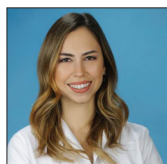


Original Article

A qualitative twitter analysis of the patient experience with invisible orthodontics; lingual braces versus invisalign

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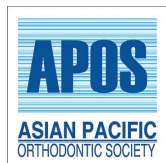
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ABSTRACT

Objectives: The aim of this qualitative study was to examine orthodontic patients' thoughts and experiences about the invisible orthodontic treatment options – lingual braces and Invisalign – through the analysis of Twitter posts' content.

Materials and Methods: A software program was written for the data collection. The program consecutively collected the tweets posted over an 8-month period from Twitter's publicly accessible database. Tweets that were written in the English language and contained any of the four keywords “Invisalign,” “lingualorthodontics,” “lingualbraces,” and “invisiblebraces” were collected. The tweets that included irrelevant or incoherent posts, professional advertisements, unclear/not applicable content, and reposts were excluded from the study. Two authors, with different experiences, independently read, and analyzed the tweets. Each applicable tweet was classified into one of the three categories: Positive, negative, and neutral for two study groups (Invisalign and lingual braces). Pearson Chi-square test was used to analyze the negative and positive tweet rates of the groups.

Results: 1176 of 2407 tweets were selected as applicable and analyzed by the authors. There was a statistically significant very good agreement between the two observers (Kappa = 0.933, $P < 0.001$). The negative comment rate (39%) and neutral comment rate (31.1%) in the lingual group were statistically higher than the Invisalign group (27.2% and 21.7%, respectively; $P < 0.001$). The positive comment rate in the Invisalign group was significantly higher (51.1%) compared to the lingual group (29.9%, $P < 0.001$).

Conclusion: Orthodontic patients use social media to share their experiences and feelings about their treatment process. The applicable Tweet number and the positive Tweet rate in the Invisalign group were higher than the lingual braces group.

Keywords: Orthodontics, Invisalign, Lingual braces, Social media

INTRODUCTION

The importance of social media today is indisputable. Social media offer a way to communicate and share information interactively and dynamically. People use different social media platforms for different kinds of sharing.^[1] Over the past few years, Twitter, a microblogging service, has become an increasingly popular social media platform for Web users. Because tweets are compact and fast, Twitter has become widely used to spread and share breaking news, personal updates, and spontaneous ideas.^[2] People use Twitter for sharing information, knowledge, and opinions about any subject they want. It has 554.7 million active users, and post a collective 58 million tweets

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each day. Moreover, Twitter has 135,000 new users joining the network daily. Twitter is most popular in USA, Japan, UK, UAE, Russia, and Brasil. However, Twitter is common all over the world; it is undeniable that as a communication platform, Twitter has increasingly infused itself into daily life – regardless of one’s geographical location.^[3] In addition, Twitter content can be analyzed to understand characteristics, conversation topics of individuals or organizations tweeting, and public opinions and beliefs about any specific topic.^[4] Researches claim that more than 80% of internet searches are related to medical affairs.^[5] Social media platforms are typically used by medical professionals and patients to share information and/or experiences.^[6] It has also been proven that large population of orthodontic patients use social media sites.^[7] Orthodontic patients can share personal experiences regarding their specific treatment or their opinions about the available treatment options. Thanks to Twitter, patients’ ideas or experiences are analyzed by orthodontists from all over the world.^[8-10] Twitter provides a large database with which to examine the effects of orthodontic treatment on daily life. The Twitter content was previously used for the analysis of patient experiences regarding orthodontic retention,^[11] orthognatic surgical treatment,^[12] braces versus Invisalign,^[10] and orthodontic marketing, etc.^[13] The reason why Twitter was chosen to be used in similar studies as it is a platform where patient comments can be evaluated with written posts.

In this modern era, teenagers and adults prefer to be treated aesthetically than the conventional treatment methods to correct irregular teeth. Therefore visual-awareness prevents the use of traditional treatment methods. This has led to further inventions with aesthetically contemporary advances for invisible orthodontics such as clear braces, lingual orthodontics, and clear plastic appliances.^[14] The reason why these techniques are preferred more is that they cannot be seen at first sight by other people. The patient experience with traditional conventional braces and Invisalign – the most common aligner technique – has been compared in different studies before. Some researchers claimed that Invisalign patients experienced less pain and discomfort.^[15] However, others found no significant differences in pain levels or speech dysfunctions between the two techniques.^[16] Noll *et al.* analyzed Twitter content to examine patient experience with having braces compared with Invisalign and found no significant difference in attitude between them.^[10] Given the increasing popularity of invisible orthodontics, lingual braces and clean aligner systems, further research is needed to investigate other aspects of the patient experience.

The aim of this study was to examine patient experience, knowledge, and opinions about lingual braces compared with those of Invisalign through the analysis of Twitter content.

The null hypothesis of the present study is that there is no difference between the patient satisfaction with lingual braces and Invisalign.

