

PalArch's Journal of Archaeology of Egypt / Egyptology

PREVALENCE OF CLINICAL AND LABORATORY ERRORS IN COMPLETE DENTURE WEARERS: A RETROSPECTIVE STUDY

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Rupawat Divya Kamlesh, Vinay Sivaswamy. PREVALENCE OF CLINICAL AND LABORATORY ERRORS IN COMPLETE DENTURE WEARERS: A RETROSPECTIVE STUDY-- PalArch's Journal Of Archaeology Of Egypt/Egyptology 17(7), 323-331. ISSN 1567-214x

Keywords: Micro Business Unit, Competitive Strategy, Performance

ABSTRACT:

A complete denture with accurately extended borders, an optimal vertical dimension, finely finished and polished with no irregularities and proper hygiene maintenance are prudent to the success of the denture. Any errors by the clinician or the laboratory may lead to loss of retention in the denture, worn out teeth, joint pain, soreness and others. A retrospective study was done in a university based setting in Saveetha Dental College and Hospital, Chennai, India. Ethical clearance was obtained from SRB Saveetha Dental College, Chennai, India. The data collection was done from the Dental Information Archiving System (DIAS). It is a recording system of all the data related to the medical and dental history of patients and the treatment done in Saveetha Dental College and Hospital, Chennai, India. Data of 86000 patients between June 2019 and March 2020 was reviewed from the patients records and analysed that was documented in Saveetha Dental College and Hospital, Chennai, India. Data of 409 patients with complete denture prosthesis with problems like loss of retention in the denture, worn out teeth, joint pain, soreness and others was analysed. The data entered was tabulated and analysed for the prevalence of these problems. Chi square test done to find any association with age and gender. Statistical analysis was done using SPSS Software for Windows, version 20.0. The prevalence of worn teeth was 33%, that of soreness was 20%, Joint pain was 15%, retention loss was 31% and others was 1%. The association of errors with gender was insignificant whereas association of errors with age was statistically significant ($p < 0.05$). Based on the results it was concluded that complete denture wearers in the age group of 41-60 years have more prevalence of worn out teeth which may be attributed to increased occlusal forces. The age group of 61-80 and >80 years showed increased retention loss which could be due to increased resorption rates as age increases. Soreness could be due to continuous wearing of the denture or if any surface of the denture is left

unpolished, joint pain could be due to an increased vertical dimension. These errors may also be the result of reduced skill as well as lack of communication between the clinician and the technician.

INTRODUCTION

A complete denture is a fixed or removable dental prosthesis that replaces the entire dentition and associated structures of the maxillae or mandible [1]. The success of complete denture prosthesis depends on a lot of factors like operator skill, patient factors, anatomical variation, requirement of pre prosthetic surgery, type of teeth and material used etc [2]. Heat cure acrylic is usually used in the fabrication of the denture whereas the teeth are also made of acrylic [3]. After some years acrylic begins to wear and hence the dentures need to be replaced [4]. Acrylic material has low impact strength and resistance and hence more prone to wear [4,5]. As a result of wearing away of acrylic, the vertical dimension at occlusion is reduced and hence the patient has to overclose every time he bites [6]. This may cause angular cheilitis [7].

Impression making is a highly sensitive procedure and requires skill and technique from the operator [8]. Inability to record the tissues properly will result in a lack of retention, stability and support of complete dentures [9]. This may be attributed to a simple balance i.e. on one side retaining forces and on the other displacing forces [10]. If the latter exceed the former, instability/looseness will arise. This is uncomfortable to the patient. In a similar fashion laboratory errors like unpolished areas of the denture or any sharp areas on the intaglio surface and at the borders will result in soreness and may lead to traumatic ulcer. Painless erythema of mucosa related to support of usually upper dentures may result [11]. Denture-related stomatitis may occur due to ill-fitting denture added with an opportunistic candidal infection or it may be related to iron or folate deficiency [12].

There are several studies in literature regarding the errors in clinical and laboratory steps in the fabrication of a complete denture prosthesis [6,13][14]. It is imperative that a dentist assume the responsibility and initiative in designing and planning complete dentures for their patients. The laboratory technicians are responsible for handling the materials and mechanical details. Dentists are negligent if the laboratory technicians are entrusted with the responsibility for the biologic and physiologic needs of patients. The results of many errors made during the fabrication of a complete denture may not be recognizable when they occur. It is prudent to determine the incidence of failure in complete denture and encourage awareness regarding better training of complete dentures for dentists and technicians. Hence this study aims to determine the prevalence of clinical and laboratory errors in complete denture wearers.

