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VERTICAL RELATIONSHIP OF MANDIBULAR CENTRAL INCISOR TO THE LINGUAL FRENUM IN DENTATE AND COMPELETY EDENTULOUS DENTURE WEAR SUBJECTS

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ABSTRACT

Objective: Evaluating the vertical alignment between the mandibular central incisor and the lingual frenum in subjects with natural teeth and those who are fully edentulous and wear dentures.

Methodology: This research was a cross – sectional, observations study carried out at the Liaquat University of Medical & Health Sciences (LUMHS) Jamshoro. History and clinical examination was performed. Before taking impressions, the chosen trays were modified to ensure that the lingual flange was roughly 2 to 3mm away from the mobile tissues on the floor of the mouth.
Mandibular casts /models of both dentulous and edentulous subjects were ready for analysis. Using a sharp carbon marker, points were marked on the cast: one at the mesio-incisal angle of the central incisors and the second at the highest anterosuperior point of the lingual frenum on the mandibular cast. The casts of the subjects were secured to a surveying table using a die stone block. The cast paralleling device was adjusted for cast tilt. Marks were made on the vertical arm of the device when the analyzing rod touches the incisal edge of the central incisor and when it made contact with the mark on the anterior attachment of the lingual frenum. The distance between the two horizontal marks on the vertical arm was measured using a Vernier caliper. All gathered data was included in a performa list for analysis. The data was analyzed using SPSS V. 22.0. A Student's t-test was conducted to assess the significant relationship between the vertical alignment of the mandibular central incisor and the lingual frenum in subjects with natural dentition and those who are completely edentulous.

RESULT: Males were 44% and females were 44%. Most of the patients fell within 20-30 year age range

as 41% followed by 31-40 years as 37%. The number of dentate participants was higher in number than the edentulous patients, the mean values are different with 12.22±1.89 for dentate subjects and 13.56±2.02 for edentulous subjects and the difference is not significant.

Conclusion: The study concluded thatthe vertical lingual frenum dimension is although a significant anatomical landmark to guide in positioning of teeth, but the effect of dentate status, age or gender does not directly influencethe distance.

Keywords: Denture, Mandible, Incisors, Ligual frenuml, Dentate.

Introduction

The lingual frenum extends from the midventral tongue to the mouth floor and is one of several anatomical frenula found throughout the human body. Frenum is a broad term that refers to a fold of integument (skin) or mucous membrane that restricts the movement of an organ or a specific structure[1]. Functional restrictions affect how a person swallows and chews, preventing proper muscle coordination and leading to a variety of problems such as cleft palate and cleft lip[2]. Short lingual frenum may coexist with well-known syndromes such as cleft palate and orofacial digit syndrome[3, 4]. One of the treatments that can be done for a lingual frenum that is too short is called a lingual frenectomy[1].

The term "denture aesthetics" refers to the cosmetic effect that a dental prosthesis has on the desirable beauty, attractiveness, character, and dignity of a person[5]. Because doing so improves denture stability, aesthetics, and phonetics, the majority of patients who have complete dentures would benefit from knowing the positions of their natural tooth positions as a starting point when determining the positions of their anterior teeth. This is because knowing their natural tooth positions serves as a starting point[6].

Incisional guidance can be affected by a variety of factors, including aesthetics, phonetics, movements of the condylar border, and the relationship between the anterior teeth of the maxillary and mandibular arches[7]. On the other hand, the lingual frenum is a fixed landmark that can be meticulously recorded. The tongue is held firmly in place by this structure, which is responsible for its function. This anatomical landmark can be utilized to determine lower occlusal level plan in patients who are wearing complete dentures. It can also be used to determine the correct position of the anterior mandibular teeth in their natural location. Both of these things are important[8, 9].

