

Systematic review of the prevalence, frequency and location of denture associated lesions and post insertion adjustments in complete denture patients.

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Abstract

Purpose: To locate most common areas of ulcerations due to complete denture, how frequently they occur and how many times patients visit for adjustments after insertion of complete denture.

Data Sources: PubMed, Google scholar, Google.

Study Selection: The database identified 4928 publications during the electronic search. Titles and abstracts were screened completely for including in the systematic review. A total of 20 publications were judged to be relevant by the title and abstract and were analysed by reading full texts. Following this review, an additional 3 articles were excluded, as they were review articles. Thus, 17 articles were appropriate and met the inclusion criteria, thus included for the review and complete text was analysed.

Data Extraction: The final 17 articles were thoroughly read and intended data was extracted from the results of each study done and were carefully segregated and compiled in a self-designed format. The overall data was analysed and mean deviation was derived to conclude the review and establish the results.

Results: It was identified that there was no significant difference found between denture associated lesions among females and males. The most prevalent lesion was denture stomatitis with 47.46%, commonly located in crest of ridge of maxilla and in alveolo-lingual sulcus and crest of ridge of mandible. Moreover, the extent of adjustments required for dentures were higher in mandibular than maxillary dentures in every post insertion revisits.

Conclusion: Denture wearers must be educated about the maintenance of the dentures and good oral hygiene. Periodic reviews should be done to avert or minimize the oral ulcerations and improve the quality of dentures. By appropriate planning of treatment, making of good impressions, support from laboratory and educating the patients, the number of post insertion revisits and discomfort can be minimized, thereby making the removable complete denture a successful treatment modality.

Keywords- Complete denture, Denture stomatitis, Post insertion adjustment.

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Introduction

Complete dentures substitute the entire dentition and reinstate the functions of esthetics, speech and mastication. It is the most traditional management for patients after all other options of tooth-support is exhausted.^[1] Complete edentulism is often seen in the geriatric individual. It must be

fabricated with an emphasis on preservation of the remaining oral structures and an understanding of the psychological changes affected by the loss of all natural teeth.^[2] After denture insertion, despite the accurate and extensive techniques followed during fabrication of complete denture, there might still be certain discrepancies which may lead to discomfort, pain and mucosal lesions. The

most predominant complaint is traumatic ulcer.

Problems associated with dentures after insertion, particularly for new denture wearers includes hyper-salivation, gagging, dysgeusia, discomfort, speech difficulty and mucosal injuries.^[3] The occurrence of the oral lesions increases with age and some authors suggests that duration of use of dentures increases with increasing age of the patients and their negligence to replace old dentures leads to oral ulcerations.^[4] The lesions result due to chronic injury caused by unstable/overextended denture flanges, irregularities, porosities, improper adaptations, tissue undercuts, premature occlusal contact, clinical errors during fabrication.^[5, 6] The mucosal ulcerations related with removable prosthesis are denture stomatitis, angular cheilitis, inflammatory papillary hyperplasia, epulis fissuratum, chronic atrophic candidiasis, frictional keratosis and traumatic ulcers.^[7, 8] An ideal location of denture related injury is non mobile oral mucosa and areas where the mucosa is mobile during functional movements.^[9, 10] It most often occurs at the frenum and muscular attachment.^[10]

The prevalence across different countries varies for the denture induced oral lesions and it ranges from 10.8% to 62% in the study conducted by Feng J and Sadig W in 2015 and 2010 respectively while the prevalence Gaur et al reported was 59.4% among Indian population.^[11] Dervis studied the most common patient complaint after three months of denture insertion and established that fabrication methods of denture, health of the tissue and patient complaints are associated with each other.^[6] Laurina and Soboleva found in their study that patients come with denture complaints because of improper designing and denture fabrication methods.^[5] In many cases the most crucial time in the patient's insight for success or failure of denture is its adjustment period. Boucher

suggested recall appointments immediately 24 hours post insertion and periodic review phase. Sharry suggested four recall appointments after 10days, 3weeks, and 3months consequently from denture insertion.^[12]

The removable complete denture modality can be of great success by appropriate planning of treatment, making of impression, laboratory support and patient education, if we can minimize patients discomfort and number of post insertion revisits, then the removable complete denture modality can be of great success.^[5]

The aim of this paper is to systematically review the prevalence, frequency and location of denture associated lesions and post insertion adjustments in complete denture patients.