MATERIALS AND METHODS

A retrospective study was done in a university based setting in Saveetha Dental College and Hospital, Chennai, India. Ethical clearance was obtained from SRB Saveetha Dental College, Chennai, India. The data collection was done from the Dental Information Archiving System (DIAS). It is a recording system of all the data related to the medical and dental history of patients and the treatment done in Saveetha Dental College and Hospital, Chennai, India. Data of 86000 patients between June 2019 and March 2020 was reviewed from the patients records and analysed that was documented in Saveetha Dental College and Hospital, Chennai, India. Data of 408 patients with complete denture prosthesis regarding oral mucosal lesions namely epulis fissuratum, angular cheilitis, traumatic ulcers and denture stomatitis was analysed.

The data entered was tabulated and analysed for the prevalence of these oral mucosal lesions. Frequency distribution of different laboratory and clinical errors was determined. Chi square test done to find any association with age and gender.

Statistical analysis was done using SPSS Software for Windows, version 20.0.

Inclusion criteria

1. Patients wearing complete denture
2. Patients wearing single complete dentures.

Exclusion criteria

1. Implant supported bridges
2. Removable partial dentures
3. Patients with systemic complications

RESULTS AND DISCUSSION

Out of the 512 complete denture patients, 52% were males and remaining 48% were females. 90% of the patients were in the age group of 50-75 years. The prevalence of patients coming with worn teeth was 33%, that of soreness was 20%, joint pain was 15%, retention loss was in 31% and others was 1% (figure 1) with a mean and standard deviation of 2.47 ± 1.267 . The association of errors with age was statistically significant ($p < 0.05$) (table 1). It was found that worn out teeth are more common in the age group of 41-60 years (64.9%) whereas loss of retention is more common in the age groups of 61-80 years (43.8%) and above 80 years (47.8%) (figure 2). The association of errors and gender was statistically insignificant (table 2); Chi-square value : 3.356, df : 4, 12, p value : 0.000, however the prevalence of worn out teeth was more in females than males (figure 3).

Worn teeth were found in 33% of the patients. One of the reasons for this could be that acrylic material has low impact strength and hence it is more resistant to wear [15]. Another reason is that usually during their first complete denture patients have high expectations and they try to use their dentures to function as normally as possible as it is difficult for them to adapt to a restricted diet [16]. Patients have a tendency to bite on one side only and this further leads to compromise in function [15,17]. It was found that worn out teeth is more common in the age group of 41-60 years (64.9%). The reason behind this being excessive masticatory load in a younger age group compared to the older age group [18,19].

The prevalence of soreness was 20% among the complete denture wearers. In a study done by Al-Dwairi the prevalence of soreness was reported to be 29.9%, the reason being xerostomia or a dry mouth[20]. Failure to give a balanced occlusion in the complete denture may lead to unbalanced forces causing soreness making the patient uncomfortable[18]. An increased vertical dimension may also lead to soreness. Another reason could be improper hygiene maintenance by the patient.

Joint pain was seen in 15% of the patients. This could be seen either immediately in a few days after insertion of the complete denture or after a few years. If observed immediately there is a chance that the clinician has given an increased vertical dimension in the complete denture or some processing error might have occurred wherein there is expansion of the material leading to a raised VD and failure of the clinician to identify this during insertion[21]. A theory also suggests that a decreased vertical dimension may lead to overclosure of the mandible causing stenitis due to engorgement of the condyle in the auditory canal [22].

In completely edentulous patients, the ridge resorbs at a variable rate depending on various factors. As age increases there is increased resorption hence the ridges become flatter further compromising retention in such cases. There was a significant association of loss of retention in the age group of 61-80 years and above 81 years (table 1). The prevalence of loss of retention was 31% as found from the results of our study. As age increases there is increased risk of osteoporosis and a low immunity leading to metabolic changes causing bone loss and hence compromising retention[23].

In a clinical survey by Juszcyk et al. it was found that out of 803 dental laboratories only 9% scored communication as very good, and only 26% dental students communicated with dental laboratories effectively [24]. Other authors in their study concluded that the main reasons for failure of complete denture prosthesis were laboratory errors. There was a lack of recognition of the errors by the dental team, lack of effective communication and a lack of knowledge by the dentist of technical procedures [24]. There is a need to increase awareness among clinicians and technicians to minimize the errors of complete denture.

