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Occlusal Bite Force Changes in Skeletal Class-II Patients during Functional and Fixed Mechanotherapy: A Prospective Study

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ABSTRACT

Introduction: Orthodontic treatment in skeletal Class II malocclusion initially leads to transient disturbances in bite force, occlusal contacts and fluctuations in Body Mass Index (BMI) due to functional adaptation and altered eating patterns. As the treatment progresses, occlusal stability and masticatory efficiency are progressively restored, leading to normalisation of masticatory efficiency and BMI.

Aim: To assess maximum occlusal bite force changes and its effects on BMI in skeletal Class II patients following functional and fixed mechanotherapy using TekscanFlexiforce sensors with extreme low frequency system (T-scan).

Materials and Methods: The present prospective study was conducted in the Department of Orthodontics, Faculty of Dental Sciences, SGT University, Gurugram, Haryana, India, from March 2021 to September 2022. A total sample of 45 patients (age 10-15 years) having Cervical Vertebrae Maturation Index (CVMI) 2, 3, and 4 were divided into three equal groups. Group I and group II consisted of skeletal Class II individuals who were treated using myofunctional therapy and fixed orthodontic mechanotherapy, respectively. Group III with Class I skeletal Malocclusion was used as control group. Occlusal contacts bite force and BMI were evaluated at the beginning of treatment (T0), first week (T1), first month (T2), third month (T3), sixth month (T4) and at the end of therapy or eight months (T5). Statistical methods like the unpaired t-test was used to analyse the quantitative variables. Statistical significance is considered for p-values<0.05.

Results: The maximum bite forces started decreasing as the treatment progressed in group I (271.20 N at T0 to 82.9 N at T4) and group II (348.27 N at T0 to 262.13 N at T2) which was more significant in group I, There was a reduction in the BMI in both group I and II but it showed a gradual recovery towards the end of the treatment. The maximum bite force for control group III was 287.73 N.

Conclusion: There was significant reduction of maximum bite force in the functional appliance therapy group as compared to fixed mechanotherapy. In the initial stages of the treatment, there was a reduction in the BMI and occlusal contacts in both the groups which gradual recovered towards the end of the treatment.

Keywords: Body mass index, Occlusal contacts, Twin block appliance

INTRODUCTION

Maximum occlusal bite force and malocclusion have a strong relationship [1]. Malocclusion is influenced by dental malalignment as well as when both the upper and lower jaws are not in harmony with each other. One of the common problems the Orthodontist treat is mandibular retrognathism. Treatment modalities for Class II malocclusions with mandibular retrognathia in the growing patients include removable and fixed functional appliances. Orthognathic surgery, extraction or distalisation of maxillary teeth is the treatment alternatives after the growth completion. With the help of functional appliances, the malalignment of the skeletal jaw bases as well as dental malocclusion can be corrected, whereas with the help of fixed mechanotherapy, only the correction of dental malocclusion takes place. Functional appliance help in modification during the growth phase resulting in a more favourable size or location of the mandible [2-4].

Functional appliances indirectly change the development of the mandible and maxilla to the desired position. Once a proper function is established, the adaptation of the craniofacial morphology follows [5,6]. Maximum voluntary bite force is one of the key predictor of the functional state of the masticatory system [6,7]. Malocclusions are often associated with altered bite force [8,9]. Individuals with normal occlusion exhibit the strongest bite force, followed by individuals with Class II, and III malocclusion [5]. Occlusal bite force also correlates with anthropometric variables, such as height and weight [10]. Body mass index is frequently used as a screening tool for conditions like obesity that are weight-related. BMI is a combination of weight and height that serves as a quick indicator of how evenly the body's mass is distributed. Orthodontic treatment can cause temporary fluctuations in BMI, primarily due to changes in eating habits and discomfort during treatment [11]. However, with adaptation, BMI usually stabilises and in some cases, improved masticatory function post-treatment may positively influence dietary intake and nutritional status. Therefore, it is important to assess how it relates to bite force. Nowadays many bite force recording devices are available such as GM 10 (Nagano Keiki, Tokyo, Japan), T scan System (Tekscaninc., South Boston, MA, USA) and Dentoforce 2 (ITL AB, Sollentuna, Sweden). The Tekscan ELF system is a useful tool for clinical examination and comprehension of occlusal problems [12,13]. It was invented to be used as an adjuvant in dentistry to correct occlusal issues. The sensor transmits real-time occlusal contact sequences and relative force information to the computer software once positioned intraorally and the biting load is applied.

