PREVALENCE OF DENTURE STOMATITIS AND ITS ASSESSMENT TOWARDS MANAGEMENT -A RETROSPECTIVE STUDY

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Abstract: Denture stomatitis is a common oral condition of multifactorial etiology. Factors such as age,gender,oral and denture hygiene may play a role in predisposition to denture stomatitis. The aim of this study was to evaluate these factors and understand the various modalities of treatment for effective management of denture stomatitis with respect to the South Indian population.Case sheets of around 26,000 patients were reviewed from March 2019 to June 2020 out of which a sample size of 56 patients were included. To eliminate bias all patients affected by the disease, who had completed treatment were included in the study. Epidemiological data of the patient along with their ongoing treatment was collected and tabulated in MS Excel sheet. The data was then analysed using IBM SPSS software version 23.The prevalence of denture stomatitis in females was 57.1% while in males was 42.9%. Age group of 51-60 years and 61-70 years was found to be equally and most commonly affected. Palate was found to be most commonly affected. The most common treatment modality used was pharmacotherapy using antifungal drugs.The increasing prevalence of denture stomatitis amongst the older population is a matter of great concern. The present study shows the prevalence of denture stomatitis in females especially in the old age population. Thus it is important to increase awareness amongst the patients regarding the condition and effective maintenance of oral and denture hygiene and to increase awareness amongst the dentists regarding the various treatment modalities to effectively prevent and clinically manage such conditions.

Keywords: Denture stomatitis, Candida Albicans, Denture hygiene, oral hygiene, pharmacotherapy, innovative.

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INTRODUCTION

Inflammation of the mucosa underlying a complete denture is called denture stomatitis(Yarborough *et al.*, 2016). It is a disorder frequently seen in elderly patients(Cunha-Cruz, 2006), having a prevalence of 15%-70% amongst all denture wearers(Gendreau and Loewy, 2011). Frequent signs associated with denture stomatitis may be inflamed red mucosa, soft tissue hyperplasia,angular cheilitis, glossitis,burning sensation in the palate(Ritchie *et al.*, 1969) and less frequently bone resorption (Jeganathan and Lin, 1992).It is rarely associated with severe pain and discomfort(Yarborough *et al.*, 2016)(Ariga *et al.*, 2018). Denture stomatitis has a characteristic appearance which can be classified using the Newton classification system(Newton, 1975). It is classified into 3 types:
Type 1- localized inflammation or pinpoint hyperemia
Type 2 -diffuse erythema associated with the denture contacting mucosa
Type 3 - papillary hyperplasia of the keratinized mucosa
If untreated,the disease usually progresses from Type I through Type I1 to Type III. Type I is usually related to denture trauma only, as compared with Type I1 and I11 which have been associated with a multi-factorial aetiology(Budtz-Jørgenskn and Bertram, 1970)(Jyothi *et al.*, 2017).Multiple factors are associated with denture stomatitis, however microbial pathogenesis is most frequently implicated as its cause(Girard, Landry and Giasson, 1996)(Duraisamy *et al.*, 2019). Multiple organisms like C. albicans, C. glabrata, C. tropicalis, and other fungi from the Candida species have been associated with denture stomatitis(Budtz-Jörgensen, Stenderup and Grabowski, 1975; Girard, Landry and Giasson, 1996), however Candida albicans is considered as its primary cause(Allison and Douglas, 1973). Other factors like trauma due to ill-fitting dentures(Nyquist, 1953)(Selvan and Ganapathy, 2016), xerostomia, poor dental hygiene, compromised immunity, nocturnal use of dentures too plays a significant role(Altarawneh *et al.*, 2013)(Ganapathy *et al.*, 2016).
Denture stomatitis is a chronic disorder, treatment of which is essential for the well being of patients. If not treated with care, denture stomatitis can cause severe systemic disorders like deep tissue infections especially in patients with comorbidities like HIV-AIDS, nutritional deficiency, uncontrolled diabetes(Shepherd, 1986)(Subasree, Murthykumar and Dhanraj, 2016). According to (Budtz-Jørgenskn and Bertram, 1970; Abelson, 1981) ill fitting dentures, poor oral and denture hygiene and trauma were the main causes of denture stomatitis hence these factors had to be taken into consideration during its treatment. Commonly used treatment modalities currently include maintenance of denture and oral hygiene(Fisher, 1956)(Ranganathan, Ganapathy and Jain, 2017), correction of denture faults or change of faulty denture and pharmaceutical management using anti-fungal medication and mouth washes. (Preti *et al.*,

