

A dissertation on adolescent compliance with oral hygiene instruction during orthodontic treatment

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ABSTRACT

Objectives: To determine the level of compliance with Oral Hygiene Instruction (OHI) of 12 to 18 years old adolescent patient receiving orthodontic treatment at Dhaka Dental College and Hospital.

Materials and Methods : In this descriptive observational study, a total number of 100 patients (37 boys & 63 girls) were selected (with convenient sampling) from Orthodontics and Dentofacial Orthopedics Department in Dhaka Dental College & Hospital. As the number of female patient is higher than that of male patient at Orthodontics and Dentofacial Orthopedics Department in Dhaka Dental College & Hospital and the samples were selected with convenient sampling, the number of female patient was higher in this study.

Results: This was an observational study conducted among 100 patients in the department of Orthodontics and Dentofacial Orthopedics, Dhaka Dental College and Hospital. The result of this study indicates that after five month of insertion of orthodontic appliance, 76% patients were good complier with Oral Hygiene instruction (OHI).

Conclusion: The insertion of orthodontic appliances can result in changes in the oral environment, such as causing higher concentration of acid-producing bacteria due to the difficulty of performing oral hygiene after the insertion of appliance. Orthodontic appliances can also be associated with white spots, enamel decalcification, periodontal breakdown, and development of carious lesions. Continual plaque build-up may thus jeopardize the continuity of orthodontic treatment and the achievement of successful treatment outcome. So it is very important to give Oral Hygiene Instruction (OHI) at the commencement of orthodontic treatment and close supervision of the patient during treatment.

Key Words : **compliance; oral hygiene instruction; orthodontic treatment** (Bangladesh Journal of Orthodontics and Dentofacial Orthopedics, April 2013; Vol-3, No. 2, p 18-24)

INTRODUCTION

The insertion of an orthodontic appliance is associated with alteration of the oral environment, greater plaque buildup due to the difficulty in cleaning teeth especially in the areas between brackets and gingival margin.¹ Plaque if not removed, can lead to several adverse conditions such as the occurrence of hyperplastic gingivitis, periodontal breakdown (in severe cases), enamel decalcification and white spots caused by the highly acidic plaque and carious lesions.²⁻⁵ Continual plaque buildup may thus jeopardize the continuity of orthodontic treatment and the achievement of successful treatment outcomes. Oral hygiene instructions (OHI) are administered at the start of the orthodontic treatment in order to educate the patient on methods to maintain a high standard of oral hygiene prior to appliance bonding and to help prevent plaque buildup.¹

To maintain good oral hygiene it is essential to perform proper tooth brushing and dental flossing. Oral hygiene instruction includes educating the patient proper tooth

brushing technique and dental flossing to prevent plaque buildup. It can be done in orthodontic patient using various methods like verbal, written or visual based (Videotapes) instruction.

Compliance with OHI is essential for patients in all age groups, but it is critical during adolescence, as patient behavior, personality and self-image are formed during this transitional phase.⁶⁻⁷ Typically during adolescence, parental influence weakens and autonomy increases, making compliance more dependent on the patient's self-motivation rather than parental direction.⁶ Also at this time adolescent undergoes social, physical and emotional changes that affect his/her treatment.⁷ Paradoxically, the stresses of this age make compliance more difficult. It is estimated that 5% to 10% of orthodontic patient do not complete treatment due to poor oral hygiene.⁸ In fact, previous studies⁹⁻¹⁰ have suggested a compliance rate of just 50% with long term treatment like orthodontics.

Orthodontists can benefit greatly from predicting the future compliance of new patients during their early treatment stage. Compliance research has identified demographic, behavioral, psychosocial and psychological factors that can influence compliance.¹¹ Demographic factors include gender, age and socioeconomic status¹¹⁻¹³ Psychosocial and psychological factors include self-control, self-esteem, and relationship with parents and peers.^{11,14}

Levels of compliance with OHI of adolescent patients receiving treatment at Orthodontics and Dentofacial Orthopedics Department of Dhaka Dental College and Hospital are not known. Therefore, the determination of the level of compliance with OHI of 12 to 18 years old adolescent patients receiving orthodontic treatment at the Orthodontics and Dentofacial Orthopedics Department of Dhaka Dental College and Hospital and the isolation of factors associated with compliance would be beneficial for a better understanding of patient's behavior that directly affects clinical practice.

