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Clinical Experience of Orthodontists on the Use of Bite Turbos in Orthodontic Treatment- A Kap Based Descriptive Study

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Abstract

Objective: To determine the current usage, indications and decision-making protocols used for bite turbos by orthodontists.

Materials and Methods: A cross-sectional descriptive questionnaire-based survey was conducted among the orthodontists. A well-designed, closed-ended, self-administered questionnaire was developed to collect the data. Information gathered was related to personal background, frequency of usage, clinical indications, position and other factors concerning the usage of bite turbos. The data thus obtained was evaluated by descriptive statistics and the results were expressed in the form of frequencies and percentages.

Results: Most of the participants used bite turbos in their daily practice particularly for correcting deep bite and for protection of the appliance from getting debonded. Preferred position for bite turbos was on the lingual surfaces of maxillary anterior teeth and on the occlusal surfaces of posterior teeth depending upon the case requirements. Differences were seen in terms of frequency of usage, period for the application and material selection for the same due to differences in terms of clinical experience and training background of individuals. Most respondents confirmed that bite turbos can help reduce the treatment time by helping in disocclusion of the teeth and controlled movement.

Conclusions: Bite turbos are frequently used as an efficient orthodontic appliance; however varying clinical practices need to be harmonized and evidence-based guidelines must be developed.

Keywords: Orthodontists, Bite Turbos, Knowledge–attitude–practice survey

Introduction

Other than having acceptable arrangement of teeth, a stable, ideal occlusal relationship is also required in orthodontic treatment without any unwanted effect on the teeth and periodontal tissues. Interfering occlusal contacts are common problems that can obstruct tooth movement and affect appliance performance in orthodontic patients with deep bite. A number of complications may arise including bracket failure, bending or fracture of the wire and undesirable occlusal contact induction.[1,2]

To manage such complications during orthodontic treatment, some auxiliary appliances have been designed to supplement fixed orthodontic appliances. Among these, bite turbos (bite blocks or bite raisers) hold a place in controlling vertical dimension thus help in orthodontic treatment more smoothly and prevent

bracket failure in correction of deep overbite. Bite turbo is used to provide temporary disocclusion between upper and lower teeth. They are basically simple occlusal builds/wedges typically bonding onto the palatal surface of upper incisors or the occlusal surface of the posterior teeth. This enables an increase of the overbite and consequently, ideal teeth movement.[1,2]

Vertical dimension control and specifically anterior overbite reduction in orthodontics are not new concepts and historically, removable bite planes were commonly used by orthodontists for decades before the development of fixed appliances. Since then, bite turbos become accepted due to its continuous control overbite and independent to patient compliance. William R Proffit et al, has mentioned that bite opening is important to solve the problem in deep bite and also improvement of mechanical efficiency.[3]

Bite turbo is used in orthodontics in many different ways which include the correction of deep bite, preventing trauma in traumatic occlusion and to control posterior teeth eruption and anterior teeth intrusion in cases of crossbite. Controlled occlusal disengagement of teeth to provide improved mechanics and predictability. Charles J Burstone, had also mentioned that properly placed controlled occlusal interferences were found to increase the mechanical efficiency. Increased overjet with controlled bite opening with bite turbo helps in developing anterior space, posterior extrusion and so forth. Discomfort, speech disturbance and difficulty in mastication are side effects during wearing, besides enamel wear/fracture in specific conditions.[4,5,6] Unintended occlusal changes can occur during long term usage. Indications for use should therefore be precisely evaluated.[5,6,7]

Therefore, the objective of the study was to investigate the indications, effectiveness and related factors of orthodontic bracket bite turbos in orthodontic treatment, as it has apparently played a critical role in helping the orthodontic tooth movement and reducing the problems and complications with the use of bracket.[2,5,7]

Materials And Methods

Study Design and Setting

This study was designed as a cross-sectional, questionnaire-based survey to evaluate the clinical experience of orthodontists regarding the use of bite turbos in orthodontic treatment. The study aimed to assess their clinical practices, perceived treatment effectiveness, associated side effects, and factors influencing clinical decision-making.