1996)(Vijayalakshmi and Ganapathy, 2016) suggested that preventive measures like implant supported dentures can be considered to allow even distribution of force, thereby causing less trauma to the underlying tissue and allowing even distribution of force.Treatment planned should be carried out properly as relapse of disease is very high in immunocompromised individuals(Greenspan and Greenspan, 1991)(Ganapathy, Kannan and Venugopalan, 2017) .Previously our team has a rich experience in working on various research projects across multiple disciplines (Ramesh Kumar *et al.*, 2011; Jain, Kumar and Manjula, 2014; Krishnan, Pandian and Kumar S, 2015; Keerthana and Thenmozhi, 2016; Sivamurthy and Sundari, 2016; Felicita, 2017a, 2017b; Kumar, 2017; Sekar *et al.*, 2019; Johnson *et al.*, 2020). Now the growing trend in this area motivated us to pursue this project.The aim of this research is to study the prevalence and treatment modality of denture stomatitis in a well reputed hospital in Chennai.

MATERIALS AND METHOD

This study was carried out in a university setting at Saveetha Dental College and hospital, Chennai, India by the department of Prosthodontics and Implantology. The study consisted of a data collector and 1 data reviewer. The disadvantage of the study was its geographical limitation. This study was approved by the institute ethical board committee.

Data of patients visiting Saveetha Oral medicine department June 2019- March 2020 was collected by method of simple random sampling. A total of 26,000 case sheets were reviewed out of which 61 patients had denture stomatitis. 5 patients were eliminated from the study as 1 was not a regular denture wearer, 2 only wore upper dentures and treatment of 2 patients wasn't completed. Cross verification of error in data was done via telephonic conversation. Measure taken to minimise sampling bias was that all case sheets of patients undergoing treatment for denture stomatitis were included. External validity is that it is applicable to the South Indian population.

The data collected was entered in MS Excel spreadsheet and tabulated. The data was imported in spss software version 26 and variables were defined. Statistical analysis of data was carried out using unpaired t test. Independent variable was denture stomatitis and dependent variable was age and sex. Data transfer was done using spss software version 26.

RESULTS AND DISCUSSION

A total of 26,000 case sheets were reviewed out of which 61 were found to be suffering from Denture stomatitis and 56 were included in the study as 5 patients were eliminated from the study. Amongst the patients 1 was not a regular denture wearer, 2 only wore upper dentures and treatment of 2 patients wasn't completed.

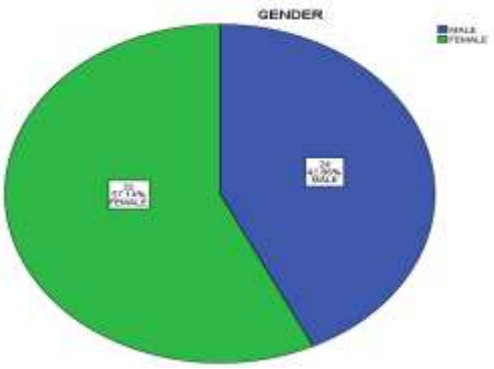

Figure 1. Pie Chart depicting prevalence of denture stomatitis in males and females. The prevalence is greater in females than males. Of all the patients affected by denture stomatitis 57.14% are females and 47.88% are males.