Several changes occur in the stomatognathic system during orthodontic treatment. Orthodontic treatment in skeletal Class II patients initially causes transient disruption in occlusal contacts during functional appliance therapy, but subsequently promotes the establishment of stable, well-distributed occlusal contacts during fixed mechanotherapy, enhancing overall functional efficiency." Natural adaptation of the tooth, periodontal ligament, bone, and muscle results in a new biological equilibrium [10]. To improve occlusion and create proper biting forces are goals of orthodontic treatment. There are no studies available in orthodontic literature utilising T-scan assessing the bite force in orthodontic therapy.

Skeletal Class II malocclusion often leads to reduced occlusal bite forces and impaired masticatory function. While functional appliances aim to correct jaw discrepancies, their impact on bite force during treatment is not fully understood. Similarly, changes during subsequent fixed mechanotherapy remain underexplored. Evaluating bite force variations across treatment phases can enhance our understanding of functional adaptation and help optimise clinical outcomes. Thus, the present prospective study aimed to assess bite force changes during functional and fixed orthodontic therapy in skeletal Class II patients by T-scan and compare it with the occlusal contacts and BMI of the patients.

MATERIALS AND METHODS

The present prospective study was conducted in the Department of Orthodontics, Faculty of Dental Sciences, SGT University, Gurugram, Haryana, India, from March 2021 to September 2022, after the approval from the Institutional Ethical committee. (Approval No.FODS/EC/ORTHO/2021/05).

A total sample of 45 patients with age ranging from 10-15 years having CVMI of 2, 3 and 4 were selected from the Department of Orthodontics and Dentofacial Orthopaedics who reported for regular orthodontic treatment. Skeletal Class II patients with retrognathic mandible were selected for the study. Treatment therapy consisted of functional appliance (Twin block appliance) and fixed orthodontic treatment (MBT 0.022 in) depending on patient's cooperation and CVMI stages [14]. Patients having CVMI stage 2 and 3 were mainly treated with functional mechanotherapy i.e., with Twin block appliance as they had more growth potential. Group II included patients having CVMI stage 4 and were treated with fixed mechnotherapy.

Inclusion and Exclusion criteria: The inclusion criteria for this study were patients having CVMI stages 2,3 and 4, with all teeth erupted except 3rd molars, skeletal Class II malocclusion (ANB >4º) and minimum crowding. The exclusion criteria were patients with evidence of any systemic disease, poor oral hygiene, severe crowding, missing first permanent molar and any congenital syndrome. Informed consent was taken from all patients and parents in the local language (Hindi) and English verbally as well as on paper.

Sample size calculation: Sample size was calculated using the formulae $N=(Z_{\alpha/2})^2\ 2s^2/d^2$, where 'N' stands for sample size, 's' for standard deviation and 'd' for estimate accuracy, or how near to the true mean the estimate was. $Z\alpha/2$ is normal deviate for two- tailed alternative hypothesis at a level of significance [15]. Power design is assumed as 80%.

Calculations:

S– Standard deviation = 0.62 (derived from the pilot study data)

$Z_{@/2}=Z_{0.05/2}=Z_{0.025}=1.96$ at type 1 error of 5%

d=0.22

$N=(1.96)^2 2*34.08^2/31.64^2$

=8.91

Considering the error and drop out, the sample size will be increased to 15.

The subjects were divided into three groups

Group I: 15 (Male: 9 Female: 6) skeletal Class II patients treated by Twin Block appliance.

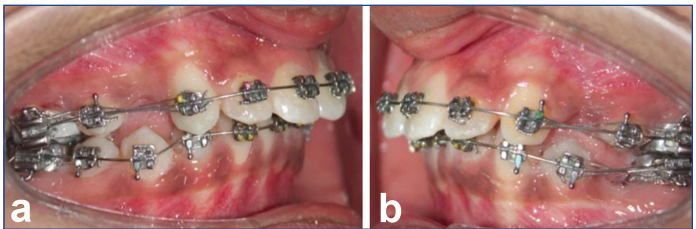
Group II: 15 (Male: 4 Female: 11) skeletal Class II patients treated by fixed orthodontic mechanotherapy.

