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## Prevalence of Denture Stomatitis Among Complete Denture Patients - A Retrospective Study

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**Abstract:** Denture stomatitis is a common oral mucosal lesion occurring in mucosa underneath a denture. It is characterised by mild inflammation and erythema of oral mucosa covered by denture. Denture stomatitis have a negative impact on the general health and overall well-being of patients. Therefore, there is a need to understand the pattern of prevalence in age and gender in hopes to provide treatment for such lesions and prevent recurrence. The aim of this study was to evaluate the prevalence of denture stomatitis among complete denture patients. The study includes adults, both males and females, who reported to Saveetha Dental College between June 2019 to March 2020. Inclusion criteria includes complete denture wearers. Patients below 18 years of age were excluded from the study. Among total data of 86000 patient records, 80 patient records were analysed and retrieved with the parameters such as patient's age, patient's gender and presence of denture stomatitis were collected. Datas were recorded in Microsoft Office Excel (2013) and analysed using SPSS software Version 26.0 and chi-square test was done to find out correlation between variables such as age group and gender. Significance test level was set at  $p < 0.05$ . A total of 80 patients presented with existing complete dentures, which includes 44 females and 36 males. 13.8% were 21-40 years, 38.8% were 41-60 years and 47.5% were 61-80 years age group. 67.5% of patients presented with denture stomatitis. The highest prevalence of denture stomatitis was found in the age group 41-60 years (83.9%), followed by 21-40 years (81.8%) and 61-80 years (50%). Statistically significant difference was observed between age groups and denture stomatitis ( $p < 0.05$ ). Denture stomatitis was found in 70.5% of females and 63.9% of males but no significant difference was found between genders ( $p > 0.05$ ). Within the limits of this study, it was observed that there was high prevalence of denture stomatitis in complete denture patients with the age group between 41 to 60 years age group and in female patients.

**Keywords:** Complete denture; completely edentulous; denture stomatitis; denture stomatitis prevalence; oral mucosal lesion.

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### INTRODUCTION

Denture stomatitis is a common oral mucosal lesion occurring in mucosa underneath a denture. It is characterised by mild inflammation and erythema of oral mucosa covered by denture. The most common area affected is the palatal mucosa in which is inflamed under a maxillary denture. The higher incidence of denture stomatitis in maxilla may be due to occlusion of the denture bearing mucosa by the denture which prevents the normal cleansing action by the flow of saliva and movement of the tongue [(Basha, Ganapathy and Venugopalan, 2018)]. The term is used to describe pathological changes in the oral mucosa which bears the denture [(NEWTON and V, 1962; Ritchie *et al.*, 1969)]. Trauma, infection and allergy are known as etiologic factors of denture stomatitis [(Nyquist, 1952; Smith and Bains, 1956; CAWSON and A, 1963; Ajay *et al.*, 2017; Ganapathy, Kannan and Venugopalan, 2017)]. Microbiological studies indicate that denture stomatitis is associated with a quantitative increase of yeast infection [(Vijayalakshmi and Ganapathy, 2016; Kannan and Venugopalan, 2018)]. Complete edentulism is highly prevalent among older individuals and is highly associated with low socioeconomic status [(Atashrazm and Sadri, 2013; Ashok *et al.*, 2014; Venugopalan *et al.*, 2014; Ashok and Suvitha, 2016)]. Among older individuals, removable dentures, especially complete dentures are more frequently prescribed and used [(Petersen, 2003)]. Based on previous studies, many of the reported oral mucosal conditions are benign [(Jeganathan and Lin, 1992; Selvan and Ganapathy, 2016)]. However, due to the existence of local and systemic factors, some lesions may become malignant [(Jeganathan and Lin, 1992)].

A previous study by Gendreau et al. reported the prevalence of denture stomatitis among denture wearers range from 15% to 70% [(Gendreau and Loewy, 2011)]. Another study stated that denture stomatitis was reported in 11% to 67% of complete denture wearers [(Arendorf and Walker, 1987)]. The prevalence of denture stomatitis is higher among elders and among females [(Gendreau and Loewy, 2011)]. Past studies from Arendorf et al. and Zisis et al. also reported higher prevalence of denture stomatitis in females [(Arendorf and Walker, 1987; Zisis, Yannikakis and Harrison, 2006)]

It is important to restore comfort, function and esthetics altogether while treating completely edentulous patients [(Ganapathy *et al.*, 2016; Jyothi *et al.*, 2017; Ariga *et al.*, 2018)]. This can be done with the application of 2% chlorhexidine gluconate to the tissue surface of the maxillary denture as previous study has found significant improvement of inflamed tissues beneath the denture with the use of chlorhexidine [(BUDTZ-JöRGENSEN and LöE, 1972)]. Denture stomatitis have a negative impact on the general health and overall well-being of patients. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J *et al.*, 2018; Menon *et al.*, 2018; Prabakar *et al.*, 2018; Rajeshkumar *et al.*, 2018, 2019; Vishnu Prasad *et al.*, 2018; Wahab *et al.*, 2018; Dua *et al.*, 2019; Duraisamy *et al.*, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu *et al.*, 2019; Mehta *et al.*, 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma *et al.*, 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi *et al.*, 2020; Samuel, Acharya and Rao, 2020)

The aim of this study was to evaluate the prevalence of denture stomatitis in complete denture patients with the objective of understanding the pattern of prevalence in age and gender in hopes to provide treatment for such lesions and prevent recurrence.