Study Population

The study population comprised orthodontists actively engaged in clinical practice. Orthodontists with varying levels of clinical experience and working in different orthodontic practice settings were included to capture a diverse range of clinical habits, treatment approaches, and experiences regarding the use of bite turbos.

Inclusion criteria included orthodontists actively engaged in clinical practice who voluntarily agreed to participate in the study and provided informed consent.

Exclusion criteria included incomplete questionnaire responses were considered ineligible for inclusion in the final analysis. All completed questionnaires were included in the study.

Sample Size Calculation

The sample size was calculated using a significance level (α) of 0.05 and a statistical power of 80%. Asample size of 68 participants was estimated to detect an effect size (W) of 0.31 using a chi-square test with 3 degrees of freedom. The calculation was performed using IBM SPSS Statistics, version 26.0.

Study Instrument

A structured, self-administered questionnaire comprising predominantly closed-ended questions was developed following a comprehensive review of the relevant literature. The questionnaire was designed to be clear, simple, and concise, with the objective of evaluating the clinical use of bite turbos among orthodontists.

The questionnaire included items addressing demographic characteristics, frequency and type of bite turbo use, perceived treatment effectiveness, associated side effects, and factors influencing clinical decision-making. The questions included in the questionnaire are presented in Table 1.

Content validity and clarity were assessed by orthodontic experts, and minor modifications were made based on their feedback. A pilot study was

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conducted to evaluate the reliability of the questionnaire, which demonstrated acceptable internal consistency based on Cronbach's alpha and good test–retest reliability.

Data Collection Procedure

Data were collected electronically using Google Forms. Participation was voluntary, and digital informed consent was obtained from all participants before questionnaire administration. All questionnaires included in the study were completed in full. The average time required to complete the questionnaire was approximately 5–10 minutes.

The responses obtained were compiled and organized for statistical analysis using IBM SPSS Statistics, version 20.0 (IBM Corp., Chicago, IL, USA).

Statistical Analysis

Descriptive statistical methods were used to analyze the collected data. Frequencies and percentages were calculated to summarize participants' responses regarding the clinical use of bite turbos, perceived treatment effectiveness, associated side effects, and clinical practice patterns. The findings were organized into tables to facilitate interpretation and presentation of the results.

Results

A total of 68 orthodontists were approached to complete the questionnaire, and all completed responses were obtained. The demographic distribution of the study participants and the responses related to clinical use, effectiveness, and decision-making regarding bite turbos are summarized and illustrated in Table 1.

The findings indicated that bite turbos are commonly used in clinical practice, with the majority of clinicians reporting occasional to frequent use. Anterior bite turbos were the most preferred type. Most participants considered bite turbos to be moderately effective in overbite correction, with treatment duration commonly ranging between 3–6 months.

Commonly reported side effects included incisor proclination and posterior open bite, while patient discomfort and limited space for placement were identified as major challenges. A majority of clinicians believed that bite turbos contribute to improved treatment efficiency, although variations were observed in their perceived impact on overall treatment duration.

The knowledge domain assessed participants understanding of the use, effectiveness, types, duration, and side effects of bite turbos in orthodontic treatment. Most participants demonstrated adequate knowledge and considered bite turbos moderately effective for overbite correction. Anterior bite turbos were the most preferred type, followed by canine bite turbos, fig.1 showing the same graphically.

Most respondents reported that overbite correction is typically achieved within 3–6 months. Awareness of potential side effects was satisfactory, with incisor proclination, molar extrusion, and posterior open bite being the most commonly identified complications. Treatment effectiveness was primarily assessed through clinical observation, while some participants also utilized cephalometric analysis. These findings suggest a good overall understanding of bite turbo therapy among the participants, which is listed in the Table 2.