The two main groups of methods that are used to measure the vertical maxillo-mandibular dimension are mechanical methods, which include using records taken prior to tooth extraction, lateral radiographs, stone casts used for occlusion, measurements of the patient's existing prosthetic appliances, and measurements taken on their faces; and anatomical methods, which include using measurements taken on the patient's face. The facial height at which the occlusion should be constructed is determined by a second group of physiological techniques[10-13]. These techniques

include the physiologic rest position, deglutition, sound production and word pronunciation, tactile sensation, and patient comfort.[10,14-16] More so than the anterior teeth in the upper jaw, the mandibular anterior teeth shift position when a variety of facial expressions are made. Stable anatomical anterior landmarks in the mandibular arch include the labial frenum and the lingual frenum.[17, 18] The purpose of this investigation is to ascertain the accuracy of the pre-extraction measurement carried out on casts and was recorded from the front attachment point of the lingual frenum to the incisal tip of the lower central incisor. Knowing where a patient's natural teeth are in relation to their anterior teeth improves the denture's stability, appearance, and phonetics. Aesthetics, phonetics, condylar border motions, and maxillary and mandibular anterior teeth affect incisional guiding.

Materials and Methods

It was an observational, cross sectional study carried out at OPD of Prosthdontics Department at the Institute of Dentistry, Liaquat University of Medical & Health Sciences (LUMHS) Jamshoro, as well as at the Advanced Dental Care Center (ADCC) in Hyderabad. Ethical approval was obtained from the ethics committee. Patients provided their written informed consent before participating. History and physical examination was performed for collection of data. The research employed a method known as non-probability convenient sampling, which is not dependent on the element of chance. Total sample size of this study was 80.

The fabrications of dentures for individuals suffering from diseases that have resulted in the loss of their teeth as well as the practice of dentistry were the primary focuses of this research. The sample population has their distance among the center of mandibular incisor and top of lingual frenum analyzed and recorded. This distance is measured in millimeters.

Before making an impression, certain trays were adjusted so that the lingual flange was about 2-3 millimeters (mm) short of moveable tissues of mouth floor.

This was done before the impression is taken. If the lingual flanges of the perforated stock tray were too long, were shortened with a metal trimmer, and if the flanges were not long enough, impression compound was used to make them longer. Following the completion of the necessary adjustments to the impression tray, the impression was obtained using an irreversible hydrocolloid impression material. After taking the impression, we double checked that every landmark was captured accurately before proceeding to pour the impression with (Gypsum type 3) dental plaster.

The pickup impression technique was used for the impression of an edentulous patient. This technique involves taking the impression with the denture wearer in its position in the lower arch of the subject. After the impression is taken, the denture was separated and returned to the patient. The remaining methodology was the same as that used for dentate patients.

Casts of the mandibles, representing edentulous as well as dentulous subjects, were ready for

examination. In order to mark points on the cast, a sharp carbon marker tip was used. One of these marks was placed in mesio-incisal angle of the central incisors. 2nd point mark on anterosuperior side of lingual frenum, which is also its most superior point a mandibular cast of the subjects was placed on the surveying table and tilted using a die stone block and a cast paralleling device. After this, a mark was placed on the vertical arm when the analysing rod made contact with the mark on incisal edge of central incisor. 2nd marking on vertical arm when analysing rode made to contact mark on anterior side of lingual frenum, then using verneir calliper to measure space among two horizontal marks on thevertical surveyor arm. All of the data that was recorded were recorded in the proforma.

The data was analyzed using SPSS version 22.0. Frequency and percentage for qualitative factors such as age, gender, dentition, frenum condition, and frenum size was calculated. For the age, mean and standard deviation were calculated. Independent t test was used to determine a significant link between dentate and fully edentulous subjects regarding the vertical relationship of the mandibular central incisor to the lingual frenum. A p-value of ≤0.05 was considered as statistically significant at confidence interval of 95%.

Results

Males were 44% and females were 44% as shown in figure-1

All patients were divided in three age groups. Most of the patients fell in age range between 20 and 30 years as 41% followed by 31-40 years as 37% (Table-1)

Dentation status is a major factor in this study against the values of vertical lingual frenum dimension. The number of dentate participants was higher in number than the edentulous patients, the mean values are different with 12.22±1.89 for dentate subjects and 13.56±2.02 for edentulous subjects and the difference is not significant as shown in table-3.