## MATERIALS AND METHODS

This retrospective study involves adults of 18 years and above, both males and females, who have reported to Saveetha Dental College between June 2019 to March 2020. The study is university based.. This allows flexible data retrieval, automated data collection and saves cost. However, such setting only allows a limited population to be covered and study may be subjected to researcher's personal bias. Data retrieval was approved by the Ethical Committee Board of Saveetha Dental College with approval number of SDC/SIHEC/2020/DIAS DATA/0619-0320. Patient's informed consent was obtained prior to clinical examination of the patients.

All case reports between June 2019 to March 2020 were reviewed for cases with existing complete dentures and the cases were cross-verified with intraoral photographs uploaded into the system. Datas were collected by a single calibrated examiner. Among total data of 86000 patient records, 80 patient records were analysed and retrieved with the parameters such as patient's age, patient's gender and presence of denture stomatitis were collected. The inclusion criteria includes complete denture wearers. Patients below 21 years and edentulous patients without complete dentures were excluded from the study.

### Statistical analysis

All the datas obtained were entered into Microsoft Office Excel (2013) and analysed using SPSS Software Version 26.0. Descriptive statistics were used to report distribution of age group, gender and presence of denture stomatitis. Chi-square test was conducted to find correlation in variable factors such as age group, gender and denture stomatitis presence. Significance test level was set at  $P=0.05$ .

## RESULTS AND DISCUSSION

A total of 80 patients aged 21 to 80 years presented with existing complete dentures to Saveetha Dental College between June 2019 to March 2020. Among them were 44 females (55%) and 36 males (45%)(Figure 1). Based on age group distribution, 13.8% were 21-40 years, 38.8% were 41-60 years and 47.5% were 61-80 years age group (Figure 2). Out of 80 patients, 54 (67.5%) of patients presented with denture stomatitis. The remaining 20 patients did not show any sign of oral mucosal lesion (Figure 3). The prevalence of denture stomatitis is more common in the age group 41-60 years which was 83.9%, followed by 21-40 years (81.8%) and the least prevalent group was 61-80 years (50%)(Table 1, Figure 4). Statistically significant difference was observed between age groups 21-40 years, 41-60 years and 61-80 years ( $p<0.05$ )(Table 2). Denture stomatitis was found in 70.5% of females and 63.9% of males (Table 3, Figure 5). However, there is no significant association in prevalence of denture stomatitis between males and females ( $p>0.05$ )(Table 4).

Oral health is an integral part of health which contributes to the quality of life and general well-being especially to elders [(Subasree, Murthykumar and Others, 2016)]. Ageing, edentulousness and complete denture wearing are all phases in which older individuals go through that causes changes to the oral epithelium [(Ranganathan, Ganapathy and Jain, 2017; Duraisamy *et al.*, 2019)]. This decreases the ability of epithelial regeneration, along with microbial resistance and traumatic factors. Therefore, it is common for people with complete dentures to experience denture stomatitis.

In this study, it was observed that denture stomatitis was seen in 67.5% of complete denture wearers (Figure 3). This finding was in agreement with other studies which reported the prevalence of denture stomatitis among denture wearers ranges from 15% to 70% [(Gendreau and Loewy, 2011)]. Another research which was in line with the present study reported that the prevalence of denture stomatitis was reported in 11% to 67% of complete denture wearers [(Arendorf and Walker, 1987)]. The overall consensus of this finding was agreed upon and to be included in clinical practice.

In the present study, the highest prevalence was observed in age group 41-60 years (Table 1, Figure 4). There was a statistically significant difference found in prevalence of denture stomatitis between the age groups ( $p < 0.05$ ) (Table 2). This finding was in conflict with another study which reported a higher prevalence of denture stomatitis in the age group 75 years and above [(Arendorf and Walker, 1987; Zissis, Yannikakis and Harrison, 2006)]. The possible reason may be due to different geographic location and socioeconomic status.