The study of compliance with OHI during orthodontic treatment can be beneficial in terms of isolating extraneous and internal factors that are capable of influencing it. This study aims to isolate factors that predict compliance with OHI, one of the important components of successful orthodontic treatment. Being able to predict the level of future compliance at the start of orthodontic treatment can help orthodontists identify patients who are likely to be complying with OHI and those who are not, avoid treatment delays or incompleteness related to poor compliance with OHI, thus, achieving better treatment outcomes.

OBJECTIVES OF THE STUDY

General objective:

To determine the level of compliance with OHI of 12 to 18 years old adolescent patient receiving orthodontic treatment at Dhaka Dental College and Hospital.

Specific objectives:

1. To elicit factors predicting patients compliance with OHI.
2. To assess the existing condition of oral hygiene of the patient.
3. To improve compliance of patient with OHI.

It is well established that proper oral hygiene maintenance is difficult in orthodontic patient due to irregularities of tooth i.e malocclusion. In Bangladesh various studies had been conducted upon different types of malocclusion. In one study the incidence of class-I malocclusion is 55.22%, Class-II is 33.33% and Class-III is 8.46%.¹⁵ Another study showed that

Class-II div-1 malocclusion is the commonest problem (46.4%), followed by class-I malocclusion (32.8%), class-III malocclusion (13.3%) and class-II div-2 malocclusion (7.5%)¹⁶

MATERIALS & METHODS

In this observational study, A total number of 100 patients (37 boys & 63 girls) were selected (by convenient sampling) from Orthodontic department in Dhaka Dental College & Hospital. As the number of female patient is higher than that of male patient at Orthodontic department in Dhaka Dental College & Hospital¹⁶ and the samples were selected with convenient sampling, the number of female patient was higher in this study.

Inclusion criteria

1. 12 to 18 years old healthy boys and girls scheduled to receive orthodontic treatment.
2. Patients must have been able to perform their own oral hygiene activities (brushing and flossing)
3. No experience of previous orthodontic treatment.

Exclusion criteria

1. Adolescent with disabilities that restrict self performed oral hygiene practice.
2. Patient with systemic disease.
3. Non-cooperative patient.
4. Patient not attending in orthodontic department.

Procedures of data collection

Direct measures were used to identify the level of compliance with OHI and indirect measures concerned with isolating the factors predicting it in the study sample were used. The measures were collected using the following:

- a) Compliance with oral hygiene was measured directly through the assessment of patient's oral hygiene level using the Plaque Index (PI) and the Gingival Index (GI).
- b) Factors predicting compliance were obtained indirectly through questionnaires distributed to the patients and by collecting data from the patient's records concerning attendance for scheduled orthodontic appointments and appliance maintenance.

a) Direct measures :

Gingival and plaque indices were used in assessment of oral hygiene in the sample population:

- 1) Gingival Index (GI):

The index was developed by Loe and Silness¹⁷ to describe the clinical severity and location of gingival inflammation using a mouth mirror and periodontal probe, the mesial, distal, buccal and lingual surface of six index teeth were examined: maxillary right first molar, maxillary right lateral incisor, maxillary left first premolar, mandibular left first molar, mandibular left lateral incisor, and mandibular right first premolar. The scores were defined based on severity from 0-3.

0 = Normal gingival

1 = Mild inflammation- light change in color, slight edema, but no bleeding on probing (BOP)

2 = Moderate inflammation-redness, edema and glazing, and BOP

3 = Severe inflammation- marked redness and edema, ulceration, and tendency to Spontaneous bleeding

The average score of each tooth was calculated by dividing the scores of each tooth by the number of surfaces examined. The final numerical score per person was obtained using the

following formula:
$$\text{Score per person} = \frac{\text{sum of individual tooth scores}}{\text{number of teeth examined.}}$$

2) Plaque Index (PI):

This index was described by Silness and Loe.¹⁸ Using a mouth mirror and periodontal probe, four surfaces of teeth (buccal, lingual, mesial and distal) were examined. The same six aforementioned teeth were used. The PI scores were defined as follows:

0 = No plaque

1= A film of plaque adhering to the free gingival margin and adjacent area to the tooth. The plaque may be seen in situ by using the probe on the tooth surface.