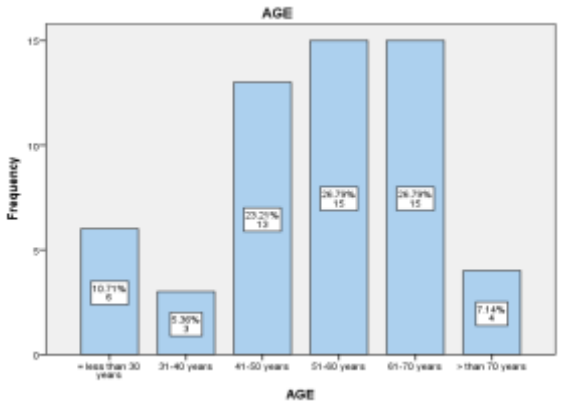

Figure 2. Bar Graph depicting prevalence of denture stomatitis in various age groups.X-axis represents the age of the individual and Y-axis represents the frequency of individuals affected by denture stomatitis. It is observed that the most common age group affected by the disease was 51-60 and 61-70 years(26.79% each)

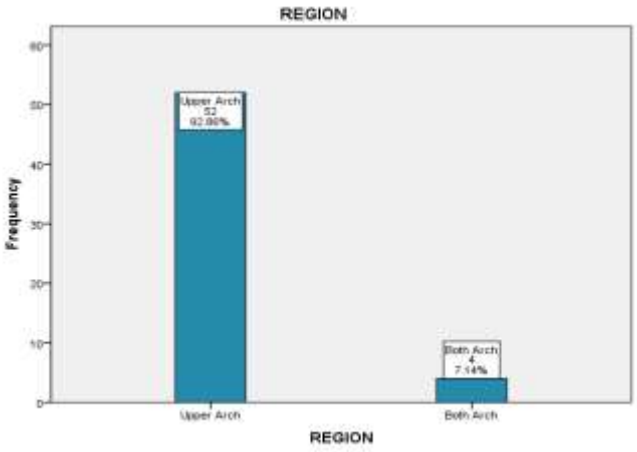

Figure 3. Bar Graph depicting the prevalence of denture stomatitis according to region. The X-axis represents the various regions affected, while the Y-axis represents the percentage of individuals affected in the given regions. It was observed that the upper arch was most commonly affected (92.85%).

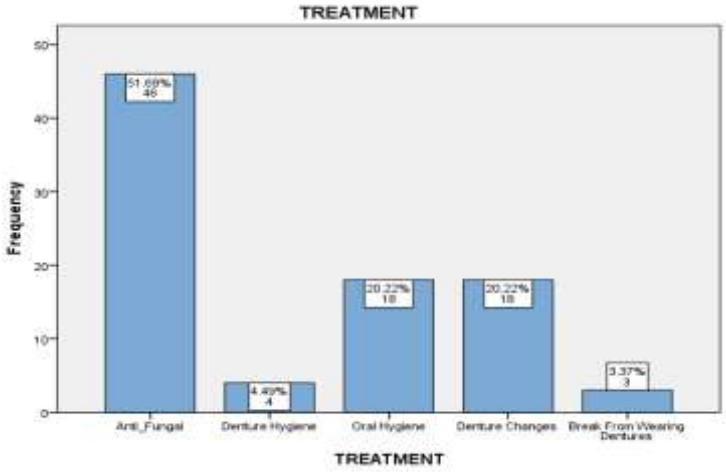

Figure 4. Bar graph depicting popularity of various treatment modalities used in the management of Denture Stomatitis. X-axis represents the various treatment modalities used in management of denture stomatitis. Y-axis represents the percentage of patients undergoing the given treatment modalities. It is observed that the most common treatment was the use of antifungal drugs(51.69%).

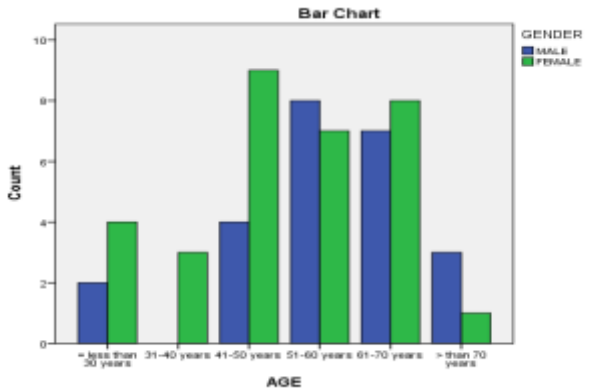

Figure 5. Bar graph depicting the correlation between Age and Gender in Denture stomatitis patients. The X-axis represents the age groups and the Y-axis the gender. The blue represents male and green female. Chi square test showed Pearson Chi Square value 5.56 and P value- 0.339. Since the p value >0.05 there is no statistically significant correlation between Age and Gender in Denture Stomatitis patients, however it is observed that the most predominantly affected group is females of age group (41-50 years)