Based on gender, females have higher prevalence of denture stomatitis compared to males (Table 3, Figure 5). However, no statistically significant difference was found between males and females ( $p > 0.05$ ) (Table 4). The reason for increased prevalence in females may be due to esthetic concerns attributed to wearing dentures, in which women tend to wear dentures more continuously including overnight than men [(Jeganathan and Lin, 1992)]. Many studies presented a higher rate of prevalence of denture stomatitis in females than in males [(Petersen, 2003; Atashrazm and Sadri, 2013)]. There are studies which conflict with ours [(Vigild, 1987; Petersen, 2003; Atashrazm and Sadri, 2013)] findings which reported higher prevalence of denture stomatitis in males [(Tucker and Heget, 1976; Shimazaki *et al.*, 2003)]. The possible reason could be due to different geographic location, and socioeconomic status. 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)

**Table 1. Table depicting relationship between presence of denture stomatitis in complete denture patients and age group.**

			Denture Stomatitis		Total
			Absent	Present	
Age Group	21-40 years	Count	2	9	11
		% within age group	18.2%	81.8%	100%
		% of total	2.5%	11.3%	13.8%
	41-60 years	Count	5	26	31
		% within age group	16.1%	83.9%	100.0%
		% of total	6.3%	32.5%	38.8%
	61-80 years	Count	19	19	38
		% within age group	50.0%	50.0%	100.0%
		% of total	23.8%	23.8%	47.5%
Total	Count	26	54	80	
	% within age group	32.5%	67.5%	100.0%	
	% of total	32.5%	67.5%	100.0%	

**Table 2: Table depicting association between presence of denture stomatitis in complete denture patients and age**

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.120	2	.006
Likelihood Ratio	10.391	2	.006
N of Valid Cases	80		

groups. Association was found to be statistically significant (Pearson chi-square value- 10.120 , p value- 0.006 ( $p < 0.05$ ), hence, statistically significant).

**Table 3: Table depicting relationship between presence of denture stomatitis in complete denture patients and gender.**

			Denture Stomatitis		Total
			Absent	Present	
Gender	Female	Count	13	31	44
		% within gender	29.5%	70.5%	100.0%
		% of total	16.3%	38.8%	55.0%
	Male	Count	13	23	36
		% within gender	36.1%	63.9%	100.0%

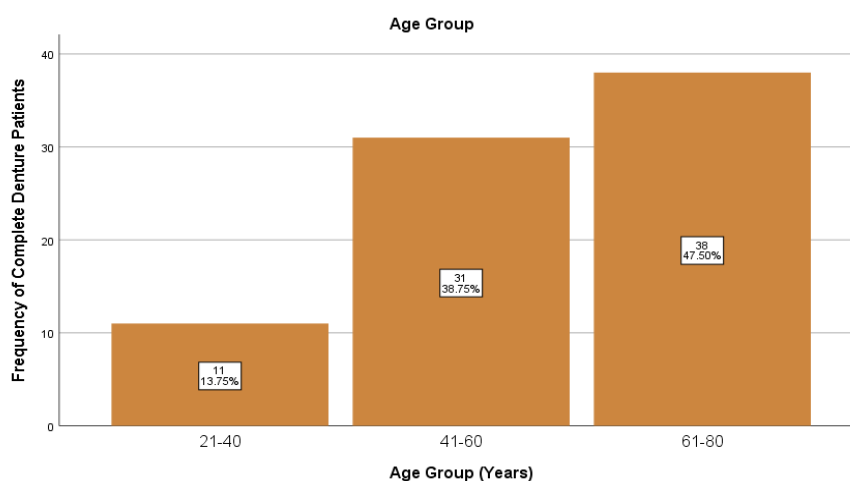
		<b>% of total</b>	16.3%	28.7%	45.0%
<b>Total</b>		<b>Count</b>	26	54	80
		<b>% within gender</b>	32.5%	67.5%	100.0%
		<b>% of total</b>	32.5%	67.5%	100.0%

**Table 4: Table depicting association between presence of denture stomatitis in complete denture patients and gender. Association was found to be statistically not significant (Pearson chi-square value- 0.389 , p value- 0.553 (p>0.05), hence, statistically not significant)**

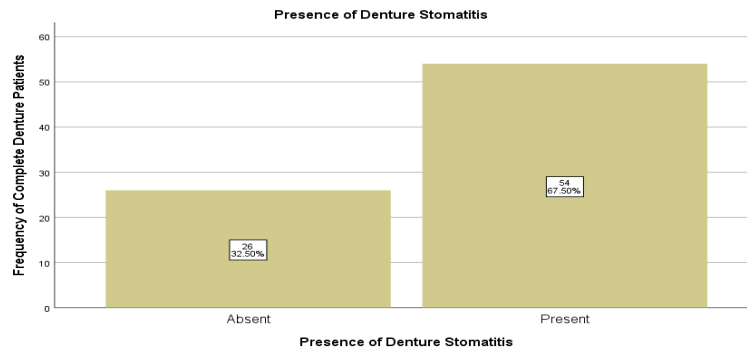
	Value	df	Asymptotic Significance (2-sided)	Exact sided)	Sig. (2-	Exact Sig. (1-sided)
<b>Pearson Chi-Square</b>	.389	1	.533			
<b>Continuity Ratio</b>	.147	1	.701			
<b>Likelihood Ratio</b>	.388	1	.533			
<b>Fisher's Exact Test</b>				.633		.350
<b>N of Valid Cases</b>	80					