The attitude domain evaluated participants' perceptions of the clinical usefulness and effectiveness of bite turbos. Overall, a positive attitude was observed, with most participants considering bite turbos more effective or equally effective than other treatment modalities, fig.2 showing the same graphically.

Most respondents agreed that bite turbos improve treatment outcomes, enhance occlusal stability, and may reduce treatment duration. Overall, the findings indicate a favorable attitude toward bite turbos, while acknowledging certain limitations, which is listed in the Table 3.

The practice domain assessed the clinical use, preferences, limitations, and decision-making factors related to bite turbos. Their use was generally intermittent, reflecting selective clinical application, with anterior bite turbos being the most commonly used type, fig.3 showing the same graphically.

Patient discomfort was the most frequently reported drawback, followed by appliance debonding and limited space for placement, while speech and eating difficulties were less common. Skeletal pattern, age, and severity of deep overbite were the main factors influencing their use. Most participants believed that

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bite turbos help reduce treatment time, although responses varied, which is listed in Table 4.

Discussion

Bite turbos or bite blockers (or bite raisers) are frequently employed as adjunctive orthodontic appliances with multiple indications, such as temporary disocclusion, tooth movement, deep overbite correction, reduction of occlusal interferences, and preventing bracket debonding and enhancing mechanics. Their widespread application can be attributed to their simplicity and the low cost of installation and their convenience.[5,7]

The purpose of the study described here was to investigate the knowledge, attitude and practice of the use of bite turbos among orthodontists. It has shown that, despite a reasonably positive attitude and good knowledge about the appliance among the sample, bite turbos are selectively employed in their practices which depends on patient related factors and mechanics.

A majority believed that bite turbos are moderately effective for correction of the overbite; this finding is in line with previous studies which have shown the efficiency of the anterior bite turbos to correct the deep bite.[2,5] Side effects of the appliance like increased proclination of incisors, extrusion of molars and posterior open bite were also well documented by the participants of the study. A significant proportion (mostly more than three fourth of the participants) felt that the correction of the overbite can be achieved with the appliance between 3-6 months' time.[2,5] This is again in agreement with studies. The participants have a positive attitude toward bite turbos and consider them effective or at least as efficient as alternative

treatments and improving the prognosis as well as stability of the occlusal relationships. Many also feel that their use could shorten the treatment time by producing rapid posterior disocclusion and efficient tooth movement. However, the views are not totally uniform; which might be explained on the basis of their experience, mechanics, indications etc.

In the clinical practice they are used quite sporadically in some practices though there seems to be no barrier to use them in anterior bite turbos due to easy application for anterior disocclusion in majority cases. Discomfort and the tendency to debond were the most cited difficulties faced with bite turbos followed by insufficient space available. The other minor difficulties with speech and mastication were mentioned very few by participants. Other studies also find the presence of patient related side effects like the discomfort with the appliance contributing to the acceptance and compliance.[6] Durability of the appliance and wear of enamel were other of the important issues highlighted.[6,7]

The factors dictating the clinical decision of using bite turbos in some patients, namely skeletal pattern, patient's age and severity of the deep overbite, also adhere to accepted principles of orthodontic treatment.[3,5,7] The findings are encouraging and, with more clinical experience and better patient selection, further increase the efficiency of bite turbos.

Conclusion

Current study demonstrated that orthodontists have adequate knowledge and positive attitude toward bite turbos but, clinical use of bite turbo remained optional and determined by clinical complications, patients related and biomechanical factors. While bite turbos are a well-established orthodontic adjuvant in correcting deep overbite, its frequent usage relies on patient's tolerance, physical properties and the efficiency of correction.

Current findings are similar to previous studies that proved its effectiveness in correction of deep bite. Bite turbos have been found comparable to reverse curve of Spee arch wires for reducing overbite by Al-Zoubi EM and Al-Nimri KS. Patients' comfort is a highly significant factor in the use of bite turbos, a fact which is proven from recent patients' point of view survey, which showed that despite an effective result they may complain about this fact. New usages like unilateral bite turbos on asymmetric correction, the use of which is still controversial, further expand the application and study of bite turbos in orthodontics.