Materials and Methods:

In this systematic review, an electronic search of publications was established using databases such as PubMed, Google scholar, Google for a period of 11 years from 2010-2021 using keywords.

The main keywords for search in the database were: "Complete denture", "Denture related mucosal lesions", "Denture adjustments", "Denture ulcerations", "Traumatic ulcerations", "Post insertion adjustments", "Denture sore", "Denture stomatitis", "Traumatic mucosal lesions", and "Angular cheilitis".

The inclusion and exclusion criteria was recognized. To identify the most relevant studies, the publications were firstly chosen by reading the titles and abstracts found in the bibliography and then, by reading the full text articles.

All the details were segregated and compiled in a self-designed format table. The categories included in the summary table are authors and year of publications, sample size recorded, gender ratio, selected age group and mean age, types of denture related

mucosal lesions, location and frequency of occurrence of lesions in maxillary and mandibular arch and its mean average.

The data was analyzed and the results were established to complete the review.

Inclusion criteria:

- (1) Articles published within the 11 years between 2010 and 2021.
- (2) Were primary studies.
- (3) Had inspected and described the oral health status.
- (4) Had available abstracts and full texts.
- (5) Were noted in English.

Exclusion criteria:

Non-human studies.

Results:

The database identified 4928 publications during the electronic search. Titles and abstracts were screened completely for including in the systematic review. Subsequent to the screening, 4908 publications were excluded, as they did not meet the inclusion criteria. A total of 20 publications were judged to be relevant by the title and abstract and were analyzed by reading full texts. Following this review, an additional 3 articles were excluded, as they were review articles. Of the final, 17 articles were most appropriate and met the inclusion criteria, thus included for the review and complete text was analyzed. (Fig.1)

The studies were analyzed and hence with the overall sample of 2589 patients of mean age ≥ 60 years and number of males were 1405 (54.2%) and females were 1184 (45.7%). The summary of the articles reviewed is as given in Table. 1.^[2-10,13-19]

From the analysis of all the 17 articles, insignificant difference between denture associated lesions among males and females were identified.

The most prevalent lesion was Denture Stomatitis (47.46%) followed by Chronic Atropic Candidiasis (38.73%), Inflammatory

Papillary Hyperplasia (22.23%), Traumatic Ulcers (17.657%), Angular cheilitis (15.45%), Frictional Keratosis (12.5%), Epulis Fissuratum (2.76%). (Table.2)

The most frequent denture associated ulcerations were seen in maxillary arch is crest of ridge (25.25%), Hard palate (22.40%), Buccal vestibule (22.06%), Posterior palatal seal (21.60%), Maxillary tuberosity (18.96%), Labial vestibule (18.03%), Slope of ridge (15.03%) and Labial frenum (14.30%). (Table.3)

The most frequent denture associated ulcerations were seen in mandibular arch, crest of ridge (32.75%), Alveolo-lingual sulcus (29.60%), Retro-mylohyoid curtain (23.40%), Slope of ridge (11.33%), Buccal vestibule (10.41%), Labial vestibule (9.56%) and Retro-molar pad (9.09%). (Table.4)

The least common denture associated ulcerations were seen in maxillary arch is Tori (8.8%), Mid-palatine raphe (8.0%), Buccal frenum (6.61%), Incisive papilla (3.87%) and Rugae (0.65%). (Table.3)

The least common denture associated ulcerations were seen in mandibular arch is Tori (7.64%), Labial frenum (6.62%), Buccal frenum (3.13%) and Lingual frenulum (2.50%) (Table.4).

The results showed that in all the post insertion follow ups, the injuries were frequently seen in relation to mandibular dentures compared to maxillary dentures. Hence, the adjustments and recall visits required were significantly higher for mandibular dentures.