Group III: 15 (Male: 9 Female: 6) Skeletal Class I occlusion individuals (Control Group).

Study Procedure

In the present study, pretreatment records of the selected patients included study models, extraoral and intraoral photographs, lateral cephalograms and Orthopantamogram (OPG). Group I patients were treated with functional appliance [Table/Fig-1]. Group II patients with skeletal Class II malocclusion were treated with 0.022 slot MBT fixed mechanotherapy [Table/Fig-2]. Group III individuals were considered as the control group: Control group subjects were evaluated only at the beginning of the study (T0). There was no treatment provided to the control group Therefore, these values were considered as the control value for comparison at different time intervals.

[Table/Fig-1]: Intraoral photograph showing patient wearing twin block appliance: (a) Right lateral view; (b) Left lateral view.



[Table/Fig-2]: Intraoral photograph showing patient with fixed mechanotherapy: (a) Right lateral view; (b) Left lateral view.

The maximum occlusal force for Group I and II participants were recorded at six time points: at the start of treatment (T0), after one week (T1), one month (T2), three months (T3), six months (T4), and at the end of therapy or eight months (T5). Measurements were taken using a piezoresistive sensor (FlexiForce B201 ELF system, Tekscan Inc., South Boston, USA). The load cells (transducers) converted the applied force into electrical signals, which were then processed by an electronic device to detect resistance changes. These changes were subsequently converted into force values (newtons) using ELF software installed on a computer.

The FlexiForce B201 sensor is a flexible, ultra-thin printed circuit with an active sensing area measuring 9.5 mm in diameter and 0.2 mm in thickness. To ensure force concentration at the center of the sensor, load concentrators with a diameter of 7 mm and thickness of 0.7 mm (Tekscan Inc., South Boston, USA) were used. The calibration process for FlexiForce sensors involves four key steps to ensure accurate force measurement. First, the sensor is conditioned by repeatedly applying and releasing force to stabilise its output. Next, a single-supply op-amp circuit is configured to amplify the sensor's signal for compatibility with microcontrollers. The circuit's sensitivity is then adjusted so that the output voltage reaches 80-90% of its full scale under maximum expected force, optimising accuracy and range. Finally, a three-point calibration is performed using known force values (e.g., 0%, 50%, and 100%) to generate a calibration curve that translates voltage readings into precise force measurements. For infection control, the sensor was covered with a plastic sleeve during measurements. Prior to use, the sensor was calibrated using a universal testing machine (Shimadzu, Kyoto, Japan).

The patients were instructed to be seated in the natural head position and then Tekscan ELFTM with Flexiforce sensor [Table/Fig-3] was

[Table/Fig-3]: Showing patient while recording occlusal bite force using flexiforce sensor in the 1st molar region.

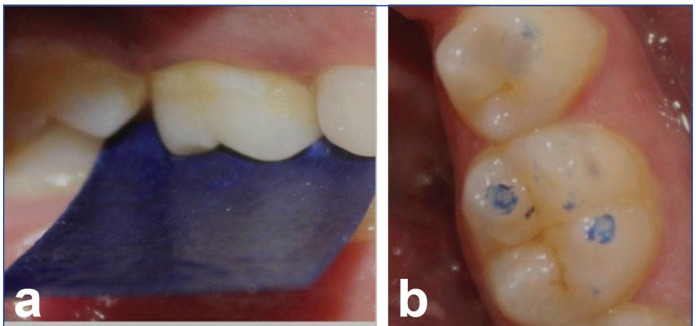
placed intraorally in the first molar region and patients were asked to bite with maximum biting force. The procedure was done both on the left as well as on right-side and the maximum bite force values were recorded. The bite force was re-evaluated after two hours by another examiner but there was no significant difference noticed in the readings (p-values<0.05).

