International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 01, 2020
ISSN: 1475-7192

ASSESSMENT OF ATTRITION IN PATIENTS WITH DEEP BITE - A UNIVERSITY HOSPITAL BASED STUDY

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Abstract

Deep bite malocclusion is described as the overlap of upper incisors on the labial surface of lower incisors vertically when the standard limit of 1 to 2 millimetres is exceeded. Correction of deep bite is crucial for maintenance of dental hard and soft tissue structures and for prevention of temporomandibular joint disorders. Untreated deep bite over a prolonged duration results in attrition of the lingual surfaces of the mandibular incisors or anteriors. Grippo defined attrition as the loss of dental hard tissue as a result of tooth to tooth friction without any additional factors. Furthermore, presence of worn dentition decreased bony support, temporomandibular joint dysfunction pose challenges in the orthodontic treatment of adults. The problem of the correction of a deep overbite, even though complicated, resolves many future complications. The aim of this study is to evaluate the prevalence and association of attrition in patients having a deep overbite. Records were obtained from a out patient department records of a private dental college and a retrospective analysis was done among 513 patients wth deep bite among which 293 were males and 219 were females and one of them identified as a transgender. Data was collected, tabulated and correlation tests were performed. Out of 513 patients with deep overbite, 239 patients were observed as having attrition. Higher prevalence of attrition in deep overbite was observed in males. Patients with deep bite within the age group 31-50 years were more commonly observed with attrition.

Keywords: *Deep bite; Lower incisors; Occlusion; Overbite.*

I. Introduction

Malocclusion is defined as an occlusion in which there are irregularities in tooth position beyond standard limits or there is an abnormal relationship. [1] Orthodontic treatment is based on the principle that if prolonged pressure is applied to a tooth, tooth movement will occur as the bone around the tooth remodels.[2] Occlusion, as such, has multiple facets and characteristics which beyond a certain range or value is termed as malocclusion. One such facet is the overbite which has been an essential occlusal characteristic or feature which is responsible for proper functioning and aesthetics of the oral system. The binding relationship between orthodontic treatment and facial esthetics has made the facial outline an important guideline for the treatment planning. [3] From initial eras of orthodontics, overbite has been focussed on for treatment alterations. Improvement of overbite has also been considered to evaluate the excellence of orthodontic treatment results. [4] Deep bite malocclusion

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Received: 09 Nov 2019 | Revised: 18 Dec 2019 | Accepted: 27 Jan 2020

is described as the overlap of upper incisors on the labial surface of lower incisors vertically when the standard limit of 1 to 2 millimetres is exceeded [5] Deep bite is frequently seen and always poses a challenge to orthodontists for efficient treatment.

Prevalence wise, the National Health and Nutrition Examination survey (NHANES III) observed that among the United States population, 16% of the sample population presented with deep overbite and a study conducted in Pakistan reported mild deep bite seen in 28.2%, moderate deep bite was observed in 20.5% and severe deep bites wherein overbite greater than 7 millimetre was seen in 30.8% of their sample. [6,7]

Etiology of deep overbite can be attributed to incisor over-eruption, extreme overjet, malposed canine, molar infraocclusion, mandibular ramus height, vertical facial type, accentuated curve of Spee or excessive root torque of the upper incisors labially. [8] Faervoig et al., reported increased anterior and decreased posterior alveolar basal heights as one of the reasons for deep overbite malocclusion. [9]

Due to the complexity of deep overbite malocclusion, if left untreated, severe consequences lie ahead for the patients. Unresolved deep overbite malocclusion can cause attrition of lower incisors, ulceration of gingival tissues, temporomandibular disorders and abnormal mandibular function. [10] As our study focuses on dental attrition of lower incisors in patients with deep overbite malocclusion, tooth wear is defined as loss of dental hard tissue as a result of either a chemical or mechanical process not involving bacteria and is also known as Non Carious Tooth Surface Lesion [NCTSL]. [11] Attrition, abrasion, corrosion contribute to the excessive wear of the occlusal and incisal areas wherein the lesions are flat, round or sharply angulated. [12] Grippo defined attrition as the loss of dental hard tissue as a result of tooth to tooth friction without any additional factors. [13] The most significant risk factors of attrition seem to be hard diet, age, or chronic occlusal overload. Boric et al., suggested that in cases demonstrating malocclusion, the tensile stresses on the cervical region of teeth seem to be higher than in the cases of normal occlusion. [14] Thus, this study aimed to attempt to quantify associations between anterior attrition and deep overbite malocclusion. A review of literature reveals many reported related to tooth wear facets many of which describe the etiology, mechanism of the loss of dental hard tissue, [11,13,15,16] though only few reportes relate the same to malocclusion. [12,17]