2 = Moderate accumulation of soft deposits within the gingival pocket, or the tooth and gingival margin, which can be seen with the naked eye.

3 = Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.

A mean score was calculated using the same formula as used to calculate the Gingival Index.

In recording both indices, if the tooth to be examined had been extracted, the distal or mesial tooth was recorded

instead.

b) Indirect measures :

The patient were asked to fill out questionnaires at both the start and at the end of the study period.

Of the study variable , the appointment punctuality variable was obtained from the patients' charts and was defined as having attended all scheduled orthodontic appointments during the study period : 'Yes' if the patient attended all appointments (or cancelled and rescheduled before the day of the appointments), and" No" if the patient failed to show up or cancelled on the appointment day. The appliance maintenance variable was dichotomized into: "well maintained" to describe no broken brackets/bands / acrylic plate, and no or mild bends in the arch wire, and "poorly maintained" to describe the presence of moderate to severe bends in the arch wire and loose or broken brackets/bands/ plate. The patient was assessed as good complier if the average PI and GI scores at T4 were lower than that of T1.

Procedure of the study:

T1 : At baseline, before appliance insertion:

On the day of appliance insertion, before receiving the appliances, each patient filled out the first questionnaires. The baseline oral hygiene level was measured (T1) and recorded in customized evaluation form. On the same day, directly after bonding each patient was given OHI.

T2 : After approximately 30 days of appliances insertion, a second assessment of oral hygiene was performed.

T3 : After approximately 120 days of appliance insertion, a third assessment of oral hygiene was performed

T4 : After approximately 150 days of baseline a final assessment of oral hygiene was conducted. The patients were requested to fill out the questionnaires.

RESULT

This was a Descriptive observational study among 100 patients, aged from 12-18 years, in the department of Orthodontics and Dentofacial Orthopedics, Dhaka Dental College and Hospital. Analysis of the items inquired about in the questionnaires revealed that the patients sought orthodontic treatment most frequently to improve their facial appearance (52%) or to straighten their teeth (48%) (Table-8). Approximately 80% of the patients reported

having performed well at school in the past year. (Table-4). At baseline, 64% of the patients reported that they brushed their teeth more than once a day. (Table-5) Among 100 patients only 7(7%) patients used dental floss,(Table-6). At T4 76% patients were good complier with OHI. (Fig-5). Details result of the study can be described as follows by table and charts.

Table 1:-Distribution of patient characteristics

Variables	%(n)
Age in years	
12	15.0(15)
13	16.0(16)
14	17.0(17)
15	7.0(7)
16	13.0(13)
17	8.0(8)
18	24.0(24)
Mean±SD	15.1±2.2
Gender	
Male	37.0(37)
Female	63.0(63)
Highest school complete years	
5-6	13.0(13)
7-8	31.0(31)
9-10	17.0(17)
11-12	39.0(39)
School performance	
Good	80.0(80)
Poor	20.0(20)
History of chewing problem	
No	99.0(99)
Yes	1.0(1)
History of TMJ Problem	
No	100(100)
Yes	0

*SD-standard deviation, TMJ-temporo mandibular joint

Table: 2 distribution of compliance according to age

Age in years	Good % (n)	Poor % (n)	Total % (n)
12	73.3(11)	26.7(4)	15.0(15)
13	81.3(13)	18.8(3)	16.0(16)
14	70.6(12)	29.4(5)	17.0(17)
15	71.4(5)	28.6(2)	7.0(7)
16	69.2(9)	30.8(4)	13.0(13)
17	75.0(6)	25.0(2)	8.0(8)
18	83.3(20)	16.7(4)	24.0(24)
Total	76.0(76)	24.0(24)	100(100)

Table-2 shows that patients age of 18 years showed better compliance (83.3%), followed by 13 years(81.3%), 17 years(75.0%), 12years(73.3%), 15 years(71.4%), 14 years(70.6%), and 16 years(69.2%).

