

# Oral Hygiene Behavior during Fixed Orthodontic Treatment

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## Abstract

**Objective:** To assess oral hygiene behavior among patients undergoing orthodontic treatment with fixed appliances.

**Material and Method:** One hundred and five orthodontic patients (33 males and 72 females) treated with fixed appliances at the Orthodontic Clinic, Department of Orthodontics, Faculty of Dentistry, Mahidol University, Thailand were studied. Patients were requested to fill out a structured questionnaire regarding the reason for seeking orthodontic treatment, the necessity of orthodontic treatment in daily life, oral hygiene behavior after placement of fixed orthodontic appliances. The data was analyzed to determine the frequency distribution and percentage ratio for each of the variables.

**Results:** Approximately 83% of the patient sought orthodontic treatment for esthetic tooth alignment and 85.7% reported orthodontic treatment was necessary in their daily lives. During orthodontic treatment, 61% of the patients used orthodontic toothbrush, 81.9% used fluoride toothpaste. Percentage of regular and occasional uses of dental floss were 19% and 60%. Similarly the use of regular and occasional use of mouth wash was 23.8% and 55.2%, toothpick 21% and 51.4%, and interdental brush 36.2% and 51.4%. Approximately 45% of the patients brushed their teeth in the morning and before bed, 28.6% brushed after meals, and 25.7% brushed every time after meals or snacks. About 83% reported that their orthodontists or dental assistants instructed them how to brush their teeth. Only 52.4% of the patients received instructions about oral hygiene care supplements.

**Conclusion:** Most patients sought orthodontic treatment for esthetic tooth alignment and reported the necessity of orthodontic treatment in daily life. Although most of the patients used fluoride toothpaste, orthodontists and dental assistants should increase their awareness for instructing their patients in oral hygiene care to prevent caries and periodontal disease during fixed orthodontic treatment. Oral hygiene instruction is essential in all cases of orthodontic treatment and the use of adjuncts must be reinforced.

**Keywords:** Oral hygiene behavior; Orthodontic treatment; Fixed appliance

hygiene behavior among patients undergoing orthodontic treatment with fixed appliances.

## Introduction

Orthodontic treatment has many recognized benefits in enhancing esthetics, function, and self-esteem in patients. However, orthodontic appliances can cause unwanted complications of enamel demineralization, tooth decay, and gingivitis. Previous studies [1,2] have shown that orthodontic care can lead to increased demineralization, or white spot lesions, on the buccal surfaces of teeth bonded with fixed appliances as compared to untreated control teeth. Excessive plaque retention adjacent to brackets and attachments is the cause of this white spot lesion [3]. In fact, inadequate pretreatment oral hygiene and poor oral hygiene during orthodontic treatment is associated with greater incidence and severity of white spots lesions [4]. Furthermore, plaque retention can lead to increased development of hyperplastic gingivitis and periodontal breakdown [5,6]. Therefore, it is a challenging task to maintain acceptable oral hygiene in patients undergoing fixed orthodontic care in order to prevent dental caries and gingival inflammation. Since oral hygiene behavior has an important role in oral health care, it was the purpose of this study to assess oral

## Materials and Methods

The study sample consisted of 105 patients undergoing orthodontic treatment at the Graduate Orthodontic Clinic, Faculty of Dentistry, Mahidol University, Thailand. There were 33 males and 72 females, aged 13 to 41 years, who were recruited at the beginning of orthodontic treatment. The mean age of the sample was 20 years (SD ± 6.4 years). These patients were treated by postgraduate students and were asked to complete a structured questionnaire. It composed of the reasons for seeking orthodontic treatment, the necessity of orthodontic treatment in daily life, and oral hygiene behavior after placement of fixed orthodontic appliances. Questions regarding patient's oral hygiene behavior were regarding the selection of toothbrush, toothpaste and other supplemental oral health care products, frequency of brushing, and oral care information they received from orthodontist or dental assistant. The patients who were enrolled in the study were asked to complete questionnaires face-to-face with one of the members of the research team so that any hesitations could be addressed directly. The data was analyzed to determine the frequency distribution and percentage ratio for each of the variables. This study

was approved by the Ethics Research Committee of Faculty of Dentistry, Mahidol University. (COA.No.MU-DT/PY-IRB 2015/028.1407) The participants were informed about the procedures and were assured of the confidentiality of the collected information. Only those who gave consent were included in the study. The results were expressed in percentage for each examined variable.