Studies have been done in our university on mini-implants used for anchorage [18–21], tested efficiency of different orthodontic bonding adhesives, [22,23], studied the role of gonial angle in growth patterns [24], analysed different methods of recycling brackets [25], the ill-effects of obstructive sleep apnea on dentition [26], clinical reports [27,28] but there are not sufficient epidemiological studies with the data present, this study hopes to do the same. The aim of the study is to assess the correlation between attrition and deep overbite malocclusion among patients visiting a dental hospital.

II. MATERIALS AND METHODS

The study was carried out in a university setting among patients visiting a dental hospital among a predominantly South Indian population. India being a large country consists of populations from multiple ethnicities, namely seven among which Dravidians are one of subethnic groups inhabiting South India and this study is based on the same. [29] A total of 513 patients who were diagnosed with a deep overbite were analysed. Records were obtained from an out patient department of a private dental college. The advantages of this methodology was the ease of access and the limitations was that the sample size was not large enough and the study was limited to one metropolitan area only. Approval was obtained from the ethical review board of Saveetha Institute of Medical and Technical Sciences (SIMATS) with the approval number: SDC/SIHEC/2020/DIASDATA/0619-0320

A retrospective study was conducted by collecting the case sheets of patients visiting the dental hospital from June 2019 to March 2020 with the age range of the sample being 20 to 50 years. Cross verification was done by reviewing the intraoral photographs and checking for attrition of mandibular incisors among patients with deep overbite.

Inclusion criteria:

- Patients of ages 18 to 50 years
- Permanent dentition

Exclusion criteria:

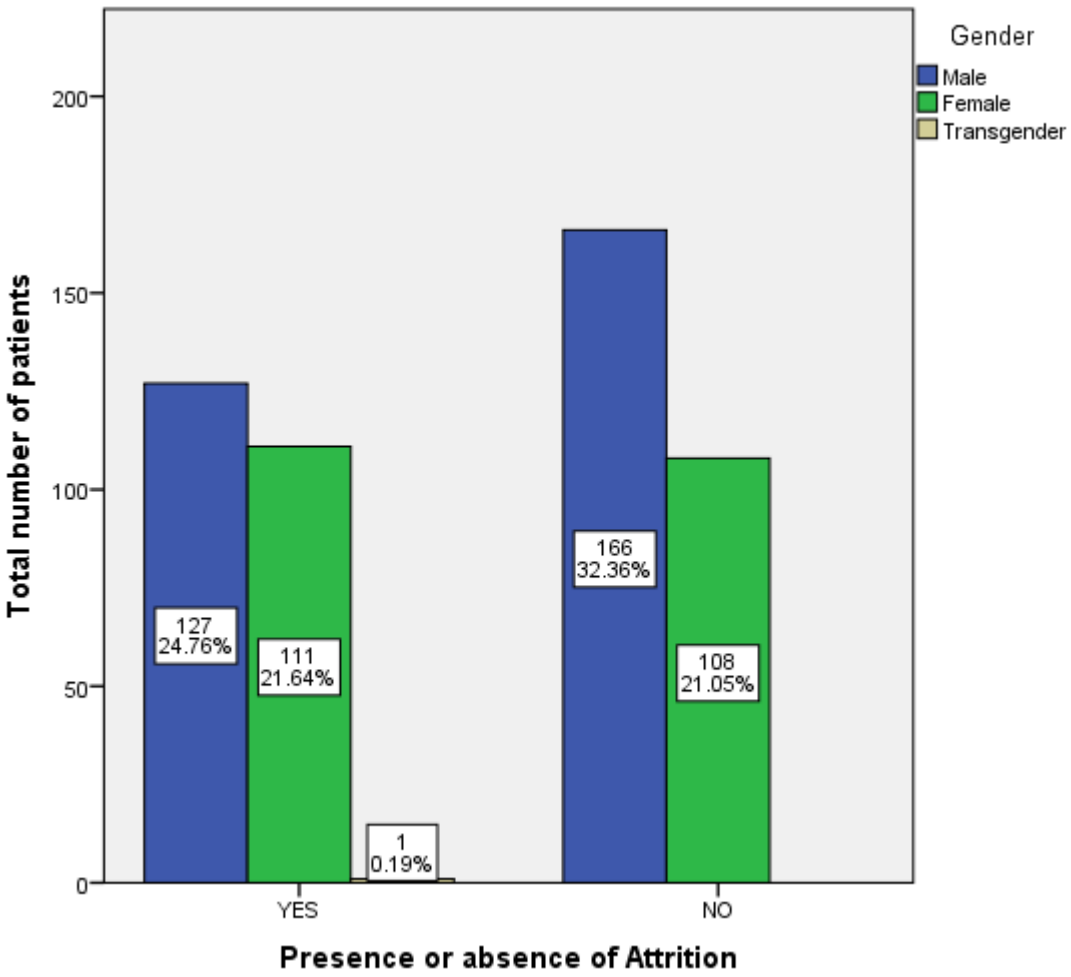
- Patients with a habit of bruxism
- Patients with history of systemic diseases
- Patients who have undergone previous orthodontic treatment
- Patient having a history of extractions other than third molars
- Patients with congenital syndromes