BMI calculation:

BMI= Weight(kg)/height(m^2) [16]

Treatment progress was evaluated by recording BMI and occlusal contacts at the beginning of treatment (T0), first week (T1), first month (T2), third month (T3), sixth month (T4) and at the end of therapy or eight months (T5). Treatment duration for all patients were either eight months or Class I molar relation, which ever achieved first. All post-treatment records were taken at the end of the treatment.

Occlusal contacts: Occlusal contact points were determined clinically on patients. The patient was positioned vertically, with his or her head and back resting on a dental chair that was angled at 45 degrees from the ground. The patient was requested to open and close once the teeth surface was dried, and occlusal contacts were counted using a 12 micromillimeter articulating film (Accu film II, ParkellTM, Farmingdale, New York, USA) [Table/Fig-4].



[Table/Fig-4]: Measuring occlusal contacts using articulating paper.

STATISTICAL ANALYSIS

Collected data was tabulated in an excel sheet and the means and standard deviations of the measurement of each group were used for statistical analysis {Statistical Package for Social Sciences (SPSS) 22.00 for windows; SPSS inc, Chicago, USA}. For each assessment point, data were statistically analysed using one way Analysis of Variance (ANOVA). Difference between two groups was determined using t-test and the level of significance was set at p<0.05. Statistical methods like the unpaired t-test were used to analyse the quantitative variables. Statistical significance is considered for p-values<0.05.

RESULTS

In the present study, 24 males and 21 females were enrolled for assessing the maximum bite force along with occlusal contacts and BMI. The age of the participants in this study were comparable in all the groups, whereas a greater number of female subjects were present in the fixed orthodontic treatment group and less in the functional and control groups as shown in [Table/Fig-5]. As depicted in [Table/Fig-6] the maximum bite force at T0 (pre-treatment) recorded the least in group I (271.2 N), followed by the control group (287.73 N) and then fixed mechanotherapy group (group II) (348.27 N), while the BMI at T0 was recorded the least in group I (21.16), maximum in group II (21.52), and the control group recorded BMI 23.16 [Table/Fig-7]. Maximum bite force and BMI recorded at various time intervals among different treatment methods have been summarised in [Table/Fig-6,7].

ANOVA test concluded that there was no statistically significant difference in group I and group II in case of maximum bite force and BMI values at the start of treatment. Whereas in case of occlusal contact areas, ANOVA test suggested that there was statistically significant difference in the occlusal contact areas of treated groups (group I and group II) as compared to the control group (group III) as p-value=0.004 [Table/Fig-6]. In the present study, occlusal contact areas were also assessed, which shows significant reduction in group I subjects as the treatment proceeds, especially from the stage T2 to T5 whereas in group II subjects there is no significant changes seen. At T6 stage significant recovery has been noticed in group I subjects. According to the t-test which is used to compare the occlusal contact areas of group I and group II shows that there is statistically significant difference in group and group II occlusal contacts as p-value <0.05 [Table/Fig-8].

DISCUSSION

Masticatory efficacy is directly related to the maximum bite force and improvements in the masticatory efficacy affect the health of the patient. So, improvement in the alignment of teeth and skeletal structure to improve masticatory efficacy is one ofthe main objective of orthodontic treatment. In the present study, the age group was 11-14-year-old and in adolescents, myofunctional appliances can be used to correct the skeletal malalignment, which is not possible in the case of adults when growth is complete [17]. As concluded by previous studies, there is a significant difference in the bite force of males as compared to females [1,18].

Tekscan ELF™ system with flexiforce sensors was used to record the bite forces at various time intervals for a period of eight months. At the beginning of the treatment for group I maximum bite force was 271.2 N and for group II was 348.27 N whereas at T5 maximum bite force for both the group was approximately 50 N less i.e., for group I 216.2 N and for group II 299.2 N. It was found that there was a significant reduction in maximum bite force in the functional appliance therapy group as compared to the fixed mechanotherapy group. Similar results were shown by Thomas G et al., in fixed orthodontic therapy, who also reported reduction in OBF (occlusal bite force) after the orthodontic treatment [19]. Alomari SA et al., showed in their study that at the end of the first week, reduction of occlusal bite forces was recorded using battery-operated portable type of OBF gauge (GM10, Nagano

Variables	Age (years)				Sex			
	Min	Max	Mean	SD	Males	%	Females	%
Functional appliance (group I)	11	13.8	12.45	0.809	9	60.00	6	40.00
Fixed orthodontic treatment (group II)	11.6	13	12.71	0.512	4	26.67	11	73.33
Control (group III)	12	13.5	12.5	0.534	9	60.00	6	40.00

[Table/Fig-5]: Descriptive analysis of age and sex among different treatment methodologies.

