



# Effect of Early Orthodontic Treatment on Body Weight, Dietary Habits, and Physical Activity in Young Adults

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## KEYWORDS

Orthodontic treatment, body weight, dietary habits, physical activity, young adults.

## ABSTRACT:

**Background:** Fixed orthodontic treatment improves facial esthetics, oral function, and psychosocial well-being in young adults. Beyond dental alignment, early treatment may influence body weight, dietary habits, and physical activity, as appliance-related discomfort often alters chewing patterns and food choices.

**Objective:** To evaluate the impact of early fixed orthodontic treatment on body weight, dietary habits, and physical activity in young adults.

**Methods:** A prospective study was conducted at BSMMU from October 2022 to September 2023, including 130 first-time orthodontic patients aged 18–27 years. Anthropometric measurements, dietary patterns, and physical activity levels were assessed at baseline, 1 month, and 3 months post-appliance placement. BMI changes were analyzed using paired t-tests, and associations with diet and activity were assessed with Chi-square tests ( $p < 0.05$ ). Ethical approval and informed consent were obtained.

**Results:** Among 130 participants (mean age  $21.3 \pm 2.4$  years; 59% female), baseline BMI and waist circumference were within normal ranges. During the first three months of treatment, soft-food consumption increased significantly ( $37.7\% \rightarrow 56.2\%$ ,  $p < 0.001$ ), while hard-food intake decreased ( $31.5\% \rightarrow 20.0\%$ ,  $p = 0.02$ ). Meal frequency and overall diet balance remained largely unchanged. Changes in food texture were associated with modest BMI fluctuations, whereas physical activity levels were unaffected.

**Conclusion:** Early fixed orthodontic treatment predominantly affects food texture preferences, resulting in moderate BMI changes, without significantly altering overall diet or physical activity. Awareness of these early modifications can help clinicians provide targeted dietary guidance to support patient health and compliance

## INTRODUCTION

Orthodontic treatment is widely recognized for its role in improving facial esthetics, oral function, and psychosocial well-being, including self-esteem and confidence.[1] The demand for orthodontic care among young adults has increased considerably, driven not only by esthetic concerns but also by the desire for functional rehabilitation of the dentition.[2] Beyond dental alignment, orthodontic treatment may have broader implications for general health, including potential effects on weight management, dietary behaviors, and overall lifestyle.[3] Pain associated with the placement and activation of fixed appliances is a common consequence of orthodontic treatment, influencing patient compliance and satisfaction. The intensity of

orthodontic pain is modulated by multiple factors, including age, sex, previous pain experiences, emotional state, physical activity, and the magnitude of applied forces.[4] Typically, discomfort peaks within 12 hours to 3 days after appliance placement and gradually subsides by the seventh day.[5]

Early stages of fixed orthodontic treatment often impose temporary limitations on mastication, resulting in increased consumption of soft-textured foods and a reduction in harder, more fibrous items. Normal masticatory function generally resumes within 4–6 weeks.[6] These dietary modifications, combined with appliance-related restrictions, can affect caloric intake and raise concerns regarding changes in body weight,



potentially measurable through anthropometric indices such as body mass index (BMI).[7,8]

Previous studies have reported variable effects of orthodontic treatment on body weight and dietary behaviors. A prospective cohort of 120 patients observed that after 12 months of treatment, 43.4% experienced a decrease in BMI, 45.8% showed mild to moderate increases, and 10.8% maintained stable BMI; overall BMI changes were not statistically significant, although notable alterations in dietary habits and self-esteem were reported.[9] Another study involving 41 adolescents (11–14 years) found no significant changes in dietary intake, BMI, or body fat percentage during the first three months of fixed appliance therapy, with baseline BMI moderating the response of fat percentage and dietary behavior.[10] Conversely, a cohort of 150 patients (mean age ~16–30 years) demonstrated statistically significant weight reductions at 1, 2, and 3 months post-bonding of fixed appliances.[11]

Limited data exist regarding the interplay between early orthodontic treatment, dietary habits, and physical activity in young adults, particularly within the Bangladeshi population. Therefore, this study aims to evaluate the influence of early fixed appliance therapy on these parameters, with a particular focus on changes in food texture preferences, meal patterns, physical activity levels, and broader implications for overall health and lifestyle in this population.