Table:-3 Distribution of compliance with OHI by sex

Gender	Good % (n)	Poor % (n)	Total % (n)	P-value
Male	75.7(28)	24.3(9)	37.0(37)	0.0001*
Female	76.2(48)	23.8(15)	63.0(63)	0.0001*

*P < 0.05 is statistically significant

Table - 3 shows that in 37 male patients 28 (75.7%) patients are good complier and 9(24.3%) patients are poor Complier. In 63 female patients 48(76.2%) patients are good complier and 15(23.8%) patients are poor complier with OHI. This table also shows that male and female are near about equally compliance with OHI.

Table 4: Distribution of compliance with school performance

School Performer	Good % (n)	Poor % (n)	Total % (n)	P-value
Good	83.8(67)	16.3(13)	80.0(80)	0.0001*
Poor	45.0(9)	55.0(11)	20.0(20)	0.205

*P < 0.05 is statistically significant

Table 4 shows that patient with good school performance are 83.8% good compliance with OHI and 16.3% poor compliance with OHI (P=0.001)*, but patient with poor school performance are 45.0% good compliance with OHI and 55.0% poor compliance with OHI(P=0.205)*

Table: 5 Distribution of compliance according to brushing frequency

Brushing frequency	Good % (n)	Poor % (n)	Total % (n)
More than once a day	81.3(52)	18.8(12)	64.0(64)
Once a day	66.7(24)	33.3(12)	36.0(36)

Table 5 shows that in 100 patients 64(64%) patients who brushed teeth more than once a day are 81.3% good complier and 36 (36%) patients who brushed tooth once a day are 66.7% good complier with OHI.

Table 6:- Distribution of compliance according to flossing

Flossing	Good % (n)	Poor % (n)	Total % (n)
Yes	100(7)	0	7.0(7)
No	74.2(69)	25.8(24)	93.0(93)

Table 6 shows that in 100 patients, only 7 (7.0%) patient used dental floss before treatment. They all are good complier. 93 (93.0%) patient did not use floss, out of them 69 (74.2%) patients are good complier and 24 (25.8%) patient are poor complier.

Table:-7 distribution of Plaque Index (PI) and Gingival Index (GI) by sex

Gender	PI T1	PI T2	PI T3	PI T4	PIT1 VS PIT4
Male	1.0±0.3	1.4±0.3	1.0±0.3	0.9±0.4	0.0821
Female	1.1±0.4	1.4±0.4	1.0±0.3	0.9±0.4	0.0061
Total	1.1±0.4	1.4±0.4	1.0±0.3	0.9±0.4	0.0001

Gender	GI T1	GI T2	GI T3	GI T4	GIT1 VS GIT4
Male	0.5±0.3	0.7±0.2	0.5±0.2	0.4±0.3	0.5611
Female	0.5±0.2	0.7±0.3	0.5±0.2	0.4±0.2	0.0109
Total	0.5±0.2	0.7±0.2	0.5±0.2	0.4±0.23	0.0005

Table 7 shows that the average plaque index (PI) score of male was 1.0±0.3 at T1 and 0.9±0.4 at T4 which indicates good compliance with OHI.(P=0.08)* In female the average plaque index (PI) score at T1 was 1.1±0.4 and at T4 0.9±0.4 which also indicates good compliance with OHI.(P=0.006)* This table also shows that at T1 the average gingival index (GI) score of male was 0.5±0.3 and at T4 0.4±0.3 which indicates good compliance with OHI.(P=0.56)* In female the average gingival index (GI) scores at T1 was 0.5±0.2 and at T4 0.4±0.2 which also indicate good compliance with OHI.(P=0.01)*

*P<0.05 is statistically significant

Fig-1: Distribution of PI & GI with time period

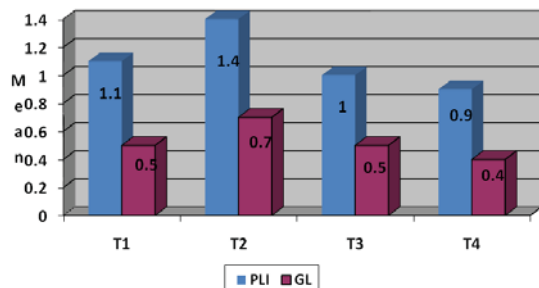


Fig 1 shows that mean plaque Index score is 1.1 at T1 and 0.9 at T4 which indicate significant increase in oral hygiene level (P=0.0001)* and mean gingival Index score is 0.5 at T1, and 0.4 at T4 which also indicate significant increase in oral hygiene level.(P=0.0005)*

*P<0.05 is statically significant.

