EAS Journal of Dentistry and Oral Medicine
Abbreviated Key Title: EAS J Dent Oral Med
ISSN: 2663-1849 (Print) & ISSN: 2663-7324 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-3 | Issue-6 | Nov-Dec-2021 | DOI:10.36349/easjdom.2021.v03i06.008

Original Research Article

Intraoral Vibratory Stimulation; Impact on Tooth Movement: Short Study

Tanushree Sharma[1*], Akshat Sharma[2], Chinki Bansal[3], Aseem Sharma[4], Arun Patyal[5]

[1]Sr. Lecturer Department of Orthodontics, HIDS, Poanta Sahib, Himachal Pradesh India
[2]Consultant, Oral and Maxillofacial Surgeon, AS Thakur Multispeciality Hospital, Hamirpur, Himachal Pradesh India
[3]Consultant, MM Hospital, Shivpuri, Madhya Pradesh India
[4]Sr. Lecturer Departments of Orthodontics, HIDS, Poanta Sahib, Himachal Pradesh India
[5]Medical Officer Dental, Regional Hospital, Bilaspur, Uttar Pradesh India

Article History
Received: 17.11.2021
Accepted: 26.12.2021
Published: 30.12.2021

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: The main perplexing challenge in the orthodontic treatment is the long duration of the treatment. The orthodontic force applied only static force results in hyalinization. If a light vibratory force is applied along with the fixed orthodontic force, it will reduce the hyalinization phase thus enhance the tooth movement. This study aims to investigate the effect of the intraoral vibratory stimulation on the tooth movement in patients undergoing orthodontic treatment. Fixed orthodontic treatment cases in which bilateral premolar extractions are performed were selected. Split mouth study was done in these patients. Patients were provided electric tooth brushes to use daily for 15min / day. OPG's were obtained periodically and the relevant structures were traced. Measurements were done from canine to 2nd premolar and from canine to 1st molar in all the subjects. The amount of tooth movement was calculated and compared in both experimental and control side. The manual readings show the significant difference between the rates of tooth movement by 2% in experimental group as compared to control group.

Keywords: Orthodontic tooth movement, vibration, split mouth study, retraction, active tieback, t-test.

INTRODUCTION

The main perplexing challenge in the orthodontic treatment is the long duration of the treatment. It takes almost 1½ to 2 yrs for the completion of the treatment which is burdensome for the patient [1, 2].

The long time duration also results in the increased risk of root resorption, caries, poor oral hygiene which results in patient's cooperation and satisfaction.

Orthodontic tooth movement is a process of mechanically induced bone remodeling which occur in 3 stages: 1st strain phase, 2nd lag phase (in which tooth movement pauses due to hyalinization and 3rd phase i.e, post lag phase. Thus it is logical to assume that if hyalinization phase is eliminated or reduce, the tooth movement will get faster [3, 4].

The orthodontic force applied only static force results in hyalinization. If a light vibratory force is applied long with the fixed orthodontic force, it will reduce the hyalinization phase thus enhance the tooth movement.

This study aims to investigate the effect of the intraoral vibratory stimulation on the tooth movement in patients undergoing orthodontic treatment.

MATERIALS AND METHOD

The subjects participated in this study were randomly assigned from the pool of patients seeking orthodontic treatment in the Department of Orthodontics and Dentofacial orthopedics, Saraswati Dental college, Lucknow.

Fixed orthodontic treatment cases in which bilateral premolar extractions are performed were selected. Split mouth study was done in these patients.

Patients were provided electric tooth brushes to use daily for 15min / day (which is splited in 5 min each with the gap of 6hrs) for 3 months on the right side (assigned as experimental side) and the left side is assigned as the control side in the maxillary arch.

OPG's were obtained periodically and the relevant structures were traced. Measurements were done from canine to 2nd premolar and from canine to 1st molar in all the subjects. Manual readings were taken

***Corresponding Author:** Dr. Akshat Sharma

using vernier caliper periodically. The retraction criteria were same for all the cases. Active tie backs were given in all the subjects for separate canine retraction in 19x25 inch SS Archwire.

