



Prevalence of Diabetes Mellitus Among Complete Denture Patients

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Article History:

Received on: 01 Sep 2020

Revised on: 01 Oct 2020

Accepted on: 06 Oct 2020

Keywords:

Diabetes mellitus,
Edentulous,
Complete Denture,
Neuropathy,
Retinopathy

ABSTRACT

Diabetes Mellitus is one of the most common metabolic disorders with 1.82 times greater risk in edentulous patients than dentate patients. It is associated with complications like neuropathy, nephropathy, retinopathy, cardiovascular problems and periodontitis. They complain of burning sensation of the mouth and multiple ulcerations in the mouth. All these problems contribute to the failure of retention of complete denture. The aim of the study is to find the prevalence of diabetes mellitus in complete denture patients. Case records of 89,000 patients who visited the hospital between June 2019 - April 2020 were retrieved and reviewed. This university setting study involved 351 complete denture patients. Data was tabulated with parameters - name, age, gender, medical history of diabetes or with other systemic diseases. Data was imported to SPSS for statistical analysis. Descriptive statistics and chi-square tests were done. 26.5% of the complete denture patients had diabetes mellitus. Males were found to be slightly more prevalent than females. The most common age group affected was 60-75 years age group. Chi-square test showed no significance between age or gender with diagnosis of diabetes (p-value >0.05). Diabetes mellitus is associated directly with edentulism with 26.5% of prevalence with this disease. The most common age group prevalent was in the age group of 60-75 years and commonly seen in males.

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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11iSPL3.3375>

Production and Hosted by

IJRPS | <https://ijrps.com>

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INTRODUCTION

Edentulism is defined as the loss of all the permanent teeth. This is due to a multi factorial pro-

cess involving caries, periodontal health, trauma, oral cancer etc ([The Journal of Prosthetic Dentistry, 2005](#)). According to a report by the World Health Education in 2005, 26% of the inhabitants aged 65-69 years were completely edentulous ([Petersen and Yamamoto, 2005](#)). Maintenance of oral health and prevention of these oral diseases is associated with systemic health ([Firoozmand et al., 2001](#)). It has been said that there is 1.82 times greater risk of having diabetes in edentulous patients than dentate patients ([Felton, 2009](#)).

Diabetes mellitus is associated with an imbalance in carbohydrate, protein and lipid levels and complications like retinopathy, nephropathy, neuropathy, macrovascular complications, impaired wound healing and periodontitis ([Varon and Mack-](#)

Shipman, 2000; Vernillo, 2001). Patients who are completely edentulous often have complaints due to errors in denture fabrication or while recording impressions. Pre machined components and equipment generally tend to reduce the risk of mechanical complications (Duraisamy *et al.*, 2019; Ajay *et al.*, 2017). Patients complain of burning mouth sensation, dry lips, altered taste and denture stomatitis and ulceration (Moore *et al.*, 2007). They have poor glycemic control because of the imbalance in insulin levels or absolute deficiency of insulin (Vitkov *et al.*, 2003). There is a lack of adaptation and stability of the prosthesis because of the increase in the osteoclastic activity of bone tissue in the upper and lower jaw (Sennerby *et al.*, 1988). They are more at risk of osteoporosis and other bone related disorders as well (Klemetti *et al.*, 1994). Aloe vera possesses moisturizing properties producing collagen and elastin fibres which allows regenerative changes to occur. It also helps in reducing inflammation (Subasree *et al.*, 2016). Apart from this, patients sometimes suffer with other systemic diseases along with diabetes mellitus.

Hypertension, asthma, hypothyroidism or hyperthyroidism, hematological disorders, immunological disorders are some systemic diseases which patients generally suffer from alongside diabetes mellitus (Heartwell, 1970; Vijayalakshmi and Ganapathy, 2016; Selvan and Ganapathy, 2016). Decrease in retention of the denture is due to lack of wettability, surface tension and muscular control (Ajay *et al.*, 2017; Ashok *et al.*, 2014; Muddugangadhar *et al.*, 2015). A very common sequel of complete denture wearers is the residual ridge resorption because of reduced blood supply and change in the functional stimulus of the bone tissue (Devaki *et al.*, 2012). Furthermore, the prevalence of RRR is higher in women due to osteoporotic changes in the bone (Singhal *et al.*, 2012). All these effects pave the way for poor oral hygiene, aesthetics with lack of stabilisation of occlusion and masticatory efficiency leading to failure of the complete denture. Other alternatives, like implants can be adopted as the scope for dental implants is increasing, and it overcomes major prosthetic complications. (Ganapathy *et al.*, 2017) Thus, it is very important to bring awareness (Ashok and Suvitha, 2016), acquire more knowledge and impart the same to the patients for proper maintenance of the denture and prevent complications which are systemically related.