## Results

From Tables 1 and 2, when the patients were asked regarding the reason to seek orthodontic treatment, they were allowed to choose more than one answer. The most to the least frequent reason for them to seek orthodontic treatment were: 82.9% mal-alignment of teeth; 21% malocclusion such as inefficient chewing; 19.0% dentist's suggestion; 11.4% difficult to clean their teeth; 10.5% dentofacial anomalies; 10.5% parent's suggestion; 6.7% influenced by their friends; 3.8% other reasons, and 1.9% fashion trend.

Malocclusion such as chewing/ bite	21%
Mal-alignment of teeth such as crowding, protrusion, crossbite etc.	82.90%
Parent's suggestion	10.50%
Influenced from friends	6.70%
Dento-facial anomalies, skeletal anomalies	10.50%
Dentist's suggestion	19.00%
Fashion trend	1.90%
Difficulty to clean the teeth	11.40%
Others	3.80%

**Table 1:** Reasons for seeking orthodontic treatment (Percentage of respondents, n=105).

Is orthodontic treatment necessary in your daily life?	
Yes	85.70%
No	14.30%

**Table 2:** Necessity of orthodontic treatment (Percentage of respondents, n=105).

In relation to the oral hygiene behavior after placing fixed appliances, (Table 3) it was found that: 61% used orthodontic toothbrush, 39% used general toothbrush (30.5% used soft brittle), and 81.9% used fluoridated tooth paste.

<b>Selection of toothbrush</b>	
General toothbrush	39%
Soft bristle	30.5%
Medium bristle	6.7%
Hard	0%
Not specific	1.9%
Orthodontic tooth brush	61%

<b>Selection of toothpaste</b>	
Fluoride	81.9%
Non fluoride	6.7%
<b>Frequency of brushing</b>	
Morning	0%
Before going to bed	0%
Morning +before going to bed	44.8%
After meals	28.6%
After every meal and snack	25.7%
<b>If toothbrush is not available after meals, how do you clean your teeth?</b>	
Rinse the mouth	90.5%
Toothpicks	9.5%
Others	1%

**Table 3:** Oral hygiene behavior (Percentage of respondents, n=105).

Regarding the supplemental tools, percentage of daily and occasional uses of dental floss were 19% and 60% (mouth wash 23.8% and 55.2%, toothpick 21% and 51.4%, interdental brush 36.2% and 51.4%). Approximately 45% of the patients cleaned their teeth in the morning and before going to bed, 28.6% brushed after meals and 25.7% brushed after every meal or snack. In case of inability to brush after meals, 90.5% rinsed their mouth (Table 4).

Interdental brush		Dental floss		Mouthwash		Toothpick	
Daily use	36.2%	Daily use	19%	Daily use	23.8%	Daily use	21.0%
Sometimes	51.4%	Sometimes	60%	Sometimes	55.2%	Sometimes	51.4%
Never	12.4%	Never	21%	Never	21.0%	Never	27.6%

**Table 4:** Supplementary tools for brushing (Percentage of respondents, n=105).

After placement of fixed orthodontic appliances, 82.9% reported that their orthodontists or dental assistants instructed them how to brush their teeth and only 41.0% received information about oral hygiene care supplements (Table 5).