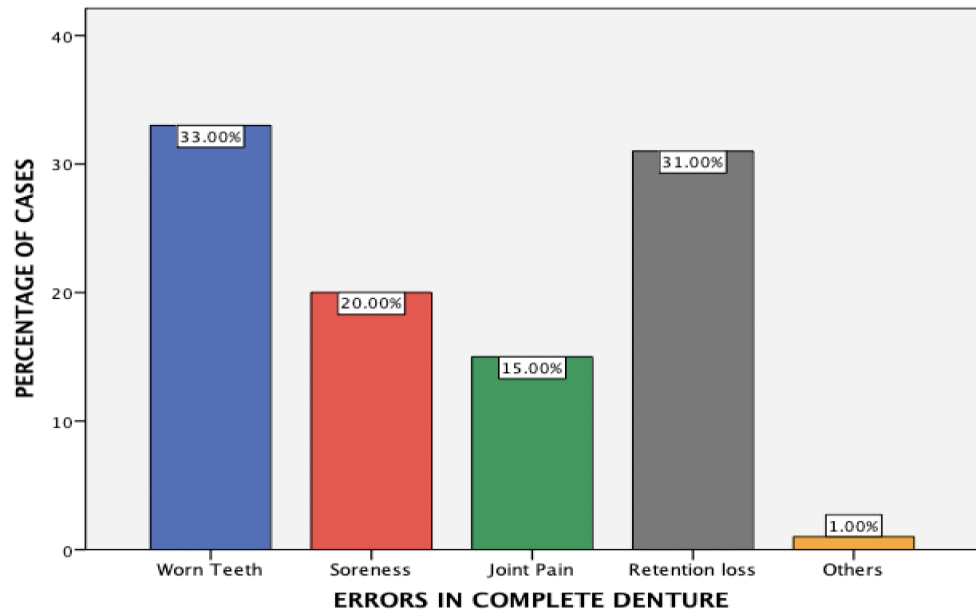


FIGURE 1 : Bar graph showing percentage distribution of clinical and laboratory errors. X-axis represents the errors and Y-axis represents the percentage distribution. Bar graph depicting the frequency of Errors in complete denture patients. X axis represents the errors and Y axis represents the percentage of these errors. The most prevalent is worn teeth (blue color), followed by retention loss (grey), soreness (red), joint pain (green) and others (orange).

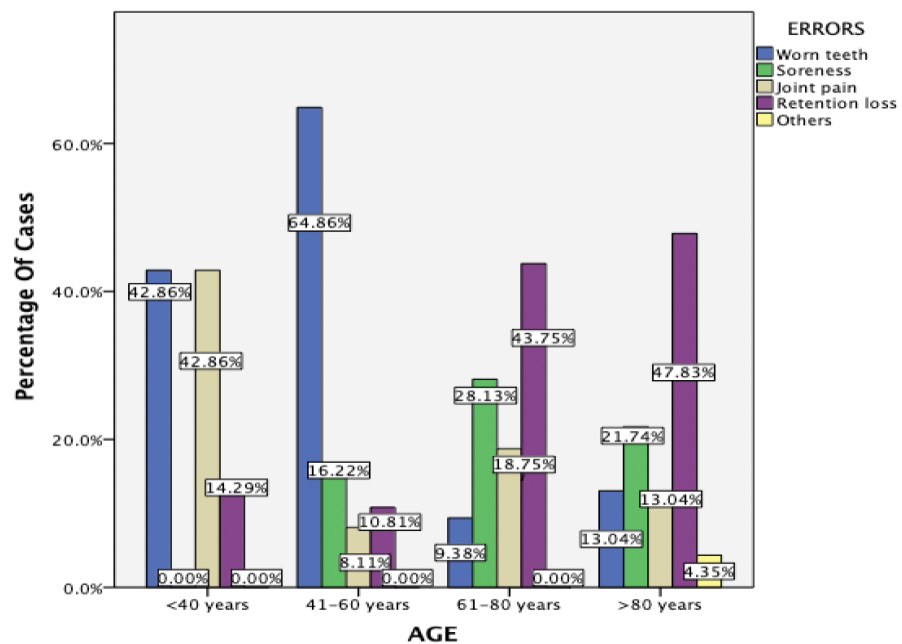


FIGURE 2 : Bar graph showing association of errors in complete denture prosthesis with different age groups. X-axis represents age groups and Y-axis represents the percentage. Blue colour represents worn teeth, green colour represents soreness, cream colour represents joint pain, purple colour

represents retention loss, yellow colour represents others. Chi-square value : 40.179, df : 12, p value :0.000, hence proving worn out teeth are more common in the age group of 41-60 years (64.9%) whereas loss of retention is more common in the age groups of 61-80 years (43.8%) and above 80 years (47.8%).