## METHODOLOGY

This prospective observational study was conducted in the Department of Orthodontics, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, from October 2022 to September 2023 to evaluate changes in body weight, dietary habits, and physical activity during early fixed orthodontic treatment. A total of 130 patients aged 18–27 years scheduled to undergo fixed orthodontic therapy were enrolled through purposive

sampling. Inclusion criteria included first-time orthodontic patients who provided written informed consent. Patients with systemic diseases, pregnancy, or medication use affecting body weight were excluded. Data were collected at three time points: before treatment (T1), one month after appliance placement (T2), and three months after treatment initiation (T3). Anthropometric measurements included weight, height, BMI, and waist circumference, taken following standard procedures. BMI was calculated as weight (kg)/height (m<sup>2</sup>) and classified according to WHO criteria. Dietary assessment covered meal frequency, food texture preference (soft, hard, or balanced diet), and consumption of sugary foods and fluids. Physical activity was evaluated using a modified version of the International Physical Activity Questionnaire (IPAQ) and categorized as none, low, moderate, high, or extremely high activity.

All data were analyzed using SPSS version 26.0 (IBM Corp., USA). Descriptive statistics were expressed as mean  $\pm$  SD or frequency and percentage. Paired t-tests compared BMI changes across time points, while Chi-square tests assessed associations between dietary, physical activity, and BMI variations. A p-value  $<$  0.05 was considered statistically significant. Ethical approval was obtained from the Institutional Review Board (IRB) of BSMMU. Written informed consent was taken from all participants, and confidentiality was strictly maintained throughout the study.

## RESULTS

A total of 130 young adults participated in the study, with a mean age of  $21.26 \pm 2.40$  years (range 18–27 years). Females were predominant, comprising 77 participants (59.2%) of the study population. The following sections present the findings on anthropometric measurements, dietary habits, lifestyle behaviors, and changes in BMI and nutritional status during the early phase of fixed orthodontic treatment.

**Table 1: Anthropometric Variables of Study Participants (n = 130)**

Variable	Mean $\pm$ SD	Range
Weight (kg)	60.2 $\pm$ 10.5	45–85
Height (cm)	165.5 $\pm$ 8.2	150–185
BMI (kg/m <sup>2</sup> )	21.9 $\pm$ 2.9	16.8–29.5
Waist circumference (cm)	78.5 $\pm$ 9.0	60–102

The study participants had an average body weight of  $60.2 \pm 10.5$  kg and a mean height of  $165.5 \pm 8.2$  cm, resulting in an average BMI of  $21.9 \pm 2.9$  kg/m<sup>2</sup>, which falls within the normal range according to WHO

classification. The mean waist circumference ( $78.5 \pm 9.0$  cm) also indicates that most participants were within a healthy body composition. (Table 1)

**Table 2: Changes in Food Consumption and Dietary Habits During Early Orthodontic Treatment (n = 130)**

Food / Dietary Variable	Before Treatment (T1)	After 1 Month (T2)	After 3 Months (T3)	p-value
Soft food consumption	49 (37.7%)	73 (56.2%)	64 (49.2%)	<0.001*



Hard food consumption	41 (31.5%)	26 (20.0%)	31 (23.8%)	0.02*
Balanced diet (soft + hard foods)	40 (30.8%)	31 (23.8%)	35 (26.9%)	0.15
Meal frequency 1–2/day	24 (18.5%)	29 (22.3%)	27 (20.8%)	0.42
Meal frequency 3/day	81 (62.3%)	71 (54.6%)	66 (50.8%)	0.08
Meal frequency 4+/day	25 (19.2%)	30 (23.1%)	37 (28.5%)	0.10