<b>What information do you get from orthodontist or dental assistant regarding oral hygiene care?</b>	
Methods of brushing	82.9%
Diet	43.8%
Oral hygiene accessories	38.1%
Fluoridated toothpaste	21.9%
Fluoridated mouthwash	10.5%

**Table 5:** Awareness for oral hygiene (Percentage of respondents, n=105).

## Discussion

The main goal of orthodontic treatment is to improve dental occlusion and teeth in alignment, which ultimately results in a good functioning of dentition [7]. Orthodontic treatment helps the patients to improve dental and facial aesthetics [8]; above all, it also builds up self-esteem [9]. The results from the questionnaire revealed that the majority of patients (82.9%) sought treatment because of teeth mal-alignment and 85.7% reported the necessity of orthodontic treatment in their daily lives. This implied that esthetics and self-esteem are important factor in modern Thai society, and the result is inconsistent with other previous studies [10,11].

Although orthodontic treatment with fixed appliances offers many distinct advantages to the patient, fixed orthodontic appliances can trap food easily, which contributes to plaque formation. If plaque is not carefully removed from teeth and brackets, patients are at a risk of developing gingivitis, dental caries, and oral malodor [12,13]. There is a direct relationship between oral health (plaque) and caries incidence in orthodontic patients [14,15]. An active preventive program must, therefore, be a part of the orthodontic treatment in order to counteract adverse factors. This study was carried out to assess oral hygiene behavior among patients wearing fixed orthodontic appliances.

Tooth brushing is the first line of defense in removing debris and plaque accumulated around orthodontic appliances. It is important that patients undergoing orthodontic therapy thoroughly clean their teeth with a toothbrush for a minimum of 2 minutes after every meal (at least 3 times a day). The tooth brushing techniques mostly used in orthodontic patients are: Ramfjord's method, modified Stillman, and Bass method. The Bass technique can be effective in reducing periodontal clinical parameters of Plaque index and Gingival index in patients with fixed orthodontic appliances [16]. Approximately 60% of the patients in this study used orthodontic toothbrush while the remaining used regular toothbrush, which were mostly soft bristled. Orthodontic tooth brush is a bi-level brush; longer bristles on the edges and shorter ones in the middle. This type of brush cleans the area above and below the brackets. Studies regarding the effectiveness of the orthodontic toothbrush as compared with the conventional toothbrush in reducing plaque and gingivitis in teeth with fixed appliances have had conflicting results [17,18]. While other studies have shown that electric toothbrushes are highly effective in plaque removal, [19] manual toothbrushes-when used with the correct technique, frequency, and duration-can be equally effective [20].

Approximately 82% of the patients in this study used fluoridated toothpaste, whereas 6.7% of the samples did not use fluoridated toothpaste. It was also interesting to note that 11.4% of the samples did not know whether their toothpastes contained fluoride. Awareness should be given to the patients regarding benefit of fluoridated toothpaste in prevention of carious lesions. Using fluoridated toothpaste twice a day is more effective in preventing tooth decay than brushing once a day. Almost half of the respondents (44.8%) brushed their teeth twice a day, while the remaining brushed more than twice. Recently, it was suggested that patients undergoing orthodontic treatment should brush twice daily with a 5000 ppm fluoridated toothpaste. This regime was reported to provide much greater prevention than the daily use of 1000 ppm fluoridated toothpaste in combination with the daily use of a 500 ppm sodium fluoride rinse [21]. Most patients in this study (90.5%) rinsed their mouth if they were caught without toothbrush after meals, and 9.5% used toothpick. In this situation, it is advised to rinse the mouth vigorously with water or mouthwash and brush as soon as possible. In terms of other hygiene

accessories, approximately 19-36% of the patients in this study used dental floss, toothpick, mouth wash, or interdental brush daily. Fifty to sixty percent of the patients used these accessories occasionally. Twelve to twenty eight percent never used these hygiene accessories. It has been reported that an effective tooth brushing technique cleans up to 60% of the tooth's surface necessitating interproximal cleaning by adjunctive methods because fixed orthodontic appliances trap food debris, particularly in the interproximal space where conventional toothbrushes cannot penetrate [22]. Although clinical studies in patients with fixed orthodontic appliances have demonstrated that the correct use of dental floss leads to substantial improvements in proximal gingival health [23], dental floss has its disadvantage in orthodontic patients because it is challenging to use. It is unable to reach the gums underneath the wires; therefore, compliance with dental floss is low for orthodontic patients. In recent studies comparing floss and interdental brush, improved interproximal plaque reduction was shown in the interdental brush group [24-26]. It was also reported that the use of interdental brushes was more effective in the removal of plaque and resulted in a larger reduction of probing depth than the use of dental floss [27].