It is observed that the prevalence of denture stomatitis was greater in females compared to males. Amongst all patients suffering from denture stomatitis 57.1% were female while 42.9 were males(Figure 1).

In the present study it is observed that there is equal prevalence present in the age groups 51-60 years and 61-70 years of age. These two age groups showed the highest prevalence. While the least affected group was of patients 31-40 years.(Figure 2)It was also observed that 92.9% of denture stomatitis cases affected only the upper arch, while the rest affected both upper and lower. No cases were reported affecting only the lower arch. individuals affected by denture stomatitis(Figure 3)It is observed that the popularity of various treatment modalities in the management of Denture Stomatitis, was pharmacotherapy using Antifungals like clotrimazole and nystatin.. (Figure 4)

In the present study it was observed that the prevalence of denture stomatitis was greater in females compared to male. Similar results were also seen in a study conducted by (Junior *et al.*, 1991)(Arendorf and Walker, 1987). The reason may be that women have a higher life expectancy than men, and undergo dental extractions more frequently than men due to higher caries index(Shaffer *et al.*, 2015)(Ashok and Suvitha, 2016), hence their need for a dental prosthesis may be higher, resulting in higher cases of denture related stomatitis. According to (Nyquist, 1952)(Ashok *et al.*, 2014) greater prevalence in women can also be explained due to hormonal changes women undergo during menopausal period predisposing them to infections, this hypothesis may be supported as a great number of female complete denture patients are found to be undergoing menopause. It has been suggested that increased prevalence may also be due to the fact that female patients wear their dentures more often and perhaps for longer periods of time for esthetic purposes(Cutright, 1974)(Venugopalan *et al.*, 2014).Many other investigators too have concluded that denture stomatitis is more common in females(Nyquist, 1952; Fisher, 1956) (Davenport, 1970; Budtz-Jörgensen and Löe, 1972)(Nater *et al.*, 1978) However, there have been a few reports in which the two sexes were equally affected(Bergman, Carlsson and Hedegard, 1964; Grabowski and Bertram, 1975)(Bergman, Carlsson and Hedegard, 1964; Ettinger, 1975)(Ettinger, 1975). Denture stomatitis is typically present in the older age groups.In the present study most patients affected by it were present within the age group 51-60 years and 61-70 years. Similar results were found in a study conducted by (Axéll, 1976)(Kannan and Venugopalan, 2018). This may be due to the fact that the elderly are the most likely population to wear dentures and are at particular risk of poor denture hygiene as they have limited financial resources ,manual dexterity, information and poorer vision. Poverty also influences the ability to visit a dentist regularly and replace ill-fitting dentures, which causes trauma to the underlying tissue predisposing them to the disease. Decreased immunity due to age may also play an important role. However the number of patients affected by denture stomatitis greater than 70 years of age, were less as the average lifespan in India is 68.7 years(National Health Report-2019), hence the number of patients in the age group greater than 70 would be lesser. Denture stomatitis was most commonly seen affecting the palate in the present study, similar results were found in a study conducted by(Figueiral *et al.*, 2007)(Basha, Ganapathy and Venugopalan, 2018). Palate is most commonly affected probably due to the large contact area between denture and oral mucosa, while the mandible is less affected due to the washing action of saliva.