In the samples analyzed it was observed that post insertion, the patients were recalled on the 1st, 3rd, and 7th days for follow up and after each week until the mucosal lesions receded and patient relief were accomplished.

Every time the site of the denture related lesions was recorded and the required adjustments were made. There was significant reduction in number of adjustments at every visits.

Discussion:

This systematic review was done to identify the prevalence, most common location and frequency of occurrence of oral lesions post insertion of the complete denture and to minimize as well as prevent these discrepancies and effectively manage it.

Although every effort to eliminate sources of dissatisfaction in prosthetic construction was made, it is impossible to eliminate all possible factors. The area of the oral mucosa enclosed by complete dentures are greater and might therefore increase the risk of denture associated mucosal ulcerations.^[20] The factors responsible for tissue abuse from fabrication process is poor resistance, abnormal forces and uneven distribution.^[21]

According to the review done, it was observed that the most prevalent lesion to occur after denture insertion was Denture Stomatitis (47.46%) followed by Traumatic Ulcers (17.657%), Frictional Keratosis (12.5%), Epulis Fissuratum (2.76%).

The common location and frequency of Denture stomatitis was observed as 25.25% in the crest of ridge occurring due to larger contact area between the denture and oral mucosa and incorrect vertical dimension of occlusion has also been suggested as a contributing factor.^[22]

Traumatic ulcer was seen 29.6% in Alveolo-lingual sulcus caused due to overextended flanges, unbalanced occlusion while Frictional keratosis was seen 23.4% in Retro-mylohyoid curtain due to sharp edges of the denture causing injury to the oral mucosa. Epulis fissuratum was seen 18.03% in Labial

vestibule due to unstable dentures and prolonged use of ill-fitting dentures or fractured dentures.

Based on the review done, it was recorded that maximum frequency of ulceration in maxilla and mandible is at the crest of ridge which might be due to bony undercuts and tissue irregularities and also because the area is very thin and is more susceptible to mucosal ulcerations.

The frequency of denture related ulcerations was found more commonly in mandible than maxilla due to overextended denture flanges made to increase retention, its dependency to record the sulcus depth and proper tongue movements while in maxilla ulcerations occurred because of inadequate widening and deepening of labial frenal notch during the insertion, over post-damming to increase retention in posterior palatal seal area and inadequate border molding.

It is said that prevention is better than a cure, and the same applies to dentures. Clinically following proper impression making methods and fabrication techniques would significantly minimize the post insertion problems. It was observed that most of the ulceration were commonly seen in the limiting areas of the denture.

Hence, proper impression technique along with good border molding must be performed and extra attempts to increase the retention by extending the flanges or posterior palatal seal areas should not be made as it is the main reason that leads to denture related ulcerations. Extra attention should be given to border molding, final impression, and adaptation of denture and proper extension of flanges during the fabrication.^[10]

Before making adjustments in the denture to minimize the discrepancies, a layer of pressure indicating paste can be applied on the concerned areas and required movements

can be performed to determine if the concern is over extension or contact pressure.

Results showed that post insertion adjustments recall also significantly decreased when standard fabrication methods and post insertion care is maintained. The management of denture related ulcerations is mainly identifying and eliminating the irritant by proper tissue evaluation such as checking for tissue undercuts or any inaccuracies in tissue contact, areas of exostosis and midpalatine raphe.^[23]

Evaluation of tissue borders for compatible extensions and contours, frenum attachments and hamular notch areas and stability during speech and swallowing. Checking for any occlusal errors by using articulating paper to identify occlusal interferences and can be adjusted if needed.^[23]

Management of denture sores which are localized/ generalized inflammatory or pin point hyperemia or erythematous increases oral hygiene and denture hygiene reinforcement by advising the patient to brush and overnight soaking of the dentures in 0.2% - 2% chlorhexidine or dilute sodium hypochlorite antiseptic solution.^[24]

Antifungal therapy locally can be done to reduce the etiology using amphotericin B, nystatin, clotrimazole or miconazole with systemic therapy using fluconazole or ketoconazole. It should be done for 4 weeks with proper oral and denture hygiene. Correcting the areas of denture causing trauma by trimming and polishing and the rough areas can be smoothed and relined with tissue conditioners or dentures can be replaced with new.^[24]