Incomplete data was excluded due to the possibility of bias. The data was collected, tabulated and frequency of attrition in deep bite individuals was checked for any correlation. Statistics were done using SPSS by IBM and Chi square test performed. The values were tabulated and descriptive statistics.

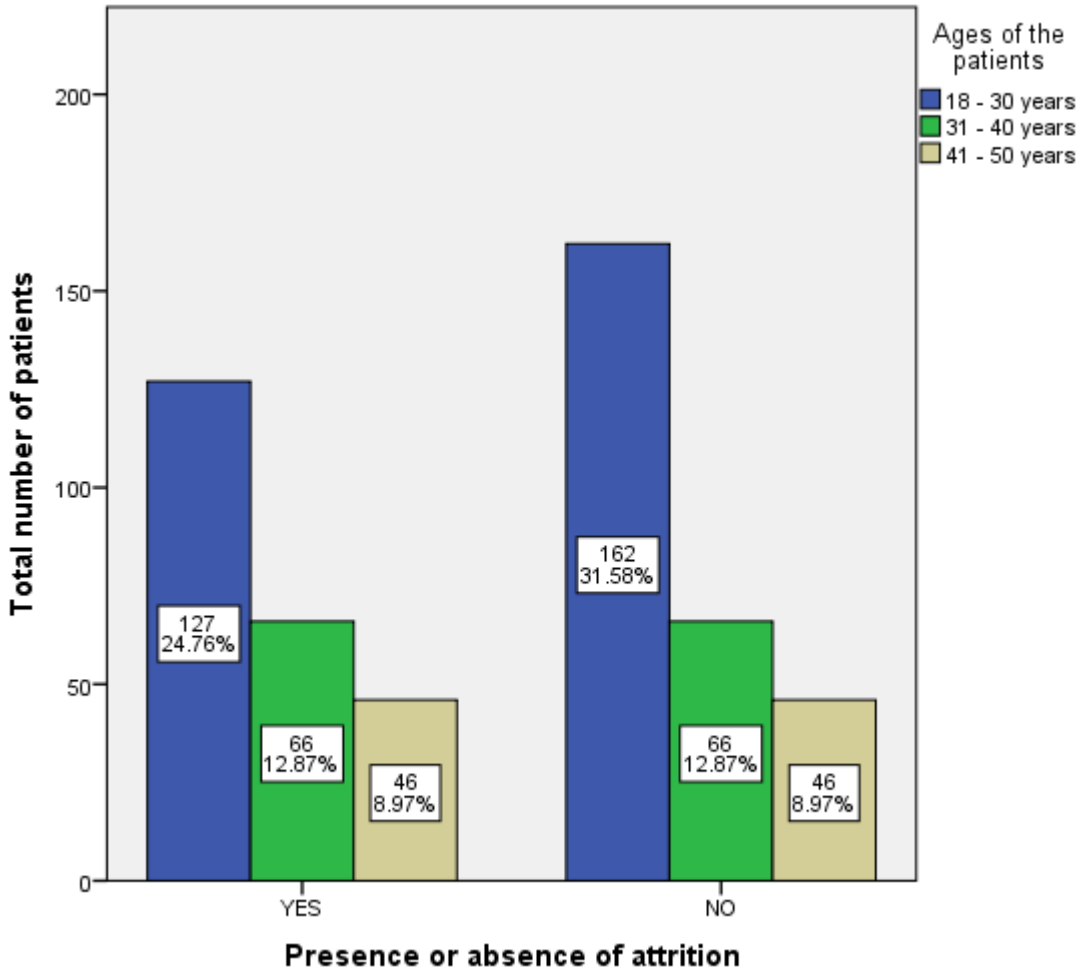
III. RESULTS

The study included 513 patients with deep overbite out of which 293 patients were males, 219 patients were female and one of them, a transgender. Out of 513, 239 patients, 46.5% of the sample was observed to have attrition of the lower incisors along with a deep overbite, 53.1% of the 239 patients were male and 46.4% were females. We observed that males were more susceptible to attrition in deep overbite conditions, even though a huge difference was observed among males and females. 53% of males with deep overbite were clinically observed to have attrition. Patients with deep bite among the age groups 31-40 years and 41-50 years were commonly observed to have attrition (50%, p value>0.05). There was a positive correlation found between deep overbite and attrition (p>0.05).

Graph 1: Bar graph representing frequency distribution of presence or absence of attrition in patients with deep overbite. X axis represents presence or absence of attrition the and Y axis represents number of patients with deep overbite. 239 patients with deep overbite were observed to have attrition.



Graph 2: Bar graph representing association between gender of the patient and presence or absence of attrition in deep overbite individuals. X axis represents presence or absence of attrition and Y axis represents total number of patients in that category. (Pearson Chi-Square test; p-value = 0.145 - not significant). There is no significant difference between gender in the presence or absence of attrition in deep overbite individuals however there is a trend in the direction that males (blue) with deep overbite have a higher incidence of attrition than females (green) and transgenders (light brown).



Graph 3: Bar graph representing association between age group of the patients and presence or absence of attrition in deep overbite individuals. X axis represents presence or absence of attrition and Y axis represents total number of patients in that category. (Pearson Chi-Square test; p-value = 0.395 - not significant). There is no significant difference between presence or absence of attrition in deep overbite individuals among different age groups however there is a trend in the direction that patients with deep bite within the age group 31-40 (green) and 41-50 (light brown) were most commonly observed with attrition (50%) when compared to other age groups.