MATERIALS AND METHODS

This study was approved by the Ethics Committee of the Medical School of Akdeniz University Antalya, Turkey (App No: 08.04.2020-253).

Data collection

A software program was written for the data collection. The software program was written by a computer engineer specifically for the present study. The program consecutively collected the tweets posted over an 8-month period between July 2019 and March 2020 from Twitter’s publicly accessible database. Tweets that were written in the English language and contained any of the four keywords “Invisalign,” “lingualorthodontics,” “lingualbraces,” and “invisiblebraces” were collected. These keywords were chosen to define lingual technique and orthodontic clear aligner systems in public language. The keyword “Invisalign” was reported as the most frequently used search term for orthodontic aligners on the Internet.^[17] It was also determined that the keyword “invisiblebraces” was used for both of the lingual orthodontics and aligner systems by the Twitter users. This search yielded total of 2407 tweets. The tweets were exported to an Excel database (Microsoft, Redmond, WA, USA). The tweets that included irrelevant or incoherent posts, professional advertisements, unclear/not applicable content, and reposts were excluded from the study. Both of the authors (E.B. and E.H.) agreed on the exclusion decision for every single tweet. The 1176 tweets that met the inclusion criteria were divided into two groups: Lingual braces ($n = 165$) and Invisalign ($n = 1011$) related tweets.

Content analysis

Manual coding of tweets by trained data collectors with high inter-rater reliability was reported as the most ideal technique for the analysis of Twitter content because of their brevity and the use of sarcasm, slang and unconventional forms of written expression.^[4] For this reason, tweets were manually analyzed by the authors in the present study.

Each applicable tweet was classified into one of the three categories: Positive, negative, and neutral for two study groups. Two authors (E.B. and E.H.), with different experiences, independently read and analyzed the tweets. The authors were blinded to the identity of the Twitter users and each other’s classification during the content analysis. The Kappa statics was used to measure agreement between the authors. Areas of disagreement between authors were resolved by consensus in a case-by-case manner.

Statistical analysis

The data were statistically analyzed using SPSS software package (version 23.0, SPSS Chicago, USA). Pearson’s Chi-

square test was used to analyze the differences between the negative and positive tweet rates of the groups. The Kappa statistic was used to measure agreement between the authors.

RESULTS

Over an 8-month period, 2407 tweets were collected. Of these, 23.7% (569), which were classified as “irrelevant” (712 and 29.6% of the total) or “advertisement” (1281 and 53.2% of the total), were excluded from the study. Therefore, 1126 applicable tweets were classified into two study groups: Invisalign (1010 and 89.7% of the total) and lingual braces (and 116 and 10.3% of the total). All tweets were analyzed by the two authors (E.B and E.H). The compliance statistics of the observers were examined and it was determined that there was a statistically significant very good agreement between the two observers (Kappa = 0.933, $P < 0.001$). The agreement in the categories was 90.4% in irrelevant, 93.3% in positive, 96.1% in negative, 94.1% in neutral, and 99.5% in advertisement. Areas of disagreement between the authors were resolved by consensus in a case-by-case manner.

Positive, negative, and neutral tweet rates of the study groups are shown in [Table 1]. Applicable tweets about lingual braces ($n = 165$) were 30.3% positive (50), 30.9% neutral (51), and 38.8% (63) negative. In the Invisalign group ($n = 1011$), 51.1% of the tweets were positive (517), 21.7 % of the tweets were neutral (220), and 27.2 % were negative (274).

The negative tweet rate (39%) and neutral tweet rate (31.1%) in the lingual braces group were statistically higher than the Invisalign group (27.2% and 21.7%, respectively); the positive comment rate in the Invisalign group (51.1%) compared to the lingual braces group (29.9%) was significantly higher (Table 1, $P < 0.001$).

DISCUSSION

A common concern for many patients considering fixed appliance orthodontic treatment is the appearance of fixed labial braces.^[17] A more appealing substitute for many patients is clear aligners and lingual orthodontics, which are called invisible orthodontics. The reason why these techniques are preferred more is that they cannot be seen at first sight. Lingual orthodontics compromises a fundamental