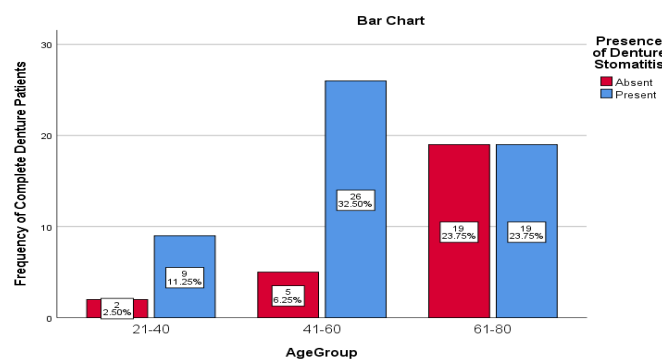
**Fig.1: Bar chart depicting frequency of complete denture patients by gender. X-axis represents gender and Y-axis represents frequency of complete denture patients 55% of complete denture patients were females and 45% were males, hence, more females reported with complete denture compared to males.**



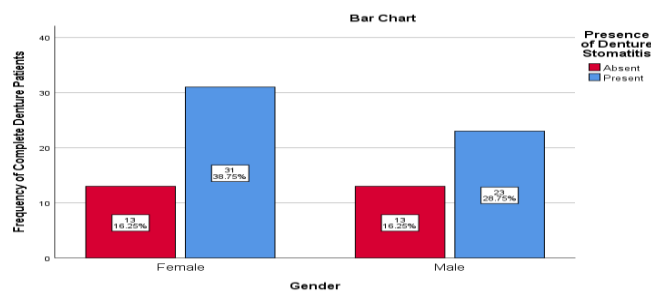
**Fig.2: Bar chart depicting frequency of complete denture patients by age group. X-axis represents the age group and Y-axis represents the frequency of complete denture patients. 13.8% of patients were 21-40 years, 38.8% were 41-60 years and 47.5% were 61-80 years, hence, patients reported with complete dentures were more in the 61-80 years age group compared to other age groups.**



**Fig.3:** Bar chart depicting frequency of complete denture patients based on presence of denture stomatitis. X-axis represents presence of denture stomatitis and Y-axis represents the frequency of complete denture patients. 67.5% of patients presented with denture stomatitis and 32.5% did not have denture stomatitis, hence, more number of complete denture patients presented with denture stomatitis.



**Fig.4:** Bar chart depicting association between presence of denture stomatitis in complete denture patients and age group. X-axis represents the age group and Y-axis represents the frequency of complete denture patients. Red denotes absence of denture stomatitis and blue denotes presence of denture stomatitis. Most patients who presented with denture stomatitis were 41 to 60 years, followed by 21-40 years, and 61-80 years. Pearson chi-square value- 10.120 , p value- 0.006 ( $p < 0.05$ ), hence, statistically significant, proving presence of denture stomatitis is higher in age group 41-60 years compared to other age groups.



**Fig.5:** Bar chart depicting association between presence of denture stomatitis in complete denture patients and gender. X-axis represents gender and Y-axis represents the frequency of complete denture patients. Red denotes absence of denture stomatitis and blue denotes presence of denture stomatitis. Majority of complete denture patients who presented with denture stomatitis were females when compared to males, hence, females have higher prevalence of denture stomatitis compared to males. However, the association between presence of denture stomatitis and gender was statistically not significant (Pearson chi-square value- 0.389 , p value- 0.553 ( $p > 0.05$ ), hence, statistically not significant)

**Limitation of the study**

One of the limitations to this study was a small population size as the study was university based. Oral hygiene practice, age of denture and duration of denture wear may be significant to the occurrence of denture stomatitis. However, this research studied association only between the denture stomatitis with age and gender.

### Future scope

Extensive study needs to be done with a larger sample population to find out prevalence of denture stomatitis.. Further research is needed to identify associating factors which contribute to occurrence of denture stomatitis.

### CONCLUSION

Within the limits of this study, it is observed that there is high prevalence of denture stomatitis in complete denture patients with the age group between 41 to 60 years age group and in female patients.

### AUTHORS CONTRIBUTIONS

Nurul Syamimi binti Mohd Azlan Sunil contributed to the original drafting, acquisition of data, analysis and interpretation of data and writing of this research. Dr. Revathi Duraisamy substantially contributed to improvising the research draft, conception and design of this study, and revising the article critically for important intellectual content.

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### CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

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