Under conditions like granular type of ulcerations or lesions, surgical treatment for eliminating crypts by cryosurgery can be indicated and effective mucosal cleaning can

be ensured. Symptomatic relief is provided with anesthetic gels in case of traumatic ulcers. In order to avoid the ulcerations or lesions to transform into malignancy, patients must be recalled every 6 months for review and adjustments if needed.^[24]

In addition to that, patient should also be educated about the post insertion care such as:

- **Removing the dentures overnight.**
- **Cleaning the dentures daily**, removing the food particles as it won't irritate the oral mucosa and cleaning regularly also removes calculus/plaque/tartar of the dentures.
- **Eating soft food and avoiding sticky food to reduce biofilm formation.**
- **Use of denture adhesive** help prevent pain as it prevents food particles from getting between the gums and dentures and also keeps the denture in position to prevent it from dislodging and irritating the gums, provided dentures are fitted appropriately.
- Food and drink that are spicy, hot, salty or acidic irritates denture sores and hence it should be avoided.

Within the limits of this review, the most prevalent denture related ulceration is Denture stomatitis occurring at the crest of the ridge. Males are more prevalent than females with mean age of occurrence at 60 years. The post insertion adjustments is higher in mandible than in maxilla. The final patient-clinician communication while managing complete denture patients should not only be denture insertion but also post insertion adjustments are very important clinical phases of denture fabrication and crucial for patient care. A maintenance program schedule should be established and followed by every doctor and patient.

Conclusion:

The education about the maintenance of the dentures and good oral hygiene and periodic reviews should be given to complete denture patients to prevent and minimize the oral ulcerations and improve the quality of life of denture wearers and post insertion adjustments are an essential part of rehabilitation.

By appropriate planning of treatment, making of impression, support from laboratory and education of the patients, the discomfort and number of post insertion revisits, thereby making the removable complete denture modality a great success.

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References:

1. Anwar A, Kumar B, Akhtar M. Complete Denture Satisfaction among Population in Bihar – A Study. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*. 2015;14:68-72.
2. Singh H, Sharma S, Singh S, Wazir N, Raina R. Problems faced by complete denture-wearing elderly people living in jammu district. *J Clin Diagn Res*. 2014 Dec;8(12):ZC25-27.
3. Yaqoob A. Assessment of the incidence and location of traumatic ulcerations subsequent to the placement of complete denture with and without the use of pressure indicating paste. *Int J Med Dent*. 2018;22:195-201.
4. Mubarak S, Hmud A, Chandrasekharan S, Ali AA. Prevalence of denture-related oral lesions among patients attending College of Dentistry, University of Damman: A clinico-pathological study. *J Int Soc Prev Community Dent*. 2015;5(6):506-512.
5. Jain S, Oberoi, N., Kumar A, Aggarwal A, Kaur K. A study to evaluate the location and frequency of denture-related ulcerations and postinsertion adjustments in complete denture patients. *Indian J Dent Sci*. 2017;9(1):16.
6. Sadr K, Mahboob F, Rikhtegar E. Frequency of Traumatic Ulcerations and Post-insertion Adjustment Recall Visits in Complete Denture Patients in an Iranian Faculty of Dentistry. *J Dent Res Dent Clin Dent Prospects*. 2011;5(2):46-50.
7. Brantes MF, Azevedo RS, Rozza-de-Menezes RE, et al. Analysis of risk factors for maxillary denture-related oral mucosal lesions: A cross-sectional study. *Med Oral Patol Oral Cir Bucal*. 2019;24(3):e305-e313.
8. Zwiri AMA. The Prevalence And Associated Factors Of Denture Wearing Associated Oral Lesions Among Dental Patients Attending College Of Dentistry Clinics In Aljouf University. *European Scientific Journal*. 2016; 12(9): 326.
9. Sharma P, Gupta R. Prevalence of oral lesions in complete denture wearers- An original research. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*. 2021;20(1):29-33.
10. Kivovics P, Jáhn M, Borbély J, Márton K. Frequency and location of traumatic ulcerations following placement of complete dentures. *Int J Prosthodont*. 2007 Jul-Aug;20(4):397-401.
11. Feng J, Zhou Z, Shen X, Wang Y, Shi L, Wang Y, et al. Prevalence and distribution of oral mucosal lesions: a cross-sectional study in Shanghai, China. *J Oral Pathol Med*. 2015 Aug;44(7):490–4.
12. Patel J, Nirmal N, Sharma D. A survey of complaints of patients wearing artificial complete removable dentures. *Natl J*