expression of this esthetic requirement.^[18,19] The aligner technique is an orthodontic treatment method based on the usage of removable, clear semi-elastic polyurethane aligners.^[20] Nowadays, the popularity of the invisible orthodontic techniques is increasing due to the increase in patients’ aesthetic concerns and expectations. Although patient cooperation is crucial in orthodontics, it is not just the clinical features or material properties also the patients’ expectations and experiences about these current techniques that should be evaluated. Traditional deductive research tools used to investigate patients’ perspectives, such as questionnaires, have the disadvantage of narrowing down the themes in question by restricting the emergence of new perspectives.^[12] However, as a new communication platform, in social media people can share any idea or experience without any restriction. As a result of the increasing use of the Internet and social media in the medical field by both professionals and laypeople, the need for studies investigating the content of posts on various health-related topics is increasing.^[21] A study investigating the content of Twitter posts relating to dental pain found that the public was using this social media site to share their experiences and thoughts about dental pain, as well as to seek advice from fellow users.^[22] It has also been proven that large proportion of orthodontic patients use internet-based social media sites and share their experiences and positive or negative thoughts about orthodontic treatments.^[7] Watts *et al.* analysed the Twitter sharing’s of the patients about orthognathic surgical treatment and concluded that their findings could increase the awareness of clinicians to better counsel their patients throughout the entire treatment process.^[12] The aim of the present study was to evaluate the patient experiences with lingual braces and Invisalign, which are the most common techniques that an orthodontist can recommend to a patient with high esthetic expectations, using Twitter content.

Strengths of the present study include accurate classification of a large volume of tweets and the individual analysis of each tweet. Due to the contraction of words in tweeting and the use of slang, sarcasm and unconventional forms of written expression, individual analysis was suggested as the most applicable technique for Twitter content.^[4] A limitation of the present and the other Twitter studies is the inability to gather demographic information, as users’ demographics are not linked to their profile.^[10] The inclusion of Twitter users only, which may not reflect the general patient population, despite the increasing usage of the Internet and social media may also be another limitation of the present study.

In the current study, there were both positive and negative tweets about lingual braces and Invisalign. Most of the patients were satisfied with the aesthetic results of the techniques. For example: “Very happy i went with Invisalign and pleased with the results [sic],” and “Getting Invisalign

Table 1: Comparison of negative, neutral, and positive tweet rates between two groups.

	Total		Invisalign		Lingual Braces		P
	n	%	n	%	n	%	
Negative	339	28.9	275	27.2	64	39	<0.001
Neutral	270	23	219	21.7	51	31.1	
Positive	565	48.1	516	51.1	49	29.9	

Pearson Chi-square test. Statistically significant differences are written in bold.

instead of braces was the best decision I've made [sic].” Moreover, a lot of patients were tweeting about their desire to be treated with invisible orthodontics, for example: “i want to get lingual braces so bad [sic],” “I can't wait to start Invisalign. So much better than traditional braces.” Moreover, there were a lot of “selfies” included in tweets, showing the progress of their treatment: “Nearing the end of my Invisalign treatment. My teeth are lookin' sweeeeet! pic.twitter.com/iIDB1ZvZLr [sic].”

Negative tweets were most likely about the pricing of the techniques. Patients claimed that invisible orthodontics was more expensive than most dental treatments. For example, there were a lot of tweets such as “Kind of want lingual braces but those are expensive as xx [sic].” A negative complaint about the invisible orthodontics was that the patients claimed that they could not be understood while talking with invisible orthodontics. Complaints about “lisp” were both in Invisalign- and lingual braces-related tweets. For example; “i just got my lingual braces and i have a little lisp [sic], ” and “Got my invisible “braces” today and I now have a lisp [sic].” Patients also complained about the pain involved in both of the techniques. “Why didn't anyone tell me that Invisalign hurt. Oh my god, my tooth is screaming [sic],” “Use lingual braces really hurts tongue [sic], ” Some patients complained about not being able to eat whatever they wanted to while the others were happy to lose weight. “Going through a break up and getting Invisalign in the same month has been the ULTIMATE weight loss program [sic],” “Everyone: you're gonna lose weight on invisalign because you won't wanna take them out to eat Me, an intellectual: lets take these bad boys out and eat as much food as possible to make it worth it [sic]. However, patients often talked about a disadvantage that the aligners can accidentally be thrown away and lost “Just when I thought my day wasn't so bad I realize I lost my Invisalign:-) [sic].”

Neutral tweets generally belonged to people who were indecisive about being treated with invisible orthodontics or the conventional treatment. They seek answers from their followers who have been treated with the techniques they were searching for. However, irrelevant tweets were most likely about celebrities tweeted by their fans. They mentioned that having lingual or Invisalign braces is “cute” or “cool” because their role model is being treated with one of the techniques. The authors analyzed a lot of tweets in this regard; “I just checked and apparently he had lingual braces? They're like fake teeth perfect [sic].”

The present study analyzed Twitter posts about invisible orthodontics to understand patients' experience better. There were far more applicable tweets related to Invisalign than lingual braces and the positive tweet rate was significantly higher in the Invisalign group. Based on these results, we can say that the Invisalign is more common than the lingual braces among Twitter users.

CONCLUSION

- Orthodontic patient population uses Twitter for sharing expectations, experiences, and thoughts or seeking advice about invisible orthodontic treatments.
- The applicable tweet number and the positive tweet rate in the Invisalign group were higher than the lingual braces group.
- Negative tweets were generally about the pain, lisping, and price issues for both techniques.

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Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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Conflicts of interest

There are no conflicts of interest.

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