Fluoridated mouth rinses significantly reduced the extent of enamel decalcification and gingival inflammation during orthodontic treatment [28]. It is recommended that the best practice for patients with fixed orthodontic appliances is daily rinsing with a 0.05% sodium fluoride mouth rinse [29]. In the present study, less than 25% of the respondents rinsed their mouth daily with fluoridated mouth rinse. A fluoridated mouth rinse will only work if it is used regularly by the patient and, therefore, relies on patient compliance to succeed. However, there is evidence to suggest that compliance with mouth rinsing is poor. One study [30] found that only 42% of patients rinsed with a sodium fluoride mouth rinse at least every other day. The authors also observed that the patients who complied least with fluoride mouth rinse regimens tended to have more white spot lesions.

Twenty-one percent of the patients in this study used toothpicks daily, whereas 51.4% used them occasionally. It is noteworthy to educate the patients that the most common damage caused by using toothpick is gum abrasion. Application of excessive pressure when attempting to remove food stuck between teeth may result in a separation between the gums and teeth. The wooden toothpicks can break easily and may be caught between the teeth injuring patients' oral tissues. A better option is to use dental floss picks, as they are compact and easier to handle than pieces of dental floss.

Table 5 showed the results regarding oral hygiene care measures which the patients' orthodontists or dental assistants gave them (brushing 82.9%, diet 43.8%, oral hygiene accessories 41.0%, fluoride tooth paste 21.9%, and fluoridated mouthwash 10.5%). Although most of the patients (82.9%) reported that they were instructed regarding tooth brushing methods, less than half reported that their orthodontists or dental assistants recommended other oral hygiene accessories or fluoride supplements. Regarding tooth brushing instructions, the percentage in this study is lower than those of previous studies [31,32] that had reported 94% and 100% of orthodontists advised tooth brushing instruction to their patients. The lower percentage presented in this study may be due to firstly, orthodontists considered these instructions as the dental assistant's responsibility and secondly, orthodontists and/or dental assistants may have inadequate awareness regarding oral hygiene performance during active orthodontic treatment. It is recommended [33-36] that effective oral hygiene measures should include at least several of the followings:

(1) mechanical plaque removal – tooth brushing, flossing, and regular prophylaxis (2) fluoride therapy– at-home use of fluoridated toothpaste and mouth rinse and in-office use of topical fluoride (3) mechanical protection of tooth surfaces–sealants and glass ionomer cements (4) diet – reduction in consumption of foods that cause acidity in the oral environment (5) motivational communication–discussion of proper oral hygiene promotion and disease prevention directly to the patients before treatment, repeating instructions during and at the end of treatment with emphasis on oral health and esthetic benefits.

Besides orthodontic treatment, the importance of dental hygiene maintenance procedures and treatment should also be emphasized before and during major medical treatments, such as joint replacement [37], and chemo- and radio-therapy for head and neck cancer [38], etc., as a preventive measure to reduce the risk of oral hygiene deterioration or interceptive therapy when the patient may be temporarily impaired to carry out daily oral hygiene procedures or in patients with low compliance or high caries index.

## Conclusions

According to the present study, most patients sought orthodontic treatment for esthetic tooth alignment and reported the necessity of orthodontic treatment in daily life. Although most of the patients used orthodontic toothbrush, fluoridated toothpaste, and some supplementary tool of brushing, there was inadequate emphasis in the oral hygiene instructions. Orthodontists or dental assistants should increase their awareness for instructing their patients on how to maintain good oral hygiene during fixed orthodontic treatment in order to prevent caries and periodontal disease during orthodontic treatment. Oral hygiene instruction is essential in all cases of orthodontic treatment and the use of adjuncts must be reinforced.

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