IV. DISCUSSION

Clinical evidence points to the fact that dental wear, if extreme, represents a risk to the dentition and even in some cases to the occlusion. Understanding of the potential risk of serious attrition, and in particular identifying individuals who demonstrate a risk factor, represents therefore an important step in the establishment of good and long lasting health. [30]

The design of the present study is retrospective which avoids the duration problems of a long time prospective study. The present research was undertaken for exploring the prevalence of attrition among patients with deep overbite and assessing a correlation if any, among patients visiting the out patient department of a private dental college.

The age of the subjects in the sample ranged from 20 to 50 years. This age range was a criterion for two reasons being, first reliable assessment of the occlusion and establishing a diagnosis of the interarch relationship should be done on permanent dentition, as any variations present at the mixed dentition stage will modify the occlusion

and the interarch relationship, second, the estimation of occlusal status of a patient should be done post cessation of craniofacial growth and development, third, attrition is a feature that occurs due to a prolonged period of tooth to tooth contact, it depends on the time.

Based on the Chi-square test done among attrition and the gender of the patients with deep overbite, we can observe a positive correlation ($p>0.05$) expressing males with a deep overbite are more likely to attrition of lower incisors. This association matched with the results observed by Bhateja NK et al [31] however, Grezegocka K et al [30] had observed a contradicting result wherein attrition was more prevalent among females with a deep overbite. However, this difference of opinion can be explained by the fact that Grzegocka's study sample had a greater number of females than males.

Graph 2 shows the presence or absence of attrition among patients with deep overbite. Only 46.5% of the sample population were observed to have attrition. There is a positive correlation between attrition and deep bite however, as stated by Grzegocka K et al [30], a tight incisal contact is necessary in a deep bite for it to cause attrition over a prolonged period of time. There were no contradicting studies found for the same and thus it can be concluded that attrition and deep overbite go hand in hand.