Variables		Min	Max	Mean	SD	t-test	p-value	ANOVA test
T0 (At the beginning of the treatment)	Functional appliance (group I)	128	401	271.2	83.25	5.591	0.025	3.59
	Fixed orthodontic treatment (group II)	168	490	348.27	94.88			
	Control (group III)	168	393	287.73	68.59			
T1 (One week)	Functional appliance (group I)	144	377	251.80	64.38	2.60	0.118	
	Fixed orthodontic treatment (group II)	160	425	295.13	81.76			
T2(One month)	Functional appliance (group I)	96	458	237.67	102.47	0.39	0.537	
	Fixed orthodontic treatment (group II)	120	417	262.13	111.68			
T3 (Three months)	Functional appliance (group I)	0	337	87.6	96.49	27.185	<0.01**	
	Fixed orthodontic treatment (group II)	128	490	308.1	132.33			
T4 (Six months)	Functional appliance (group I)	16	184	82.93	50.65	74.61	<0.01**	
	Fixed orthodontic treatment (group II)	152	482	326.33	96.67			
T5(Eight months)	Functional appliance (group I)	136	297	216.2	60.40	6.45	0.017	
	Fixed orthodontic treatment (group II)	120	458	299.2	111.26			

[Table/Fig-6]: Analysis of maximum bite force at various time intervals among different treatment methods (Newton).
Unpaired t-test was used to analyse the quantitative variables; Statistical significance was considered for p-values<0.05 (*); p-values<0.01 (**)

Variables		Min	Max	Mean	SD	t-test	p-value
T0 (At the beginning of the treatment)	Functional appliance (group I)	17.2	28.7	21.16	2.80	3.96	0.056
	Fixed orthodontic treatment (group II)	18.2	27.5	23.16	2.71		
	Control (group III)	19.1	23.6	21.52	1.37		
T1 (One week)	Functional appliance (group I)	17.2	28.7	21.04	2.88	4.69	0.038
	Fixed orthodontic treatment (group II)	18.2	27.5	23.22	2.64		
T2 (One month)	Functional appliance (group I)	14.8	28.7	20.26	3.33	3.17	0.086
	Fixed orthodontic treatment (group II)	18.1	25.9	22.19	2.56		
T3 (Three months)	Functional appliance (group I)	15.8	25.4	19.03	2.60	3.13	0.087
	Fixed orthodontic treatment (group II)	16.8	24.5	20.57	2.14		
T4 (Six months)	Functional appliance (group I)	16.2	24.6	19.06	2.02	8.22	0.007**
	Fixed orthodontic treatment (group II)	18.3	24.1	20.99	1.64		
T5 (Eight Months)	Functional appliance (group I)	17.4	24.9	19.53	1.88	3.049	0.092
	Fixed orthodontic treatment (group II)	17.2	24.6	20.69	1.75		

[Table/Fig-7]: Analysis of BMI at various time intervals among different treatment methods.
Unpaired t-test was used to analyse the quantitative variables; Statistical significance was considered for p-values<0.05 (*); p-values<0.01 (**)

Keiki, Tokyo, Japan) [20]. In the present study, group II showed reduction in the bite force during the treatment which is similar to the study done by Sonnesen L and Bakke M [21], in fixed orthodontic treatment using pressure transducer in a similar time frame. In addition, results were in coincidence with an EMG study conducted by Goldreich H et al., who concluded that there was