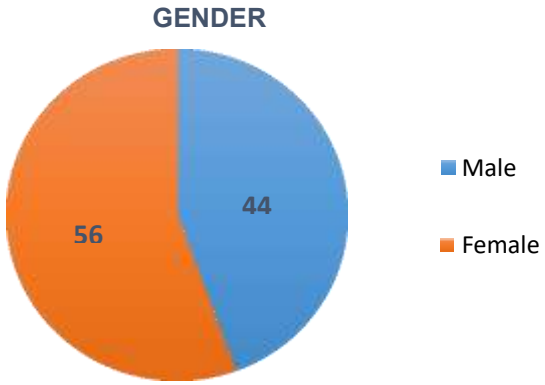

Figure 2: Graphical representation of gender

Table 1: Statistical Analysis of Age Groups

Age Groups	Frequency	Percentage (%)	Mean	Std. Deviation
20-30 Years	33	41.3	11.14	1.55
31-40 Years	30	37.5	12.77	1.84
40+ Years	17	21.3	14.37	.601
Total	80	100.0	12.44	1.96

Table-2 Relationship of mandibular central incisor to the lingual frenum in dentate and edentulous patients

Dentition status	N	Mean	Std. Deviation	P-value
Edentulous	13	13.56	2.02	0.340
Dentate	67	12.22	1.89	

Discussion

The lingual frenum is a stable, photographable anatomical feature. This device presses the tongue against the palate. This anatomical landmark determines the lower occlusal plane when fitting complete dentures[19, 20].

The distance of anterior attachment of the lingual frenum and incisal edge of the mandibular central incisor variation within the group is higher for female than male participants but the mean value is higher for men as compared to women. The results are in line with a previous research conducted by Swati Gupta et al[9]. The reason may lies in the anthropology difference.

The youngest group has lowest and oldest has highest mean values for the recorded dimension. The middle group (31-40) has highest variation whereas oldest has lowest variations. The pattern with age group also reported by Parimala and prithviraj[2] that analyzes age groups from twenty to above sixty age.

The independent t test was applied on different age groups to examine the relationship between the values of each group. The findings are in accordance with the findings of Pandey[21] that also reported no significant difference in different age groups. The results indicated the independent nature of vertical dimension for each group and deny the possibility of predicting one age group based on the values of another.

The comparison of standard deviation among dentate and edentulous participants indicates that the dentate subject group has more variation in dimensions than the edentulous participants. The difference in variation is higher and it shows that the edentulous patients have almost same morphology of anterior mouth positions as compared to dentate subjects whose vertical dimension vary due to different size and positions of existing teeth. Similar findings are reported by Swati with 9.41mm mean value for dentate and 10.82 mm for edentulous subjects. The standard deviation results are not in line with the study with more variation in edentulous with 2.57 for edentulous and 1.95 for dentate subjects. The reason lies in the more dentate subjects in current study than edentulous that is although higher in study by Swati, but the ratio of dentate to edentulous is ½ for Swati Gupta et al[9] and 1/5 for current study. The test results indicated that there is not a significant relationship ($p>0.05$) in dimensions of dentate and edentulous participants and values of one group cannot be used for predicting other group subjects.

Conclusion

The study examined the effectiveness of lingual frenum vertical distance for correct positioning of mandibular central incisor. The relationships of the dentate and edentulous patients show insignificant behavior. The study concluded that the vertical lingual frenum dimension is although a significant anatomical landmark to guide in positioning of teeth, but the effect of dentate status, age or gender does not directly influence the distance.