Graph 3 showing the presence or absence of attrition among different age groups of patients with deep overbite reports that 50% of patients within the older age groups reported with attrition. This can be explained by untreated deep overbite for extended time causing attrition. The limitations of this study are that it covers only one metropolitan area and the limited sample size. However, the study helps us identify a correlation between attrition and deep overbite, accurate diagnosis and precise appreciation of underlying etiological components will aid in better understanding of the condition, overcoming major issues like anchorage loss and post treatment relapse [32] prevention, easy prediction and eventually in optimal treatment outcomes.

V. CONCLUSION

From the study done, it can be concluded that, within the limits of the study, there is a trend observed between attrition and deep overbite. Higher prevalence of attrition in deep overbite was observed in males. Patients with deep bite within the age group 31-50 years were more commonly observed with attrition. Therefore, improvement of deep overbite is an essential objective of orthodontic correction and investigation of underlying etiological elements, and consequences are imperative for customised and effective treatment planning.

AUTHOR CONTRIBUTIONS

Dr. Srirengalakshmi designed and directed the research along with Dr. Saravana Dinesh S.P and supervised the work. Janhvi Manohar collected and analysed the data along with Dr. Srirengalakshmi. Janhvi Manohar wrote the manuscript with input from all authors. All authors discussed the results and commented on the manuscript.

ACKNOWLEDGEMENT

I would like to thank the Chancellor, Director of academics and the Dean of Saveetha Dental College for the constant encouragement with my work during all stages of the study.

CONFLICT OF INTEREST

There were no conflicts of interest in this study.

REFERENCES

1. Daskalogiannakis J, Miethke RR, McNamara JA. Glossary of orthodontic terms. Quintessence Publ.; 2000.

2. Dinesh SPS, Arun AV, Sundari KKS. An Indigenously Designed Apparatus for Measuring Orthodontic Force. Journal of clinical and [Internet]. 2013; Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3879891/

3. Pandian KS, Krishnan S, Kumar SA. Angular photogrammetric analysis of the soft-tissue facial profile of Indian adults. Indian J Dent Res. 2018 Mar;29(2):137–43.

4. Bergersen EO. A longitudinal study of anterior vertical overbite from eight to twenty years of age. Angle Orthod. 1988 Jul;58(3):237–56.

5. Parker CD, Nanda RS, Currier GF. Skeletal and dental changes associated with the treatment of deep bite malocclusion. Am J Orthod Dentofacial Orthop. 1995 Apr;107(4):382–93.

6. Drury TF, Winn DM, Snowden CB, Kingman A, Kleinman DV, Lewis B. An Overview of the Oral Health Component of the 1988–1991 National Health and Nutrition Examination Survey (NHANES III-Phase 1). J Dent Res. 1996 Feb 1;75(2_suppl):620–30.

7. Gul-e-Erum, Fida M. Pattern of malocclusion in orthodontic patients: a hospital based study. J Ayub Med Coll Abbottabad. 2008;20(1):43.

8. Sangcharearn Y, Ho C. Effect of Incisor Angulation on Overjet and Overbite in Class II Camouflage Treatment. A typodont study. Angle Orthod. 2007 Nov;77(6):1011–8.

9. Færøvig E, Zachrisson BU. Effects of mandibular incisor extraction on anterior occlusion in adults with Class III malocclusion and reduced overbite. Am J Orthod Dentofacial Orthop. 1999 Feb 1;115(2):113–24.

10. McDowell EH, Baker IM. The skeletodental adaptations in deep bite correction. Am J Orthod Dentofacial Orthop. 1991 Oct;100(4):370–5.

11. Eccles JD. Tooth surface loss from abrasion, attrition and erosion. Dent Update. 1982 Aug;9(7):373–4, 376–8, 380–1.

12. Cunha-Cruz J, Pashova H, Packard JD, Zhou L, Hilton TJ, for Northwest PRECEDENT. Tooth wear: prevalence and associated factors in general practice patients. Community Dent Oral Epidemiol. 2010 Jun;38(3):228–34.

13. Grippo JO, Simring M, Schreiner S. Attrition, abrasion, corrosion and abfraction revisited: a new perspective on tooth surface lesions. J Am Dent Assoc. 2004 Aug;135(8):1109–18; quiz 1163–5.

14. Borcic J, Anic I, Smojver I, Catic A, Miletic I, Ribaric SP. 3D finite element model and cervical lesion formation in normal occlusion and in malocclusion. J Oral Rehabil. 2005 Jul;32(7):504–10.