Limitations were also present. The cross-sectional questionnaire approach, based on self-report responses, could have generated response bias. With a small number of respondents, generalizations of study results are not justified. Clinical responses in terms of efficiency of bite turbos were not explored, and differences in practitioner experience and treatment philosophies could have affected reported responses. Patient adherence was not documented, as were variations between types of bite turbo, bonding agent,

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and bite appliance. Additionally, the cross-sectional design of the study cannot provide insight into any causal associations between knowledge, attitudes, and practices.

Future research needs large scale sample collection with prolonged follow-up in order to test the durability, efficacy and potential side effects of diverse bite turbo Designs. Comparative studies with Bite turbos and other procedures aimed at correcting deep bite and with studies focusing on patient outcome are also needed. More detailed digital analyses including cephalometric measurements may identify better explanation for Bite turbo Biomechanics whereas, novel biomaterials CAD/CAM and 3D printing technology, Artificial intelligence (AI) will certainly expand possibilities on design of new generation appliance, improved selection criteria of cases and outcome predictability.

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Figure legends:

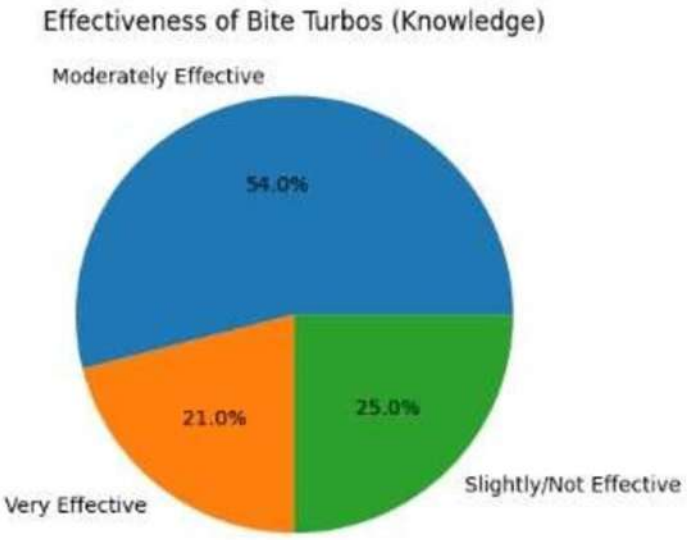
Figure 1 - Pie chart explaining the Knowledge perspective of orthodontist towards bite turbos

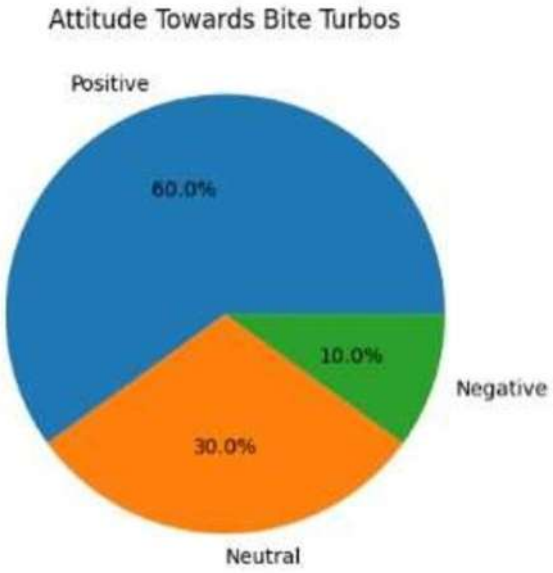
Figure 2 - Pie chart explaining the Attitude perspective of orthodontist towards bite turbos

Figure 3 - Pie chart explaining the Practice perspective of orthodontist towards bite turbos