Variables		Min	Max	Mean	S.D.	t-test	p-value
T0 (At the beginning of the treatment)	Functional appliance (group I)	4.5	7.5	5.7	1.06	0.094	0.760
	Fixed orthodontic treatment (group II)	4.5	7.5	5.77	0.678		
T1 (One week)	Functional appliance (group I)	4.5	7.5	5.87	1.06	0.094	0.761
	Fixed orthodontic treatment (group II)	4.5	7.5	5.77	0.678		
T2 (One month)	Functional appliance (group I)	0	7	3.27	1.98	21.38	<0.01**
	Fixed orthodontic treatment (group II)	4.5	7.5	5.77	0.678		
T3 (Three months)	Functional appliance (group I)	0	5	1.167	1.676	95.01	<0.01**
	Fixed orthodontic treatment (group II)	4.5	7.5	5.77	0.729		
T4 (Six months)	Functional appliance (group I)	0	4	1	1.323	145.06	<0.01**
	Fixed orthodontic treatment (group II)	4.5	7	5.733	0.752		
T5 (Eight months)	Functional appliance (group I)	3.5	6.5	4.7	0.841	14.19	<0.01**
	Fixed orthodontic treatment (group II)	4.5	7	5.77	0.704		

[Table/Fig-8]: Analysis of number of occlusal contacts at various time intervals among different treatment methods.
Unpaired t-test was used to analyse the quantitative variables; Statistical significance was considered for p-values<0.05 (*); p-values<0.01 (**)

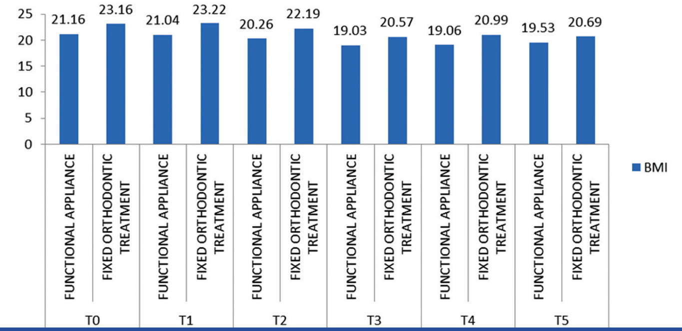
a reduction in muscle activity during function after orthodontic wire adjustment in fixed orthodontic treatment even after 48 hours of treatment [22]. As the treatment progressed there was more reduction in maximum bite force in group I as compared to group II at T3, T4 and T5. A study conducted on skeletal Class I patients presenting with a mildly increased horizontal maxillary overjet and minimal dental crowding demonstrated that bite force significantly decreased one week following the placement of fixed orthodontic appliances. Subsequently, a gradual recovery was observed, with bite force values returning to baseline levels approximately six months after the initiation of treatment [20]. This is in agreement with the present study in which the bite force starts slowly recovering towards stage T6.

Various studies concluded that a decrease in maximum bite force in the case of myofunctional appliance therapy could be due to changes in functional muscular activity [23-26]. Hiyama S et al., reported that immediately after the insertion of the functional appliance there was increased activity of the lateral pterygoid muscle and the activity decreased markedly after 4-6 months of the functional appliance therapy treatment [24]. Whereas Tabe H et al., concluded that due to biting on the appliance there was change in the muscle length which explains the decreased activity of the temporalis muscles [25]. OBF may fluctuate depending on changes in the orofacial musculature's functional pattern even though jaw muscles have a good variety of responses to local and systemic alterations [26].

Mandibular advancement is performed using a myofunctional appliance (twin block appliance in the present study) to correct the skeletal imbalance in skeletal Class II jaw relation, which would cause a reduction in the electromyographical activity of the masticatory muscles as an instant neuromotor reaction to mandibular advancement [6]. Antonarakis GS et al., also reported that following functional appliance therapy there is a significant reduction in OBF in the molar region [27]. Koc D et al., also concluded that myofunctional appliance therapy along with the correction of skeletal discrepancies, decreases the functional activity of the jaw muscles which may lead muscular atrophy and thereby influence the function of the masticatory muscles, leading to a reduction in the maximum bite force. The occlusal support, periodontal mechanoreceptor actions, and jaw elevator muscle reflexes all cause short-term alterations in the maximal bite forces [28].