- Med. Dent Res. April-June 2017;5(3):177-181.
13. Da Silva HF, Martins-Filho PR, Piva MR. Denture-related oral mucosal lesions among farmers in a semi-arid Northeastern Region of Brazil. *Med Oral Patol Oral Cir Bucal*. 2011 Sep 1;16(6):e740-744.
 14. Shah A, Ahmad T. Oral mucosal lesions in complete denture wearers. *J Pak Assoc Dermatol* 2011;21(3):170-173.
 15. Patil S, Yadav N, Patil P, Kaswan S. Prevalence and the relationship of oral mucosal lesions in tobacco users and denture wearers in the North Indian population. *J Fam Community Med* 2013;20:187-91.
 16. Bilhan H, Geckili O, Ergin S, Erdogan O, Ates G. Evaluation of satisfaction and complications in patients with existing complete dentures. *J Oral Sci*. 2013 Mar;55(1):29-37.
 17. Cordova C, Valdés AM, Jorquera G, Mahn E, Fernández E. Distribution of traumatic injuries after the installation of complete dentures in adult patients. *Revista Clínica de Periodoncia, Implantología y Rehabilitación Oral*. 2016;9(1):48-53.
 18. Ogunrinde TJ, Olawale OF. The prevalence of denture related mucosa lesions among patients managed in a Nigerian teaching hospital. *The Pan African Medical Journal*. 2020;37:358.
 19. Reddy AB, Sherlin HJ, Nivethigaa B. Traumatic oral mucosal lesions in elderly dental patients - An institutional study. *Int J Res Pharma Sci*. 2020;11(Suppl3):1054-1059.
 20. Coelho CM, Sousa YT, Dare AM. Denture-related oral mucosal lesions in a Brazilian school of dentistry. *J Oral Rehabil* 2004; (31):135-139.
 21. Jainkittivong A, Aneksuk V, Langlais RP. Oral mucosal lesions in denture wearers. *Gerodontology*. 2010;27(1):26-32.
 22. Pattanaik S, Vikas BVJ, Pattanaik B, Sahu S, Lodam S. Denture Stomatitis: A Literature Review. *Journal of Indian Academy of Oral Medicine and Radiology*. 2010;22(3):136-140.
 23. Zarb G, Hobkirk JA, Eckert SE, Jacob RF. *Prosthetic treatment for Edentulous patients*. 13th ed. Mosby, Elsevier; 2013.
 24. V Rangarajan, TV Padmanaban. *Textbook of Prosthodontics*. 2nd ed. India, Elsevier Health Sciences; 2017.