RESULTS

During experimental duration, patient's compliance was 100%. The amount of tooth movement was calculated and compared in both experimental and control side. The manual readings show the significant difference between the rates of tooth movement by 2% in experimental group as compared to control group. In paired t- test, p-value for experimental groups is 0.51 and for control group its 0.11 which shows insignificant changes in the tooth movement of the experimental and control group.

Paired Samples Statistics

		Mean	N	Std. Deviation	Statistical significance Paired 't'-test ('p' value)
T0	Experimental	12.50	10	1.34	0.515
	Control	12.44	10	1.45	
T3	Experimental	7.41	10	1.82	0.116
	Control	7.57	10	1.76	
% Change	Experimental	41.35	10	9.27	0.172
	Control	39.86	10	7.56	

DISCUSSION

This clinical trial examined the effect of mechanical vibration on the rate of the tooth movement. The study was conducted at the Department of Orthodontics and Dentofacial Orthopedics at Saraswati Dental College, Lucknow.

Total 10 subjects were taken and the split mouth study was done in these subjects. This study started in April 2017 is still in progress.

The vibration protocol utilized in this study was given through electric tooth brushes applied for only 15 minutes per day. In this split mouth design study, the right side of the patient of maxillary arch is assigned as experimental group and left side as control group. In our research, the paired t-test in Table 1 shows that there is no statistically significant changes seen in the experimental and control group. This result is in agreement with the study done by Miles *et al*. in which he found that there is no significant difference in the rate of tooth movement after using vibration device [5].

One study done by Woodhouse in 2015 also shows insignificant results when vibratory stimulation is provided in both experimental and control group that supports the results of our study [6].

In contrary, study done by Nishimura et al showed vibratory stimulation could accelerate the rate of tooth movement as the RANK/RANKL which contributes to osteoclast formation, was activated in response to vibration [1]. This study shows the biological changes in contrast to my study which shows only the clinically visible changes in the experimental and control sides.

REFERENCES

1. Nishimura, M., Chiba, M., Ohashi, T., Sato, M., Shimizu, Y., Igarashi, K., & Mitani, H. (2008). Periodontal tissue activation by vibration: intermittent stimulation by resonance vibration accelerates experimental tooth movement in rats. *American Journal of Orthodontics and Dentofacial Orthopedics*, *133*(4), 572-583.
2. Bosio, J. A., & Liu, D. (2010). Moving teeth faster, better and painless: Is it possible?. *Dental Press Journal of Orthodontics*, *15*, 14-17.
3. Leethanakul, C., Suamphan, S., Jitpukdeebodintra, S., Thongudomporn, U., & Charoemratrote, C. (2016). Vibratory stimulation increases interleukin-1 beta secretion during orthodontic tooth movement. *The Angle Orthodontist*, *86*(1), 74-80.
4. Pavlin, D., Anthony, R., Raj, V., & Gakunga, P. T. (2015, September). Cyclic loading (vibration) accelerates tooth movement in orthodontic patients: a double-blind, randomized controlled trial. In *Seminars in Orthodontics* (Vol. 21, No. 3, pp. 187-194). WB Saunders.
5. Miles, P., Smith, H., Weyant, R., & Rinchuse, D. J. (2012). The effects of a vibrational appliance on tooth movement and patient discomfort: a prospective randomised clinical trial. *Australian orthodontic journal*, *28*(2), 213-218.
6. Woodhouse, N. R., DiBiase, A. T., Johnson, N., Slipper, C., Grant, J., Alsaleh, M., & Cobourne, M. T. (2015). Supplemental vibrational force during orthodontic alignment: a randomized trial. *Journal of dental research*, *94*(5), 682-689.

Cite This Article: Tanushree Sharma *et al*. Intraoral Vibratory Stimulation; Impact on Tooth Movement: Short Study. *EAS J Dent Oral Med*, *3*(6), 184-185.