Table8:- Distribution of compliance according to reason for seeking orthodontic treatment

Reason	Good % (n)	Poor % (n)	Total % (n)
Straightening teeth	72.9(35)	27.1(13)	48.0(48)
Having of better facial/ profile appearance	78.8(41)	21.2(11)	52.0(52)

Table 8 shows that 52 % (52) patients came for orthodontic treatment to improve their facial appearance. Out of them 78.8% (41) are good complier and 21.2% (11) are poor complier. 48% (48) patients come for orthodontic treatment to straight their teeth, out of them 72.9% (35) are good complier and 27.1% (13) are poor complier with OHI.

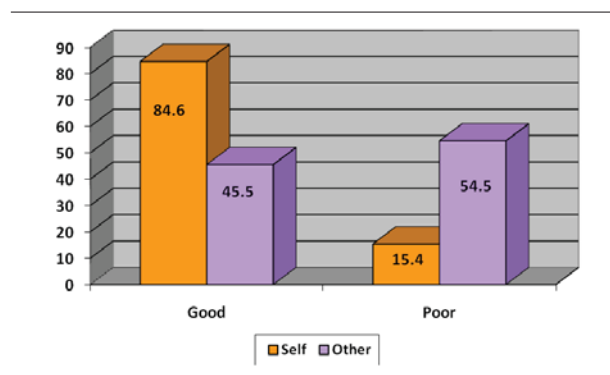


Fig 2 shows that patients who were self motivated for orthodontic treatment are 84.6% good complier and 15.4% are poor complier.(P=0.001)* but who are motivated by others are 45.5% good complier and 54.5% poor complier(P=0.470)* with OHI.

*P<0.05 is statistically significant

Fig-3 Distribution of compliance with appointment punctuality

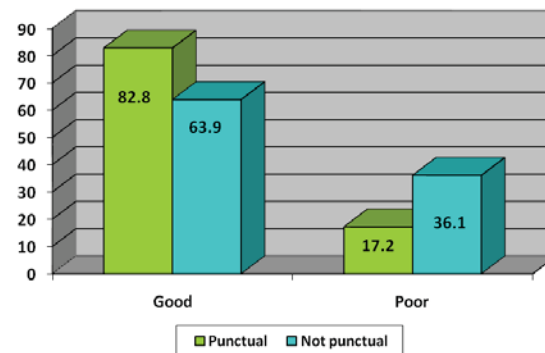


Fig 3 shows that Patients who were punctual with their appointments are 82.8% good complier.

Fig-4 Distribution of compliance with appliance maintenance

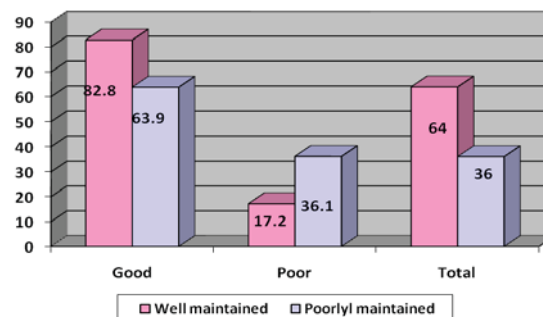


Fig 4 shows that 64% patients maintained their appliance well, out of them 82.8% are good complier