TABLES

Table.1: Summary of the 17 articles reviewed

S.NO	AUTHOR & YEAR	SAMPLE (N)	MALE	FEMALE	SELECTED AGE GROUP (IN YEARS)	MEAN AGE
1.	Fontes H et al, 2011 ¹³	102	18 (17.6%)	84 (82.3%)	18-85	49
2.	Shah AA et al, 2011 ¹⁴	106	51 (48.1%)	55 (51.8%)	37-80	60
3.	Sadr S et al, 2011 ⁶	60	37 (61.6%)	23 (38.3%)	27-70	50.01
4.	Patil S et al, 2013 ¹⁵	555	332 (59.8%)	223 (40.1%)	28-83	49.7
5.	Bilhan H et al, 2013 ¹⁶	64	25 (39.1%)	39 (60.9%)	Not specified	63.48
6.	Singh H et al, 2014 ²	100	50 (50.0%)	50 (50.0%)	65-75	70
7.	Mubarak S et al, 2015 ⁴	210	166 (79.0%)	44 (21.0%)	40-70	57.5
8.	Cordova C et al, 2015 ¹⁷	84	24 (28.6%)	60 (71.4%)	Not specified	67
9.	Zwiri AMA, 2016 ⁸	344	296 (54.2%)	48 (14.0%)	Not specified	66.11%
10.	Jain S et al, 2017 ⁵	221	93 (42.0%)	128 (57.9%)	31-75	53
11.	Patel J et al, 2017 ¹²	150	73 (48.6%)	77 (51.3%)	45-75	60
12.	Kivovics P et al, 2017 ¹⁰	61	14 (22.9%)	47 (77.0%)	59-91	69
13.	Yaqoob A et al, 2018 ³	26	8 (30.7%)	18 (69.2%)	Not specified	Not specified
14.	Brantes MF et al, 2019 ⁷	97	34 (35.0%)	63 (65.0%)	44-86	63
15.	Ogunrinde TJ et al, 2020 ¹⁸	104	43 (41.3%)	61 (58.7%)	12-84	53.94
16.	Reddy A et al, 2020 ¹⁹	80	46 (57.5%)	34 (42.5%)	60-85	72.5
17.	Sharma P et al, 2021 ⁹	225	95 (42.2%)	130 (57.8%)	<40, >40	Not specified
	TOTAL	2589	1405 (54.2%)	1184 (45.8%)	Min 12 years Max 91 years	60.28

Table.2: Prevalence of complete denture associated mucosal lesions (%)

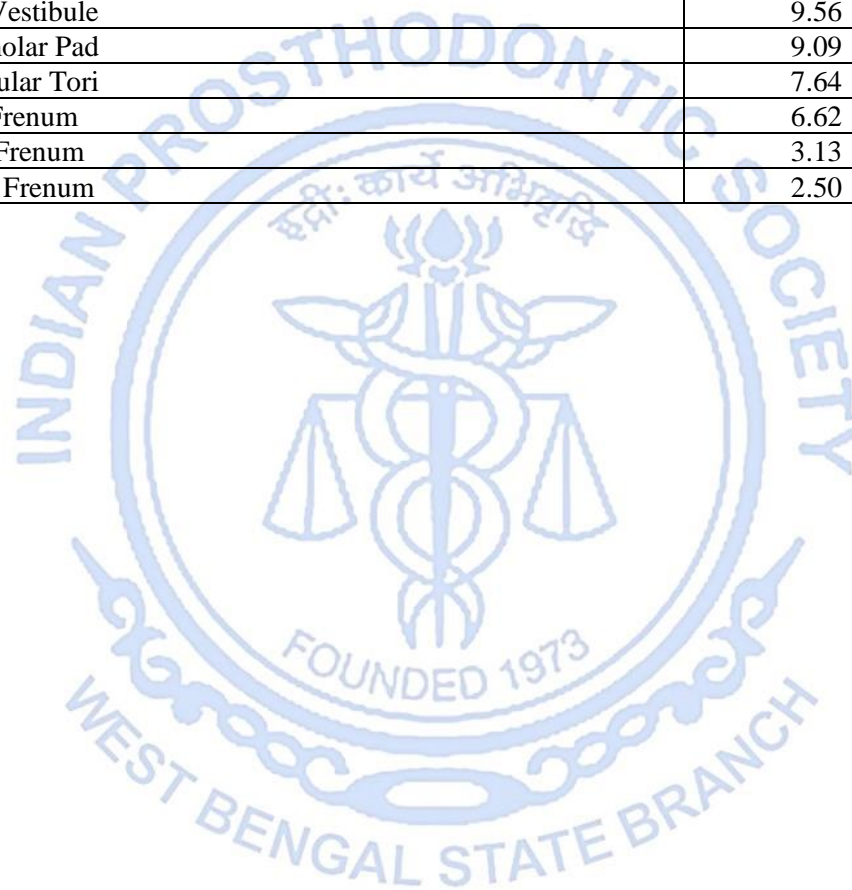
S.NO	DENTURE-RELATED MUCOSAL LESIONS	MEAN
1.	Denture Stomatitis	47.46
2.	Chronic Atrophic Candidiasis	38.73
3.	Inflammatory Papillary Hyperplasia	22.23
4.	Traumatic Ulcers	17.675
5.	Angular Chelitis	15.45
6.	Frictional Keratosis	12.5
7.	Epulis Fissuratum	2.76