There were notable changes in food consumption patterns during the early phase of orthodontic treatment. Soft food intake increased significantly from 37.7% before treatment to 56.2% after one month ( $p < 0.001$ ), reflecting an adaptation to discomfort and chewing difficulty following appliance placement. Conversely, hard food consumption decreased significantly from 31.5% to 20.0% at one month ( $p = 0.02$ ), indicating a temporary dietary adjustment. The proportion of participants maintaining a balanced diet (both soft and

hard foods) showed no significant change ( $p = 0.15$ ). The meal frequency of participants remained relatively stable during the early phase of orthodontic treatment. Most participants continued to consume three meals per day (50.8–62.3%), while the proportion eating 1–2 meals or 4+ meals showed only minor, non-significant changes ( $p > 0.05$ ). This suggests that overall eating frequency was largely unaffected despite changes in food texture. (Table 2)

**Table 3: Association Between Food Consumption, Dietary Habits, and BMI Change During Early Orthodontic Treatment (n = 130)**

Food / Dietary Variable	BMI Decreased n (%)	BMI Increased n (%)	No Change n (%)	Total	p-value
<b>Soft food consumption</b>					<b>&lt;0.001*</b>
Yes (n = 73)	35 (47.9%)	30 (41.1%)	8 (11.0%)	73	
No (n = 57)	18 (31.6%)	33 (57.9%)	6 (10.5%)	57	
<b>Hard food consumption</b>					<b>0.02*</b>
Yes (n = 31)	16 (51.6%)	10 (32.3%)	5 (16.1%)	31	
No (n = 99)	37 (37.4%)	53 (53.5%)	9 (9.1%)	99	
<b>Balanced diet (soft + hard foods)</b>					0.15
Yes (n = 35)	15 (42.9%)	16 (45.7%)	4 (11.4%)	35	
No (n = 95)	38 (40.0%)	47 (49.5%)	10 (10.5%)	95	
<b>Meal frequency</b>					0.09
1–2/day (n = 27)	14 (51.9%)	9 (33.3%)	4 (14.8%)	27	
3/day (n = 66)	28 (42.4%)	31 (47.0%)	7 (10.6%)	66	
4+/day (n = 37)	11 (29.7%)	23 (62.2%)	3 (8.1%)	37	

Table 3 shows the association between dietary habits and BMI changes during early orthodontic treatment. Participants who consumed soft foods were more likely to experience a decrease in BMI (47.9%) compared to those who did not (31.6%) ( $p < 0.001$ ). Conversely, participants consuming hard foods were more likely to

have BMI increase (53.5%) if they did not regularly consume hard foods ( $p = 0.02$ ). Balanced diet and meal frequency showed no significant association with BMI changes ( $p > 0.05$ ), indicating that food texture, rather than overall meal patterns, influenced BMI during early treatment.

**Table 4: Physical Activity Levels of Participants During Early Orthodontic Treatment (n = 130)**

Physical Activity Level	Before Treatment (T1)	After 1 Month (T2)	After 3 Months (T3)	p-value
No physical activity (sedentary)	28 (21.5%)	26 (20.0%)	24 (18.5%)	0.04*
Low (1–3 days/week)	40 (30.8%)	42 (32.3%)	38 (29.2%)	
Moderate (3–5 days/week)	45 (34.6%)	44 (33.8%)	46 (35.4%)	
High (6–7 days/week)	12 (9.2%)	14 (10.8%)	16 (12.3%)	
Extremely high (daily high activity/hard work)	5 (3.8%)	4 (3.1%)	6 (4.6%)	

Table 4 shows changes in physical activity levels during early orthodontic treatment. The proportion of sedentary participants slightly decreased from 21.5% to 18.5%

over three months ( $p = 0.04$ ), indicating a modest increase in activity. Participants reporting low to moderate activity remained the largest group, with



minor fluctuations over time. High and extremely high activity levels increased slightly by T3.