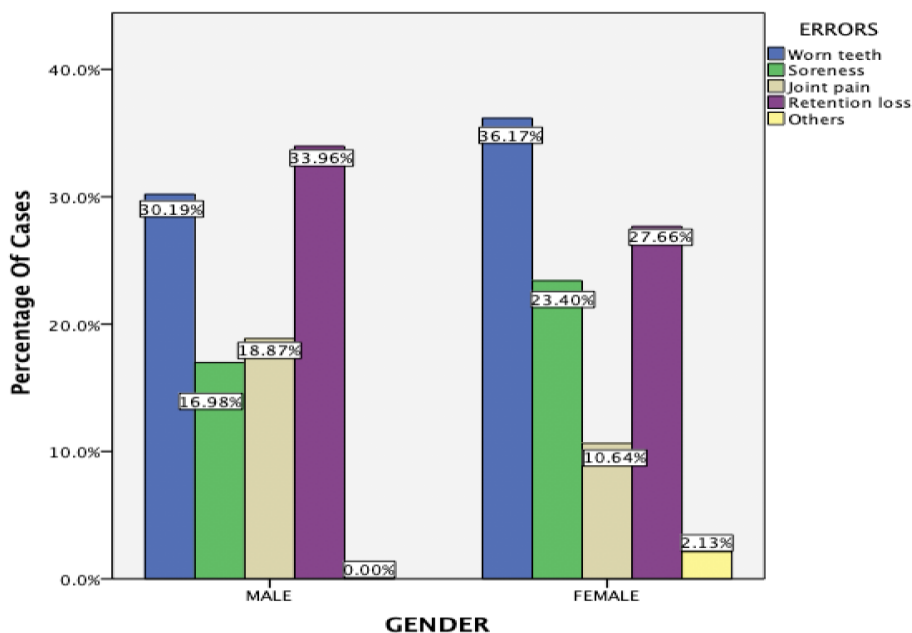


FIGURE 3 : Bar graph showing association of errors in complete denture prosthesis with different age groups. X-axis represents gender and Y-axis represents the percentage. Blue colour represents worn teeth, green colour represents soreness, cream colour represents joint pain, purple colour represents retention loss, yellow colour represents others. Chi-square value : 3.356, df :4 12, p value :0.000, however the prevalence of worn out teeth was more in females than males.

TABLE 1 : Association between errors in complete denture prosthesis with different age groups. There is a significant correlation of errors and age; worn out teeth are more common in the age group of 41-60 years whereas loss of retention is more common in the age groups of 61-80 years (43.8%) and above 80 years .

		AGE				Chi square value	P value
		<40 years	41-60 years	61-80 years	>80 years		
ERRORS	Worn teeth	42.9 %	64.9 %	9.4%	13.0 %	40.179	0.000
	Soreness	0.0%	16.2 %	28.1 %	21.7 %		

	Joint pain	42.9 %	8.1%	18.8 %	13.0 %		
	Retention loss	14.3 %	10.8 %	43.8 %	47.8 %		
	Others	0.0%	0.0%	0.0%	4.3%		

*The chi-square statistic is significant at the 0.05 level.

TABLE 2 : Association between errors in complete denture prosthesis with gender. There is no association between the errors and gender however however the prevalence of worn out teeth was more in females than males.

		GENDER		Chi square value	P value
		MALE	FEMALE		
ERRORS	Worn teeth	30.2%	36.2%	3.356	0.500
	Soreness	17.0%	23.4%		
	Joint pain	18.9%	10.6%		
	Retention loss	34.0%	27.7%		
	Others	0.0%	2.1%		

*The chi-square statistic is significant at the 0.05 level.

CONCLUSION

Based on the results it was concluded that complete denture wearers in the age group of 41-60 years have more prevalence of worn out teeth which may be attributed to increased occlusal forces. The age group of 61-80 and >80 years showed increased retention loss which could be due to increased resorption rates as age increases. Soreness could be due to continuous wearing of the denture or if any surface of the denture is left unpolished, joint pain could be due to an increased vertical dimension. These errors may also be the result of reduced skill as well as lack of communication between the clinician and the technician.

ACKNOWLEDGMENT

We would like to acknowledge Saveetha dental college and hospital for providing complete patient details required for the study purpose and their constant help and support for this research.

AUTHOR CONTRIBUTIONS

First author (Dr. Divya Rupawat) performed the analysis and interpretation and wrote the manuscript. Second author (Dr. Vinay) contributed to

conception, data design, analysis, interpretation and critically revised the manuscript. Both authors have discussed results and revised the manuscript.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise

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