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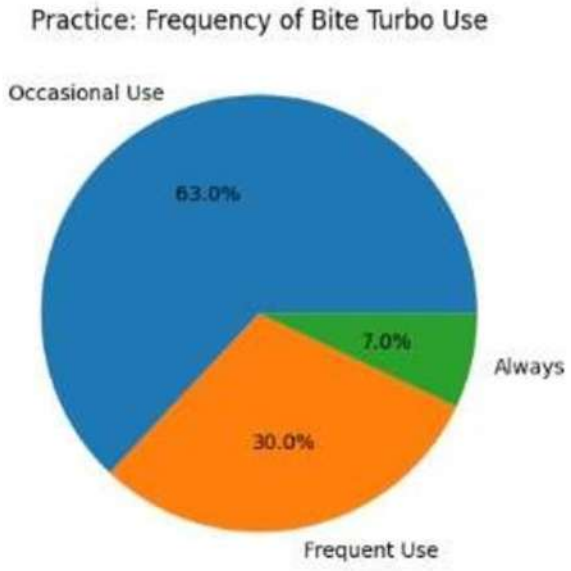


Table 1.- Questionnaire form and responses

Question	Response	n (%)
Q1. Age Group	Below 30 years	50 (73.5)
	30–40 years	11 (16.2)
	≥40 years	7 (10.3)
Q2. Practice Setting	Academic Institution	33 (48.5)
	Private Practice	23 (33.8)
	Hospital-Based	8 (11.8)
	Student/Resident	4 (5.9)
Q3. Frequency of Use of Bite Turbos	Always	4 (5.9)
	Frequently	21 (30.9)
	Occasionally	43 (63.2)
Q4. Preferred Type of Bite Turbos	Anterior Bite Turbos	43 (63.2)
	Canine Bite Turbos	23 (33.8)
	Posterior/Molar	2 (2.9)
Q5. Effectiveness in Overbite Correction	Moderately effective	37 (54.4)
	Very effective	14 (20.6)

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	Slightly effective	14 (20.6)
	Not effective	3 (4.4)
Q6. Duration for Overbite Correction	<3 months	20 (29.4)
	3–6 months	39 (57.4)
	>6 months	9 (13.2)
Q7. Preferred Material for Bite Turbos	Composite resin	32 (47.1)
	Glass ionomer cement	12 (17.6)
	Flowable composite	4 (5.9)
	Metal bite turbos	8 (11.8)
	Other	3 (4.4)
Q8. Comparison with Other Methods	More effective	30 (44.1)
	Equally effective	25 (36.8)
	Less effective	13 (19.1)
Q9. Impact on Treatment Duration	Decreased	26 (38.2)
	Increased	24 (35.3)
	Unchanged	18 (26.5)
Q10. Side Effects	Incisor proclination with molar extrusion	38 (55.9)
	Posterior open bite	28 (41.2)
	None	15 (22.1)
Q11. Challenges Encountered	Patient discomfort	41 (60.3)
	Limited space for placement	30 (44.1)
	Appliance debonding	28 (41.2)
Q12. Assessment of Effectiveness	Clinical observation	39 (57.4)
	Cephalometric analysis	29 (42.6)
Q13. Stability Post-Treatment	Strongly agree	16 (23.5)

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	Agree	30 (44.1)
	Neutral	17 (25.0)
	Disagree	4 (5.9)
	Strongly disagree	1 (1.5)
Q14. Difference in Treatment Duration	Bite turbos shorten time	32 (47.1)
	Lengthen time	23 (33.8)
	No difference	12 (17.6)
Q15. Issues with Speech/Eating	Occasionally	32 (47.1)
	Frequently	23 (33.8)
	Rarely	11 (16.2)
	Never	2 (2.9)
Q16. Factors Influencing Decision to Use Bite Turbos	Skeletal pattern	41 (60.3)
	Patient age	40 (58.8)
	Severity of deep overbite	30 (44.1)
Q17. Do you believe bite turbos contribute to a more stable occlusion post-treatment?	Strongly agree	16 (23.5%)
	Agree	30 (44.1%)
	Neutral	17 (25.0%)
	Disagree	4 (5.9%)
	Strongly disagree	1 (1.5%)

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Table 2.