Fig:- 5 Distribution of compliance with OHI

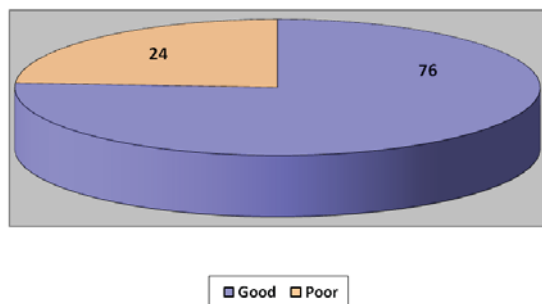


Fig 5 shows that 76% patients are good complier with OHI and 24% patients are poor complier with OHI

DISCUSSION

Compliance in general remains a complex research topic and evidence on factors predicting it is conflicting. Research on compliance with OHI during orthodontic treatment in particular is very limited. It was found that oral hygiene performance of the sample in this study first worsened within the first month of receiving orthodontic appliances but improved thereafter at T4, when 76% of the sample was assessed as having good OHI compliance. This percentage is higher than a previous study that reported a 73% compliance rate with oral hygiene among patients who received orthodontic appliance at six month of treatment.¹⁹ This percentage is also higher than another study that reported a 48% compliance rate with oral hygiene.⁹ This improvement may be explained by the leveling and reduction in crowding commonly seen approximately 3 month into treatment, which have been shown to be associated with improved gingival health and oral hygiene. Feil et al⁹ studied the intentional use of the Hawthorne effect on oral hygiene compliance in orthodontic patient with history of poor oral hygiene. Hawthorne effect indicates that study subjects' behavior can improve or get modified by their awareness that they are being observed as part of the study. Fiel et al⁹ observed that repeated plaque and gingival index scoring may have served as motivational factor. Thus the Hawthorne effect may also have played a role as patients were aware that they were being examined and evaluated, and awareness could have influenced their behavior.

In this study at T2, PI and GI score increased markedly, indicating poor oral hygiene performance. This is expected, since the initial period after bonding is associated with an increase in gingival bleeding in crowded dentition. In a previous study, it was also found that at T2 the percentage PI and GI score were the highest (indicating poor oral hygiene

performance)¹⁹ Pain and discomfort caused by the insertion of new appliance reduces the patient's initial acceptance of the appliance and their compliance. In the present study, the T2 evaluation was approximately 30 days after appliance insertion, at which time, they were still getting acquainted with their orthodontic appliance experience and the oral hygiene techniques required.

In this study it was found that good school performers showed better compliance (83.8%) than poor school performers (45%). This factor was explored in several previous studies that found academically higher grade achieving students were more compliant with orthodontic treatment than their scholastically lower grade achieving counterparts.^{11,19} High grade performers may be more conscious of their appearance and conceive good oral hygiene to be an important aspect of their self confidence in school.

An important predictor was source of treatment motivation. In this study it was revealed that patients who were self motivated for orthodontic treatment showed better compliance (84.6%) than who were motivated by others (45.5%).

Investigators have argued that keeping punctual appointments among adolescents is more dependent on parental time and availability to bring the patient to the hospital.⁸ In this study patients who were punctual with their appointments showed better compliance (82.8%) than their counterparts (63.9%).

The mean age of the patients in this study was 15.1 years. It was found in this study that patient age of 18 years showed better compliance (83.3%) than other age group. This result differs from a previous study⁶ which found no relationship between age and cooperation during and after the completion of orthodontic treatment.

In this study, it was found that patient's gender was not significantly associated with oral hygiene compliance. The compliance level of male and female is near about equal i.e.75.7% and 76.2% respectively. Similar finding was also reported by Amado et al⁷

LIMITATION OF STUDY

1. The study group was selected from Dhaka Dental College & Hospital. So the findings might be in specific area, which may not represent the whole national situation.
2. Comparison with neighboring countries had not been done.
3. The study was not done in a specific race of population.
4. The size of the sample of the study was limited in relation to the great number of populations in Bangladesh to represent the situation prevailing nationality.

CONCLUSION

Following conclusion can be drawn from the study:

- Oral hygiene (OH) performance worsened from the date of bonding to T2, but then improved markedly at T4
- Approximately 76% of the adolescent patient was assessed as good complier with Oral Hygiene Instruction (OHI) when evaluated at T4.
- Good school performer and self motivated patients showed better compliance with OHI.

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