References

1. Scott S. The Anatomy and Physiology of the Human Prepuce. In: Denniston GC, Hodges FM, Milos MF, editors. Male and Female Circumcision: Medical, Legal, and Ethical Considerations in Pediatric Practice [Internet]. Boston, MA: Springer US; 1999 [cited 2022Nov 17]. p. 9–18. Available from: https://doi.org/10.1007/978-0-585-39937-9_2
2. Parimala BK, Prithviraj DR. A Comparative Study of Mandibular Incisor Relation to the Lingual Frenum in Natural Dentition and in Complete Denture Wearers. J Indian Prosthodont Soc. 2012 Dec;12(4):208–15.
3. Felemban R, Mawardi H. Congenital absence of lingual frenum in a non-syndromic patient:a case report. Journal of Medical Case Reports. 2019 Mar 10;13(1):56.
4. Short Lingual Frenulum and Obstructive Sleep Apnea in Children [Internet]. [cited 2022 Nov 16]. Available from: https://www.readkong.com/page/short-lingual-frenulum-and- obstructive-sleep-apnea-in-3884386
5. Young HA. Denture esthetics. The Journal of Prosthetic Dentistry. 1956 Nov 1;6(6):748– 55.
6. Bohnenkamp DM, Garcia LT. Phonetics and tongue position to improve mandibular denture retention: A clinical report. The Journal of Prosthetic Dentistry. 2007 Nov 1;98(5):344–7.
7. Roumanas ED. The Social Solution—Denture Esthetics, Phonetics, and Function. Journal of Prosthodontics. 2009;18(2):112–5.
8. Hickey JC, Boucher CO, Woelfel JB. Responsibility of the dentist in complete dentures. The Journal of Prosthetic Dentistry. 1962 Jul 1;12(4):637–53.
9. Gupta S, Garg S, Tandan A, Dwivedi R, Gupta NK, Agarwal G. Relationship of the lingual frenum to the mandibular central incisors. Journal of Oral Biology and Craniofacial Research. 2015 Jan 1;5(1):40–5.
10. Vierheller PG. A functional method for establishing vertical and tentative centric maxillomandibular relations. The Journal of Prosthetic Dentistry. 1968 Jun 1;19(6):587–93.
11. Scutariu MM, Ciurcanu OE, Forna DA, Forna NC. Importance of dental maxillofacial aesthetics in dental therapy. The Medical-Surgical Journal. 2016;120(4):926–31.
12. Moland LL. Hegel's Aesthetics: The Art of Idealism. Oxford University Press; 2019. 353 p.
13. Themes UFO. 1. Introduction to Esthetics [Internet]. Pocket Dentistry. 2015 [cited 2022 Nov 17]. Available from: https://pocketdentistry.com/1-introduction-to-esthetics/
14. de Vasconcelos Carvalho M, Iglesias DPP, do Nascimento GJF, Sobral APV. Epidemiological study of 534 biopsies of oral mucosal lesions in elderly Brazilian patients.Gerodontology. 2011;28(2):111–5
15. Abduo J, Bennamoun M, Tennant M, McGeachie J. Impact of digital prosthodontic planning on dental esthetics: Biometric analysis of esthetic parameters. The Journal of Prosthetic Dentistry. 2016

Jan 1;115(1):57–64.

16. Katsoulis J, Huber S, Mericske-Stern R. [Gerodontology consultation in geriatricfacilities: general health status (I)]. Schweiz Monatsschr Zahnmed. 2009;119(1):12–8.

17. Heffernan MJ, Aquilino SA, Diaz-Arnold AM, Haselton DR, Stanford CM, Vargas MA. Relative translucency of six all-ceramic systems. Part I: Core materials. The Journal of Prosthetic Dentistry. 2002 Jul 1;88(1):4–9.

18. Impact of anterior guidance in designing of All-ceramic anterior fixed partial denture -Case Report - ProQuest [Internet]. [cited 2022 Nov 20]. Available from: https://www.proquest.com/openview/ee7bfc5ac8b01bbf88071e409f42aeaf/1?pq-origsite=gscholar&cbl=2040251

19. Vasantha Kumar M, Ahila SC, Suganya Devi S. The Science of Anterior Teeth Selection for a Completely Edentulous Patient: A Literature Review. J Indian Prosthodont Soc. 2011 Mar 1;11(1):7–13.

20. Rathod S, Bawankar PV, Chikhale P, Bidwaikar A. Evaluation of variations in morphology and attachment of frenum in diverse population - A cross-sectional study. Clinical Epidemiology and Global Health. 2020 Dec 1;8(4):1094–7.

21. Pandey KK, Ali M, Verma AK, Chaturvedi S, Ahmad N, Deo K. Relating Mandibular Incisor to the Lingual Frenum in Dentulous and Edentulous (Complete Denture Wearers) Subjects: An in vitro Study. Br J Med Med Res [Internet]. 2016 [cited 2022 Nov 18]; Available from: http://imsear.searo.who.int/handle/123456789/182166