Occlusal contact is found to be an important factor in influencing the occlusal bite force and occlusal contacts were found out to be the another reason for reduction in maximum occlusal bite force. It was found out that there was more reduction in the occlusal contact areas in the case of group I as compared to fixed mechanotherapy group II. At the start of the treatment (T0), occlusal contacts for group I was 5.87 and for group II was 5.77 whereas at T2 stage of treatment occlusal contacts for group I was 3.27 and for group II was 5.77as shown in [Table/Fig-8]. There could be a reduction in the number of occlusal contacts during the functional orthodontic treatment. The participants stage of dental development and the development of a posterior open bite during functional appliance therapy when the acrylic bite blocks were left untrimmed may be connected to the decline in occlusal contacts [1]. As it was previously documented that occlusal contacts account for reduction in maximum bite force in adults and reduction in occlusal bite force due to changes in occlusal contacts that occurred during the orthodontic therapy [29]. The reduction in occlusal contacts observed during orthodontic treatment, followed by an increase in contacts by stage T6, can be attributed to changes in intercuspidation throughout the treatment process. This pattern aligns with the findings of Therkildsen NM and Sonnesen L [29]. During active orthodontic treatment, tooth movement leads to a temporary disruption in intercuspidation. However, following treatment completion, the teeth undergo vertical settling, resulting in an increase in occlusal contacts.

The BMI of every patient from T0 to T5 over an 8-month period of orthodontic therapy was examined in the current study. In case of both functional appliance therapy and fixed mechanotherapy there is a decrease in BMI during the treatment from T0 to T3 as shown in [Table/Fig-9] i.e., at the T0 BMI for group I is 21.16 whereas at T3 BMI value is 20.57 same for the group II, BMI value at T0 is 23.16 and deceased to 20.57 at T3 stage. Lilja M et al., and Whitlock G et al., showed that during growth phase in young adulthood BMI increases linearly with age [30,31]. Ajwa N et al., concluded that there is marked weight loss during the initial months of the orthodontic treatment [32]. After analysing the changes in BMI over a 2-month period, Hameedullah J et al., came to the



[Table/Fig-9]: Analysis of BMI at various time intervals among different treatment methods.

conclusion that orthodontic therapy induces weight reduction and can be utilised to prevent obesity and enhance personality [33]. In the present study, results shown that there is gradual recovery of BMI in all the subjects of group I and group II from T3 to T5 as depicted in graph-2 (from 19.03 to 19.53 and from 20.57 to 20.69 in case of group I and group II, respectively). Gnanasambandam V and Gnaneswar SM also showed that BMI dropped in the first three months before steadily increasing at the conclusion of the first treatment year [34].

So, this study used Tekscan ELF™ system with flexiforce sensor to assess maximum bite force in skeletal Class II patients treated with fixed mechanotherapy and functional appliance therapy along with evaluation of the BMI and occlusal contact areas during the orthodontic therapy. In the case of BMI, at the start of the treatment, there is a reduction in the BMI but it showed a gradual recovery towards the end of the treatment. The results showed that there is significant reduction in maximum bite force in case of functional appliance therapy group as compared to the fixed mechanotherapy group.

Clinical significance of the present study is that during the initial stages of orthodontic treatment (functional appliance therapy as well as fixed mechanotherapy), a gradual decrease in maximum bite force may be observed in patients deteriorating masticatory efficiency and BMI. A prior knowledge may help the clinician to better manage the challenges faced during early stages of orthodontic treatment.

Limitation(s)

A limitation of the present study is the reduced time period and lesser sample size. Further studies can be performed to evaluate the maximum bite force till the end of treatment to observe the outcome of different treatment modalities.

CONCLUSION(S)

The present prospective study aimed to assess bite force changes during functional and fixed orthodontic therapy in skeletal Class II patients by T-scan and compared it with the occlusal contacts and BMI of the patients. The results showed that orthodontic intervention in growing skeletal Class II patient may decrease the maximum bite force, occlusal contacts and fluctuations in BMI due to functional adaptation and altered eating patterns. As the treatment progressed masticatory efficiency and BMI were progressively restored. Therefore, in clinical practice dietary modification and patient counselling should be integrated to overcome the challenges of compromised masticatory efficiency and BMI in such patients.

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