15. Smith BG, Bartlett DW, Robb ND. The prevalence, etiology and management of tooth wear in the United Kingdom. J Prosthet Dent. 1997 Oct;78(4):367–72.

16. Benazzi S, Nguyen HN, Schulz D, Grosse IR, Gruppioni G, Hublin J-J, et al. The evolutionary paradox of tooth wear: simply destruction or inevitable adaptation? PLoS One. 2013 Apr 24;8(4):e62263.

17. Seligman DA, Pullinger AG. Analysis of occlusal variables, dental attrition, and age for distinguishing healthy controls from female patients with intracapsular temporomandibular disorders. J Prosthet Dent. 2000 Jan;83(1):76–82.

18. Sivamurthy G, Sundari S. Stress distribution patterns at mini-implant site during retraction and intrusion—a three-dimensional finite element study. Prog Orthod. 2016 Jan 18;17(1):4.

19. Vikram NR, Prabhakar R, Kumar SA, Karthikeyan MK, Saravanan R. Ball Headed Mini Implant. J Clin Diagn Res. 2017 Jan;11(1):ZL02–3.

20. Felicita AS. Quantification of intrusive/retraction force and moment generated during en-masse retraction of maxillary anterior teeth using mini-implants: A conceptual approach. Dental Press J Orthod. 2017 Sep;22(5):47–55.

21.Jain RK, Kumar SP, Manjula WS. Comparison of intrusion effects on maxillary incisors among mini implant anchorage, j-hook headgear and utility arch. J Clin Diagn Res. 2014 Jul;8(7):ZC21–4.

22. Samantha C, Sundari S, Chandrasekhar S, Sivamurty G, Dinesh S. Comparative Evaluation of Two Bis-GMA Based Orthodontic Bonding Adhesives - A Randomized Clinical Trial. J Clin Diagn Res. 2017

Apr;11(4):ZC40–4.

23. Ramesh Kumar KR, Shanta Sundari KK, Venkatesan A, Chandrasekar S. Depth of resin penetration into enamel with 3 types of enamel conditioning methods: A confocal microscopic study. Am J Orthod Dentofacial Orthop. 2011 Oct 1;140(4):479–85.

24. Rubika J, Felicita AS, Sivambiga V. Gonial angle as an indicator for the prediction of growth pattern. World J Dent. 2015;6(3):161–3.

25.Kamisetty SK, Verma JK, Arun, Sundari S, Chandrasekhar S, Kumar A. SBS vs Inhouse Recycling Methods-An Invitro Evaluation. J Clin Diagn Res. 2015 Sep;9(9):ZC04–8.

26. Viswanath A, Ramamurthy J, Dinesh SPS, Srinivas A. Obstructive sleep apnea: awakening the hidden truth. Niger J Clin Pract. 2015 Jan;18(1):1–7.

27. Felicita AS. Orthodontic management of a dilacerated central incisor and partially impacted canine with unilateral extraction--A case report. The Saudi dental journal. 2017;29(4):185–93.

28. Felicita AS. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor--The sling shot method. The Saudi dental journal. 2018;30(3):265–9.

29. Felicita AS, Chandrasekar S, Shanthasundari KK. Determination of craniofacial relation among the subethnic Indian population: a modified approach - (Sagittal relation). Indian J Dent Res. 2012 May;23(3):305–12.

30. Grzegocka K, Williams S, Loster J, Wieczorek A, Loster B. Relationship between occlusion and dental attrition in a group of young Polish adults. Journal of Stomatology. 2016;69(3):285–94.

31. Bhateja NK, Fida M, Shaikh A. Deep Bite Malocclusion: Exploration Of The Skeletal And Dental Factors. J Ayub Med Coll Abbottabad. 2016 Jul;28(3):449–54.

32. Krishnan S, Pandian S, Kumar S A. Effect of bisphosphonates on orthodontic tooth movement-an update. J Clin Diagn Res. 2015 Apr;9(4):ZE01–5.

33. Farhat Yaasmeen Sadique Basha, Rajeshkumar S, Lakshmi T, Anti-inflammatory activity of Myristica fragrans extract . Int. J. Res. Pharm. Sci., 2019 ;10(4), 3118-3120 DOI: https://doi.org/10.26452/ijrps.v10i4.1607