcomes (Li et al., 2016). The force that innovation exerts on contemporary society is evident in technical disciplines or the world of social life. Recently, social media platforms have assumed a significant function in medical care, reported in various studies (Antheunis et al., 2013).

In this study, significantly different from many studies that focus on social media and its impact on orthodontic care and treatment. Because in this study, we established a link between social media sites and clinical orthodontic treatment. Social media networks are found to be a popular way, especially among adults and teens, to obtain information as it is considered the fastest and easiest way to get information either through audio materials or by direct questions to the orthodontist. These networks are currently the key to sources of information and the dissemination of views (Ajwa et al ., 2018).

This research is divided into two-part (questionnaire and clinical study). The questionnaire study contained two sections. The first section is related to use of social media as a source of information for orthodontic patients. The second section of the questionnaire determines how orthodontic patients use social media sites to share their orthodontic treatment experiences and thoughts.

A recent report found that a large percentage of adults use social networking sites daily, with that percentage reaching 73%. And 79% of adult females compared of adult males. The researchers also found that 89% of adults ages eighteen to twenty-nine years old use, and that use has steadily decreased with age (Norouzizadeh et al., 2016). These results were somewhat close to our findings; we originated that 73.4% of patients use social networking sites as a source to obtain information related to orthodontic treatments and care; the majority were adult females.

During our study, we found that most of the participants tend to use social media sites of Instagram 32%, followed by YouTube 24%. Compare to a study conducted in 2015; the researcher found that the YouTube program is the most popular program for attracting information, followed by Instagram (Al-Silwadi et al., 2015); this is slightly different from what we found. Another study conducted at the University of Hong

Kong, in 2020, investigated that most students tend to use social media to get quick and pictorial information and that what we also found (Chan et al., 2020).

Our study showed that many patients who used social media as a source of information significantly improved their knowledge about orthodontic treatment compared to non-users of social media. The observed differences in knowledge may be significant enough to collide the outcomes of orthodontic treatment, including the time consumed and efforts exerted by orthodontists. Confirmation for that research conducted by Al-Silwadi, in 2015 studied the effect of these platforms on individuals' information and knowledge. It was found that individuals tend to receive information from these platforms more than traditional ways because they are simplest and pictorial. , And also, is in line with a study conducted where the results of this study showed that social media has an influential role in acquiring and developing information between high schools students in the UK (Hamid et al., 2020).

We found about 74% of participants predominantly female confirmed that social networks were the main trigger for their decision to go to the orthodontist and start orthodontic treatment through the statistics that we made, previous study conducted on orthodontic patients, claimed the majority of patients (76%) reported the likelihood of visiting an orthodontics website before receiving treatment with a significant patient (39%), indicating that they visited a Facebook page. Approximately (35%) of patients showed that they visited the social media sites of an orthodontist when deciding to start the treatment (Cox et al., 2015), another study contradicting what we found in our study conducted on a group of people who use social networks opposed this view, it was reported that many patients wanted to start orthodontic treatment or were thinking about it, but some negative comments from some other patients changed their minds to begin orthodontic treatment (Lee et al., 2015).

The majority of patients trust the orthodontic with a more significant number of followers on social media sites than others with a little number of followers, which is a powerful indicator of the importance of these social sites to broaden a trustworthy relationship with patients. They believe that all the more followers someone has, the more credible and experienced in a currency. This is the opinion of the participants in this survey.

It was found that around 8.7% of participants had personally posted comments about braces, where females posted most of the photos and information on their social media accounts. This percentage is considered somewhat small, as many patients who

undergo orthodontic treatment, especially fixed treatment, often try to hide their smiles for psychological reasons and thus feel ashamed of the existence of fixed braces (Bradley et al., 2020).

In the clinical part of this study. We studied the impact of these platforms on the cooperation of patients, oral hygiene, appliance maintenance, and the income of the clinic. Many studies conducted previously stated that the best way to improve patients' behavior and increase their cooperation is a rewards program (Hammerslag et al., 2014). However, this method is not practical, especially for adolescent or adult patients. So, we investigated the effect of social media platforms on patient behavior management. The experimental group showed a very improvement in the patient's cooperation for orthodontic treatment, a remarkable commitment to oral care on the one hand, and the other hand commitment to the appointments assigned to them. There is also an increase in the maintenance of orthodontic devices. And this we did not notice in the other group. That because people tend to absorb information as audio-visual content rather than traditional ways. A study conducted by Thomas et al., in 2010 showed that giving orthodontic patients instruction and information by audio-visual technique was significantly improved their knowledge be large enough to positively impact the outcome of orthodontic treatment because of certain aspects of patient compliance such as oral hygiene and patient cooperation.

On the other hand, social media platforms had an excellent role in increasing the financial income of the clinic. Likewise, we had the option to demonstrate by making a page on the social networking site (Instagram) to consider the effect of this platform on marketing and dragging a new patient. We received many messages talking about their intentions to start orthodontic treatment. Within a month, we noticed several patients came to the clinic and showed their interest in starting orthodontic treatment. This conclusively indicates the extent of the influence of social media in improving the income of the orthodontist. Especially since these platforms are considered low or no-cost media platforms, that also proven in a study conducted by Smith et al. in 2017 investigated the positive effect of social media platforms on the financial income of the clinic. Another study suggested orthodontists who utilized social media to share their training and information on the site had more new patients every year than those who didn't (Keim et al., 2013). A previous investigation found a correlation between the presence of social media and the number of new patients in clinics (Smailhodzic et

al., 2019; Shaw., 2012). It was discovered that social media use in orthodontic practice was genuinely successful as work on building techniques (Singh et al., 2020).

The study that we conducted differs from many studies that discuss the relationship between social media and orthodontics, as this study contained clinical trials and a detailed and integrated questionnaire. This does not mean that it does not include some shortcomings.

Examination of social media use in orthodontic consideration is still in the early stages of progress. Therefore, meaningful analyzes are needed to understand the impact of social media on patient knowledge, behavior, and outcomes of orthodontic treatment. The patient samples used in this study are small and may not represent all types of people. It may be necessary to conduct further studies that include a larger patient sample, where results are expected to differ according to the geographical area, culture, and level of patient awareness. The questionnaire could have been done online, which would guarantee a large number of participants in the questionnaire. Still, at the same time, we were satisfied only with the patients participating in the clinic for the reliability of the results.

In the section that includes practical experience on patients, the number of patients participating in this study is relatively small. We can, in future studies, increase the number even more. On the other hand, the difference in ages among the patients participating in this study may affect the results slightly. Still, the reason for this difference is to make the research is more comprehensive.

## 7 | CONCLUSION

Social media has an essential and influential role that cannot be underestimated in orthodontics, as it directly affects the patient's cooperation for orthodontic treatment. On the other hand, it affects the financial income of orthodontists.

Our study found that Instagram was the most common social media site that uses orthodontic patients to obtain information related to orthodontic treatment and care, and the majority in females and younger patients.

Using social media to conduct information results in an improvement in knowledge of patients related to orthodontic care, appliances & increases patient's cooperation, thus the time needed for treatment and efforts done by the orthodontist compared with standard methods of providing information.

Use social media as a means to give advice and instructions to the patients. It has an essential role in reducing the adverse effects that may occur due to the patient's inability to come to an orthodontist, especially because of the compulsive conditions that the world is exposed to due to the spread of the COVID 19 virus.

Social media sites have an effected role in increase the oral hygiene of patients, motivation toward treatment, and decrease clinic chair time.

It was apparent that social platform sites played an important role in increasing the income of the orthodontist as a cost-effective means of marketing.

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