Intergroup comparison- knowledge section

Parameter	Response	n (%)	p-value
Age Group	Below 30 Years	50 (73.5)	0.001
	30-40 Years	11 (16.2)	
	≥ 40 Years	7 (10.3)	
Preferred type of bite turbo	Anterior Bite Turbos (ABTs)	43 (63.2%)	0.001
	Canine Bite Turbos (CBTs)	23 (33.8%)	
	Posterior/Molar	2 (2.9)	
Effectiveness in overbite correction	Not effective	3 (4.4%)	0.002
	Slightly effective	14 (20.6%)	
	Moderately effective	37 (54.4%)	
	Very effective	14 (20.6%)	
Common side effects noticed	Incisor proclination with molar extrusion	38 (55.9%)	0.014
	Posterior open bite	28 (41.2%)	
	None reported	15 (22.1%)	
Average duration for overbite correction	<3 months	20 (29.4%)	0.006
	3–6 months	39 (57.4%)	
	>6 months	9 (13.2%)	
Comparison with other methods	More effective	30 (44.1%)	0.031

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	Equally effective	25 (36.8%)	
	Less effective	13 (19.1%)	
Assessment of effectiveness	Clinical observation	39 (57.4%)	0.041
	Cephalometric analysis	29 (42.6%)	
Factors influencing decision to use bite turbos	Skeletal pattern	41 (60.3%)	0.022
	Patient age	40 (58.8%)	
	Severity of deep overbite	30 (44.1%)	

Table 3

Intergroup comparison- Attitude section

Parameter	**Response**	**n (%)**	**p-value**
Do you believe bite turbos contribute to a more stable occlusion post-treatment?	Strongly agree	16 (23.5%)	0.001
	Agree	30 (44.1%)	
	Neutral	17 (25.0%)	
	Disagree	4 (5.9%)	
	Strongly disagree	1 (1.5%)	
Impact on treatment duration	Decreased	26 (38.2%)	0.048
	Increased	24 (35.3%)	
	Unchanged	18 (26.5%)	

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Have you noticed any differences in treatment duration between bite turbos and other methods?	Yes, bite turbos shorten treatment time	32 (47.1%)	0.012
	Yes, bite turbos lengthen treatment time	23 (33.8%)	
	No significant difference	12 (17.6%)	
	Not applicable	1 (1.5%)	
Have you encountered any issues with bite turbos affecting speech or eating?	Occasionally	32 (47.1%)	0.009
	Yes, frequently	23 (33.8%)	
	Rarely	11 (16.2%)	
	Never	2 (2.9%)	
Comparison of bite turbos to other methods	More effective	30 (44.1%)	0.031
	Equally effective	25 (36.8%)	
	Less effective	13 (19.1%)	

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Table 4

Intergroup comparison- Practice section

Parameter	Response	n (%)	p-value
Frequency of using bite turbos	Always	4 (5.9%)	0.001
	Frequently	21 (30.9%)	
	Occasionally	43 (63.2%)	
Practice setting	Academic institution	33 (48.5%)	0.003
	Private practice	23 (33.8%)	
	Hospital-based practice	8 (11.8%)	
	Student/ Resident	4 (5.9%)	
Preferred type of material for bite turbos	Composite resin	32 (47.1%)	0.011
	Glass ionomer cement	12 (17.6%)	
	Flowable composite	4 (5.9%)	
	Metal bite turbos	8 (11.8%)	
	Other	3 (4.4%)	
Challenges encountered during use	Patient discomfort	41 (60.3%)	0.018
	Limited space for placement	30 (44.1%)	
	Appliance debonding	28 (41.2%)	
Clinical experience with side effects	Incisor proclination with molar extrusion	38 (55.9%)	0.014
	Posterior open bite	28 (41.2%)	

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