The aim of the study was to assess the prevalence of diabetes mellitus along with age and gender analysis in complete denture patients. It is also to assess the susceptibility of other systemic diseases, along with

diabetes mellitus among CD patients.

MATERIALS AND METHODOLOGY

Study Setting

This is a retrospective study regarding completely edentulous patients who have visited Saveetha Dental College and Hospitals in between June 2019-April 2020. The approval for this university setting study was obtained from the Institutional Ethics Board. The sample size for this study was 351 complete denture patients in which the sampling bias was minimised by verification with photographs. The study was reviewed by two reviewers and was cross-verified. Inclusion Criteria - Completely edentulous patients, patients with a complete denture. Exclusion Criteria- patients who weren't cooperative, incomplete record In the Record System.

Data Collection and Tabulation

The case records of 89,000 patients were retrieved and reviewed for the analysis. The data of these complete denture patients were analysed and tabulated. It included information/ parameters - Name of the patient, Age, Gender, diagnosis of Diabetes/ diabetes along with any other systemic diseases/ Non-Diabetic. The patients were grouped into 4 on the basis of age as - 30-45, 46-59, 60-75, above 75 years.

Statistical Analysis

After further verification of data by an external reviewer, it was imported to the SPSS software by IBM for statistical analysis. Percentages, mean, Standard deviation, frequency of parameters were employed in the analysis. Chi-square test was used to detect the significance between age, gender and diagnosis of diabetes/with other systemic disease. p-value less than 0.05 was considered to be statistically significant.

RESULTS AND DISCUSSION

The data collected and imported to SPSS software was used for descriptive statistics. The total sample size of the patients was 351. Gender distribution revealed that 201 patients were male and 150 were females (Table 1). Out of total 351 complete denture patients, there were 93 patients who had diabetes mellitus out of which 18 patients suffered from diabetes along with other systemic diseases (Table 3). Maximum number of edentulous patients were seen in the age group 60-75 years (Table 2). Chi-square tests for association of age/gender with a diagnosis of diabetes showed no significance (p-value > 0.05)(Tables 4 and 5). It revealed that 48

were males and 45 were females and the most common age group was 60-75 among the people who had diabetes. The following are the tables and bar graphs.



Figure 1: This graph represents the frequency of gender distribution of Complete Denture patients.

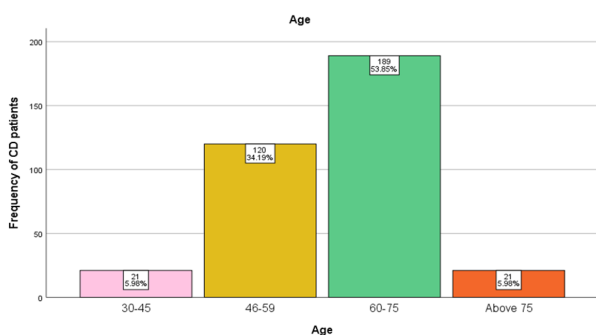


Figure 2: This graph represents the frequency distribution of age groups of complete denture patients.

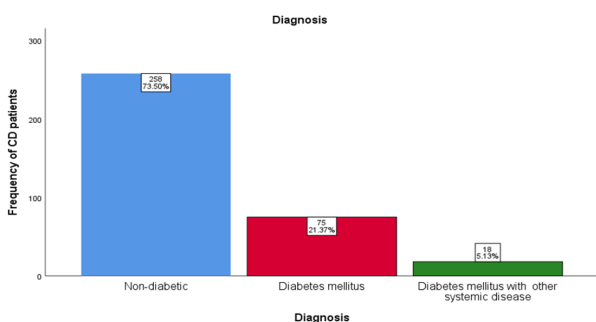


Figure 3: This graph represents the prevalence of complete denture patients with Diabetes Mellitus and diabetes mellitus with systemic diseases.

Patients undergoing treatment for complete dentures always expect that comfort, function and esthetics will be restored. Harmonious appearance and efficiency are considered to be secondary when

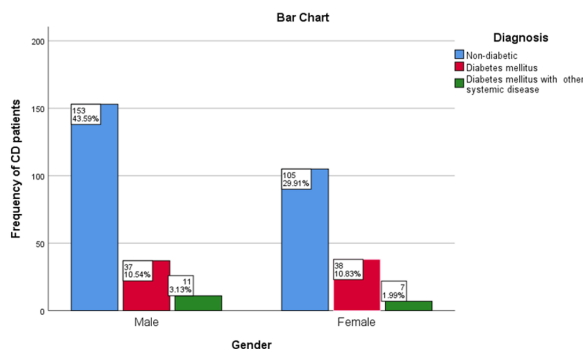


Figure 4: This graph represents the association of gender and diagnosis.