Table 3: Most common location and frequency of mucosal ulcerations in complete denture patients (Maxillary arch)

ANATOMICAL LANDMARKS	MEAN
Crest of Ridge	25.25
Hard Palate	22.40
Buccal Vestibule	22.06
Posterior Palatal Seal	21.60
Maxillary tuberosity	18.96
Labial Vestibule	18.03
Slope of Ridge	15.03
Labial Frenum	14.30
Maxillary Tori	8.80
Mid-Palatine Raphe	8.0
Buccal Frenum	6.61
Incisive Pappilla	3.87
Rugae	0.65

Table.4: Most common location and frequency of mucosal ulcerations in complete denture patients
(Mandibular arch)

ANATOMICAL LANDMARKS	MEAN
Crest of Ridge	32.75
Alveolo-lingual sulcus	29.60
Retro-mylohyoid Curtain	23.40
Slope of Ridge	11.33
Buccal Vestibule	10.41
Labial Vestibule	9.56
Retro-molar Pad	9.09
Mandibular Tori	7.64
Labial Frenum	6.62
Buccal Frenum	3.13
Lingual Frenum	2.50



FIGURES

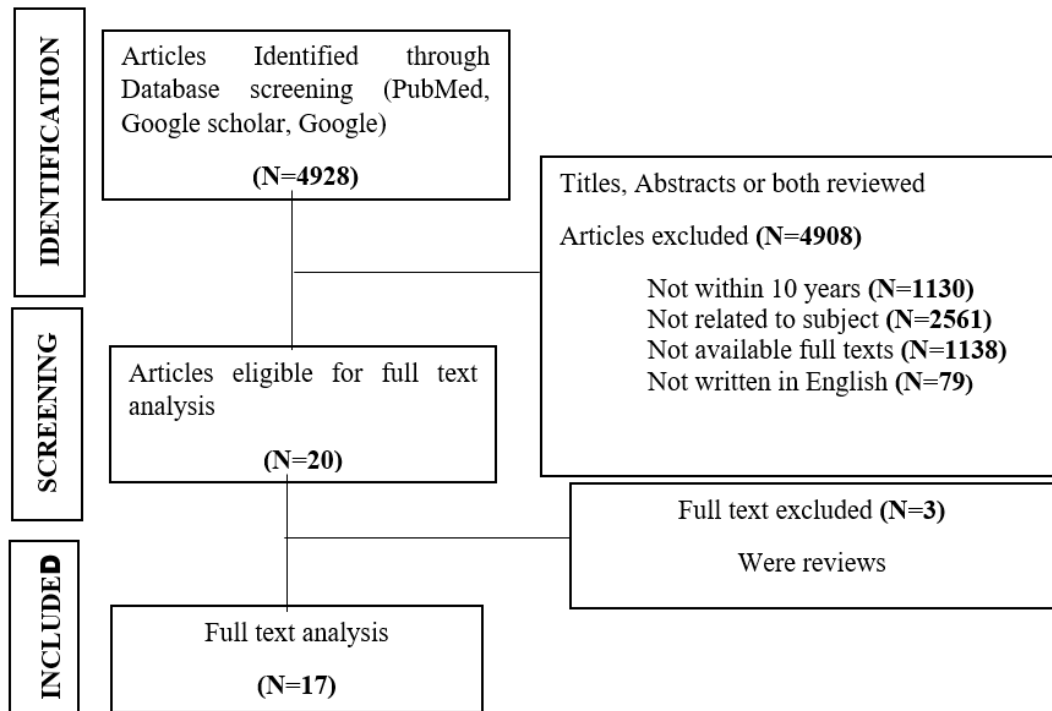


Fig.1: Prisma flow chart of publications through systematic review