**Table 5: Association Between Physical Activity and BMI Change During Early Orthodontic Treatment (n = 130)**

Physical Activity Level	BMI Decreased n (%)	BMI Increased n (%)	No Change n (%)	Total	p-value
No physical activity (sedentary)	10 (38.5%)	8 (30.8%)	8 (30.8%)	26	0.32
Low (1–3 days/week)	18 (42.9%)	16 (38.1%)	8 (19.0%)	42	
Moderate (3–5 days/week)	19 (41.3%)	18 (39.1%)	9 (19.6%)	46	
High (6–7 days/week)	7 (36.8%)	6 (31.6%)	6 (31.6%)	19	
Extremely high (daily/hard work)	2 (28.6%)	3 (42.9%)	2 (28.6%)	7	

Table 5 presents the association between physical activity levels and BMI changes during early orthodontic treatment. Although some variations in BMI change were observed across different activity levels, a substantial proportion of participants experienced no change in BMI across all categories (19–31%). The distribution of BMI decrease and increase was relatively balanced among participants with low, moderate, high, and extremely high activity levels. Statistical analysis showed that the association between physical activity and BMI change was not significant ( $p = 0.32$ ).

## DISCUSSION

In this study, 130 young adults (mean age  $21.26 \pm 2.40$  years) participated, with females representing 59.2% of the sample. Baseline anthropometric measurements revealed a mean BMI of  $21.9 \pm 2.9$  kg/m<sup>2</sup> and a mean waist circumference of  $78.5 \pm 9.0$  cm, both within normal limits according to WHO classification [12]. These findings indicate that the participants had a healthy nutritional status prior to the initiation of orthodontic treatment, providing a reliable reference for evaluating subsequent changes. Similar anthropometric patterns have been reported among young adults in Bangladesh and other Asian populations, supporting the generalizability of the baseline nutritional profile [13]. Establishing this baseline is essential, as fixed orthodontic therapy is known to influence dietary habits, food choices, and lifestyle behaviors, particularly during the early phase following appliance placement.

During the early phase of treatment, significant modifications in food consumption patterns were observed. Soft-food intake increased markedly from 37.7% at baseline to 56.2% after one month ( $p < 0.001$ ), while hard-food consumption decreased from 31.5% to 20.0% ( $p = 0.02$ ). In contrast, the proportion of participants maintaining a balanced diet and the frequency of meals remained relatively stable, indicating that early dietary adjustments are primarily related to food texture preference rather than changes in the number of meals consumed. These findings are consistent with Ozdemir et al. [14], who reported increased soft and processed food consumption alongside reduced intake of hard and fibrous foods

during the initial months of orthodontic therapy. [15] similarly observed mild weight reduction and temporary alterations in dietary habits and physical activity during the first trimester of fixed appliance treatment. Additional studies [16,17] confirm that early orthodontic treatment predominantly affects food texture selection due to discomfort or chewing difficulty, while overall meal patterns remain largely unchanged.

Taken together, these results indicate that young adults undergoing early fixed orthodontic treatment adapt to mechanical discomfort by favoring softer foods, without significant disruption of meal frequency or diet balance. This emphasizes the importance of dietary counseling and monitoring during the initial months of treatment to maintain adequate nutrition and prevent unintended weight or nutrient changes.

## CONCLUSION

During the early phase of orthodontic treatment, dietary patterns particularly increased soft food consumption and reduced hard food intake—were significantly associated with changes in BMI, whereas physical activity showed no significant influence. Meal frequency and balanced diet patterns did not significantly affect BMI. These findings suggest that modifications in food texture and consumption habits play a more critical role than physical activity in influencing body weight during the initial months of orthodontic treatment.

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