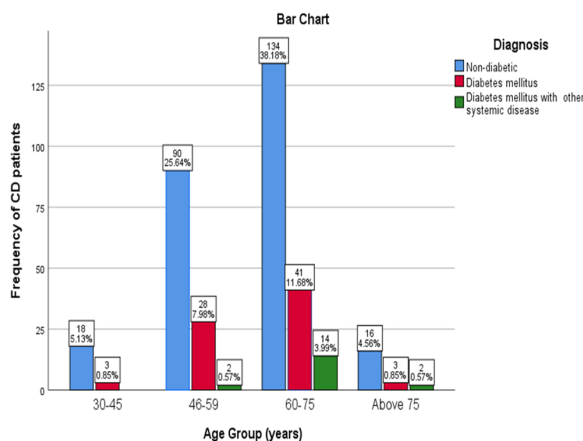


Figure 5: This graph represents the association of age and frequency of CD patients.

compared to comfort (Jain et al., 2019; Kannan and Venugopalan, 2018). The above results show association between certain parameters, its significant value and descriptive statistics showing frequency and percentages. It is observed that 26.5% of the complete denture patients gave a history of diabetes mellitus, as shown in Table 3. The proportion of patients who are completely edentulous are higher in men. This was in concordance with a study done previously (Samaila et al., 2013). Another study showed a contradicting result in men : women ratio of completely edentulous patients as 1:4 (Carr et al., 1993; Kotkin, 1985; Marcus et al., 1996). The result of our study justifies and reasons out as men tend to lose their teeth more readily. This might be because of poor maintenance of oral hygiene, periodontal health, stress, habits like alcohol and smoking in males (Oliver and Tervonen, 1993; Palmer, 1988; Sakki et al., 1995). Whereas, females are more conscious and concerned about their health and appearance. Removable prosthetic dentures are always prone to more plaque formation, which explains its need for high maintenance and care (Ganapathy et al., 2016; Jyothi et al., 2017).

Table 1: This table shows the frequency and percentage of the gender distribution of Complete Denture patients. It shows that the prevalence of Male (57.3%) is more than Female (42.7%).

Gender	Frequency	Percentage (%)
Male	201	57.3
Female	150	42.7
Total	351	100.0

Table 2: This table shows the frequency and percentage distribution of age groups of complete denture patients. Complete denture treatment is most common in the age group 60-75 years (53.8%).

Age (years)	Frequency	Percentage (%)
30-45	21	6.0
46-59	120	34.2
60-75	189	53.8
Above 75	21	6.0
Total	351	100.0

Table 3: Prevalence of Diabetes mellitus and diabetes mellitus with systemic diseases among CD patients.

	Frequency	Percentage (%)
Non- Diabetic	258	73.5
Diabetes Mellitus	75	21.4
Diabetes Mellitus with other systemic disorder	18	5.1
Total	351	100.0

Table 4: Association of Gender and Diagnosis

		Diagnosis			Total
		Non- Diabetic	Diabetes Mellitus	Diabetes Mellitus with other systemic disorder	
Gender	Male	153 (43.59%)	37 (10.54%)	11 (3.13%)	201
	Female	105 (29.91%)	38 (10.83%)	7 (1.99%)	150
	Total	258	75	18	351
Pearson Chi-square - Asymptotic significance - 0.290					

Table 5: Association of Age (years) & Diagnosis

		Diagnosis			Total
		Non-diabetic	Diabetes Mellitus	Diabetes Mellitus with other systemic disorder	
Age	30-45	18	3	0	21
	46- 59	90	28	2	120
	60-75	134	41	14	189
	Above 75	16	3	2	21
	Total	258	75	18	351
Pearson Chi-square - Asymptotic significance - 0.207					