(Girard, Landry and Giasson, 1996) had conducted a study in which it was observed that the primary cause of denture stomatitis is microbial pathogenesis, and the most commonly present species found was Candida albicans. Even if the cause of denture stomatitis may be prolonged hours of denture wear, or the use of old worn out dentures the primary line of treatment is usually pharmacotherapy using antifungals due to the increased presence of candida species in such patients. In the present study too the most popular line of treatment was the use of antifungals amongst which the use of clotrimazole was more popular than that of nystatin as it had better taste and less gastrointestinal adverse reactions(Kaur and Kakkar, 2010), however many still advocate the use of nystatin over clotrimazole due its high efficacy, low cost, and less side effects(Sklenár *et al.*, 2013)(Ajay *et al.*, 2017). Although most cases resolve in a span of 12-14 days with the use of topical antifungals the use of systemic antifungals can be recommended to immunocompromised individuals or patients with poor compliance(Dias, Samaranayake and Lee, 1997). Denture hygiene plays a significant role in the prevention of denture stomatitis(Sadamori *et al.*, 1990)(Marinoski, Bokor-Bratić and Čanković, 2014)(Kulak-Ozkan, Kazazoglu and Arikan, 2002), hence it is required to use denture cleaners such as hypochlorite solution and chlorhexidine to disinfect the dentures and decrease plaque and microbial accumulation on the denture surface.In the present study we observe the use of hypochlorite solution for the disinfection of dentures and chlorhexidine for the maintenance of oral hygiene. Hypochlorite solution although is an effective disinfecting agent(Orsi *et al.*, 2011) its use is limited because it whitens acrylic resins(Paranhos *et al.*, 2013)and corrodes metal components of prostheses(Paranhos *et al.*, 2014). A study done by (Pavarina *et al.*, 2003) had proved the efficacy of chlorhexidine as a denture cleaner, hence chlorhexidine solution can be used as a denture disinfectant at a concentration of 4% while as a mouthwash for oral hygiene at a concentration of 0.12%. (Nyquist, 1952) along with several other workers(Nyquist, 1952; Turrell, 1966)(Niesłuchowska *et al.*, 1980) had claimed the role of trauma and ill fitting dentures in progression of denture stomatitis. (Samaranayake, McCourtie and MacFarlane, 1980) suggested that inflammatory exudate leaking from a traumatized palatal mucosa promotes candidal colonization of the denture surface. Hence it was essential to either replace ill fitting dentures or rebase them. In the present study it is observed that replacement of ill fitting dentures was more advisable than their rebasing,to overcome problems such as crazing and attrited teeth seen in old dentures. The limitations of this study were that it was geographically limited. The sample size was also less. Hence studies with larger sample size and a longer duration of follow up are required to achieve conclusive data.

Denture stomatitis is a chronic disorder, which if not managed well may cause deep tissue infections. It also has high recurrence in patients with comorbidities. Hence this study was important to understand the prevalence of the disorder and educate clinicians regarding its effective management. Since prevention is better than cure it is advised to carry out effective prevention programs which include(Hoad-Reddick, Grant and Griffiths, 1990) routine inspection of the oral cavity disorders,educating patients regarding proper denture wearing, denture sanitization and oral hygiene habits. Patients with partial dentures should undergo periodic professional plaque control procedures. Prosthodontists should ensure that the dentures they deliver have good fit and polish so as to reduce trauma to denture

bearing tissues and to decrease microbial load on denture. Patients who are susceptible should be given softliners only with incorporation of antifungals like nystatin as soft-liners are more porous than acrylic and may have increased adherence to the fungi. However if precautionary methods fail, it is essential to manage the disease well to allow the patient to enjoy a good quality of life. The present study helps us understand the prevalence of the disease to allow prevention, as well as explains the advantages and disadvantages of various propularly used treatment modalities to allow effective management of the disease, increasing clinician and patient satisfaction. Our institution is passionate about high quality evidence based research and has excelled in various fields (Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Mathew *et al.*, 2020). We hope this study adds to this rich legacy.

CONCLUSION

Denture stomatitis is a chronic, debilitating disease effective management of which is important.In present study prevalence of denture stomatitis is greater in females than males, and is commonly found in the older population. The high prevalence of this disease is quite alarming hence it is essential to increase awareness. General dentists should be knowledgeable and familiar with the etiopathogenesis,clinical presentation, diagnosis and management of this condition, while prosthodontists should take care in the fabrication of dentures and should educate the patient well regarding its use.

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