Figure 1 Grey colour denotes Male and Yellow denotes females. The graph shows that the prevalence of Male (57.3%) is more than Female (42.7%). X-axis denotes gender and Y-axis denotes the frequency of CD patients. Figure 2 Pink colour denotes patients in the age group 30-45 years, mustard colour denotes 46-59 years, light green colour denotes 60-75 years and orange colour denotes patients above 75 years of age group. The 60-75 years age group shows the highest prevalence of complete denture patients (53.8%) and least is 30-45 years and above 75 years age group (6%). X-axis denotes the Age (years) and Y-axis denotes the frequency of CD patients. Figure 3 Blue colour denotes non-diabetic patients, red colour denotes diabetic patients and dark green colour denotes patients who have diabetes mellitus along with other systemic disease. The graph shows that most of the patients (73.5%) did not suffer from diabetes mellitus, 21.4% had diabetes mellitus and 5.1% had diabetes mellitus with other systemic disease. X-axis denotes the Diagnosis, Y-axis denotes the frequency of CD patients. Figure 4 Blue colour denotes non-diabetic CD patients, red colour denotes CD patients with diabetes mellitus and dark green colour denotes CD patients who have diabetes along with other systemic disease. Prevalence of non-diabetic and diabetic male CD patients was higher than the same female category. However, this is statistically not significant (Chi-square test; p-value - 0.290 (> 0.05) not significant). X-axis denotes gender and Y-axis denotes the frequency of CD patients. Figure 5 Blue colour denotes non-diabetic patients, red colour denotes patients with diabetes mellitus and dark green colour denotes patients who have diabetes along with other systemic disease. The age group 60-75 years show a higher prevalence of diabetes mellitus (11.68%) and also with other systemic diseases (3.99%). The graph also shows a drastic decrease in the prevalence of diabetes (0.85%) in the age group of above 75 years. However, this is statistically not significant (Chi-square test; p-value - 0.207 (> 0.05) not significant). X-axis denotes the different age groups - 30-45, 46-59, 60-75, above 75 years; Y-axis denotes the frequency of diabetes mellitus in complete denture patients.

The most common age group of high prevalence of diabetes mellitus was found to be 60-75 years. It was found that few of the patients suffered from other systemic diseases like hypertension, renal disorders, asthma, thyroid disorders along with diabetes mellitus. Prognosis of the treatment, occlusal instability, cost, kind of treatment offered, post-treatment maintenance are all influenced by the

systemic status of the patient (Venugopalan *et al.*, 2014). Brunello *et al.* also observed a higher prevalence in this age group with a mean of 68.7 years (Brunello and Mandikos, 1998). It is also seen that few young patients are completely edentulous, which possibly is because of maintenance of oral hygiene, diet control is not very consistent among them (Basha *et al.*, 2018). Figures 4 and 5 shows the association of age/gender with the disorder. Table 4 shows that there is no significant relationship between gender and diagnosis of diabetes mellitus (p-value > 0.05)

The ratio of prevalence of only diabetes between males and females was almost equal, but males were more in number of other systemic diseases along with diabetes mellitus. Evidence has been suggested that edentulous older men have 4.06 times greater risk of developing non insulin dependent diabetes mellitus regardless of their age or race (Cleary and Hutton, 1995). The association of age and disorder in Figure 5 shows that the prevalence of diabetes kept increasing as age increased from 30 to 60 years. 60-75 years of age group were found to be the most prone to diabetes and other systemic diseases as well. Older patients often find it difficult to adapt to new dentures because of xerostomia, atrophy of ridges and mucosa and other conditions associated (Marcus *et al.*, 1996). Patients with insulin dependent diabetes mellitus and poorly controlled did not survive to an advanced age (Xie and Ainamo, 1999). This is in support of the study, which proves less prevalence of patients above 75 years.

In Table 3, shows the frequency and percentage distribution of diagnosis of Diabetes Mellitus or diabetes mellitus along with other systemic diseases. 26.5% of the complete denture patients are found to be diabetic.

In Table 4, shows the association between gender and diagnosis of diabetes mellitus - Chi-square test - statistically not significant - p-value > 0.05

In Table 5, shows the association of age and diagnosis of diabetes mellitus - Chi-square test - Insignificant relation (p-value > 0.05).

The limitations of the study include its small sample size, it is self-centered, and information was acquired retrospectively from patients case records. Therefore, it is a necessity to extend the research with a larger population and build more scope for more in future. Increased awareness on the risk of diabetes and various complications in edentulous or complete denture patients is required. Effective management and implementation to prevent complications and failure of complete dentures is the need!

CONCLUSION

Within the limitations of the present study, it is concluded that there is no significant correlation between age, gender and diabetes mellitus among complete denture patients. 26.5% of the completely edentulous patients were diabetic and few associated with other systemic diseases along with diabetes. The male prevalence of patients suffering from the disease was higher than the females by a small margin. The most affected age group is in the range of 60-75 years. More extensive research and awareness to reduce the risk of diabetes mellitus and its complications among complete denture patients should be encouraged.

Conflict of interest

The authors declare that they have no conflict of interest for this study.

Funding support

The authors declare that they have no funding support for this study.

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