

Association between complete edentulism and comorbid disorders among Libyan adults aged 35 years and older attending the removable prosthodontic department

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How to Cite

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Annali Di Stomatologia, 16(3), 234-239.

<https://doi.org/10.59987/ads/2025.3.234-239>

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Abstract

Background: Various systemic diseases play an important role in selecting treatment options in dentistry. Most procedures in removable prosthodontics need good systemic health or a well-balanced systemic situation. The main objective of this retrospective, cross-sectional study is to investigate the prevalence of systemic disorders among Libyan completely edentulous patients aged 35 years and older attending the removable prosthodontic department at the Faculty of Dentistry, University of Benghazi, Libya. **Materials and methods:** 1317 completely edentulous patients' case sheets were reviewed, and 417 were chosen. Non-Libyan, healthy patients, patients with significant mental retardation, and HIV positive patients were excluded. **Results:** In our study, it was found that male participants were affected more than females. Patients with diabetes mellitus account for 90.5%, 72.5% account for patients with hypertension, 38.5%, 31.5%, and 31.2% account for rheumatoid arthritis, cardiovascular problems, and liver diseases, respectively. Out of the included participants, 28% were suffering from cancer, 19.7% accounted for renal issues, and 16.7% accounted for rheumatoid fever. A minority of participants (6.3%) reported having epilepsy. **Conclusion:** The current study, conducted in a representative sample of Libyan edentulous adults, suggests an association exists between tooth loss and harmful systemic disorders.

Key Words: completely edentulous, systemic diseases, tooth loss, oral health

Introduction

Complete edentulism is defined as the absence of all permanent teeth. Tooth loss results from various factors that vary by gender, age, education, socioeconomic status, race, and geographic region.¹ Tooth loss can be a marker of oral health and other diseases in the body and, consequently, an indicator of accelerated aging.² Previous observational studies show that missing teeth can be linked to many adverse health effects, including ischemic heart disease,³ angina pectoris,³ peripheral vascular diseases,⁴ cognitive impairment,⁵ stroke,⁶ heart failure,⁶ diabetes mellitus, high blood pressure,^{7,8} cancer⁹ and the onset of disability and reduced mobility in old age.² According to the World Health Organization (WHO), fully edentulous patients meet the criteria for being physically impaired, disabled, and handicapped.^{10,11} Furthermore, global oral health goals recommended by the WHO state that there should be an increase in the proportion of individuals aged 35–44 and 65–74 years who have functional dentitions of at least 21

natural teeth.¹² A comorbidity is one or more disorders that coexist with a primary disease or disorder, such as complete edentulism. The relationship between the primary condition and comorbidities can significantly impact an individual's overall health.¹³

The main goal of this study is to determine the prevalence of systemic diseases in fully edentulous patients attending the Removable Prosthodontic Department at Benghazi University's Dental Faculty.

Materials and methods

The study was a retrospective, cross-sectional, and longitudinal investigation. Data were collected from the records of completely edentulous patients in the removable prosthodontic department at Benghazi University's Dental Faculty by reviewing 1317 patient files. Of these, 417 records were selected, while 900 were excluded because 493 were healthy, 343 had incomplete information in their history sheets, and 59 were not Libyan. The data spanned from May 2018 to December 2023. The Scientific Research Ethics Committee of the Dental Faculty at Benghazi University ethically approved the study (Approval No: 0247). Inclusion criteria included Libyan patients who were fully edentulous and needed removable complete dentures, of both genders, aged 35 and older. Non-Libyan patients, healthy individuals, patients with severe mental retardation, and HIV-positive patients were excluded.

Bio-statistical data analysis

The data was analyzed using IBM Corporation's Statistical Package for the Social Sciences software version 20, based in Chicago. Descriptive statistics were summarized with frequencies and percentages. Differences in proportions were assessed using the Chi-square test. All statistical analyses were performed at a significance level of $P < 0.05$.

Results

The collected data were imported into Social Science software version 20, provided by IBM Corporation, for descriptive statistics. The total sample size was 417.

Gender distribution showed that 132 patients (31.8%) were female and 285 patients (68.2%) were male, which was significantly higher (Chi-Square 56.317) ($P = 0.00001$). Furthermore, the highest number of edentulous patients was seen in the age group above 65 years, with 175 patients (41.9%), while the fewest were in the 35-45 age group—Table 1 & Figure 1.

Table 2 and Figure 2 show that most participants had diabetes, with 377 patients (90.5%), including 265 males and 112 females. The number and percentage of individuals with hypertension were 302 (72.5%) patients, consisting of 205 males and 97 females. Among the total, 158 (38%), 131 (31.5%), and 130 (31.2%) patients had rheumatoid arthritis (RA), cardiovascular diseases (CVD), and liver diseases, respectively. Additionally, 116 (28%) patients had cancer. Table 2 also reports a small percentage of individuals with renal problems (19.7%) and rheumatoid fever (16.7%), and a minority of participants (6.3%) reported having epilepsy.

Discussion

Evaluation of patients, including accurate diagnosis and suitable treatment planning, is crucial for successful complete denture therapy. Many patients seeking complete dentures have underlying health issues. Various systemic diseases can affect the tissues supporting the prosthesis, influencing treatment outcomes.¹⁴ The connection between tooth loss and other systemic conditions is complex (comorbid conditions). Comorbidity refers to the presence of one or more additional diseases or disorders alongside the primary condition (in our study, complete edentulism).¹⁵ In this study, about 37% of patients did not have systemic diseases. Additionally, systemic diseases were more common among male participants than females (68.2% versus 31.8%), consistent with prior research.^{7,16} This may be linked to poor oral hygiene, stress, and habits like smoking. A small percentage of young patients (11.7%) are completely edentulous, possibly due to better oral hygiene. The most common systemic disease in our study was diabetes mellitus, found in 90.5% of participants with systemic conditions. Diabetes can lead to abscesses, periodontal damage, and alveolar bone loss, often making denture adaptation

Table 1. Frequency and percentage of gender and age groups of completely edentulous patients

Personal History		Frequency(%)		Total	Chi-square	P-value	Significances
Males(%)		Females(%)		Incidences(%)			
Gender		285(68.2)	132(31.8)	417(100)	56.137*	<0.00001	Significant
Age group	35-45	42(10)	7(1.7)	49(11.7)			
	45-55	52(12.6)	13(3.2)	65(15.8)			
	55-65	83(19.9)	45(10.7)	128(30.6)			
	Above 65	108(25.8)	67(16.1)	175(41.9)			

* Significant, $p < 0.05$

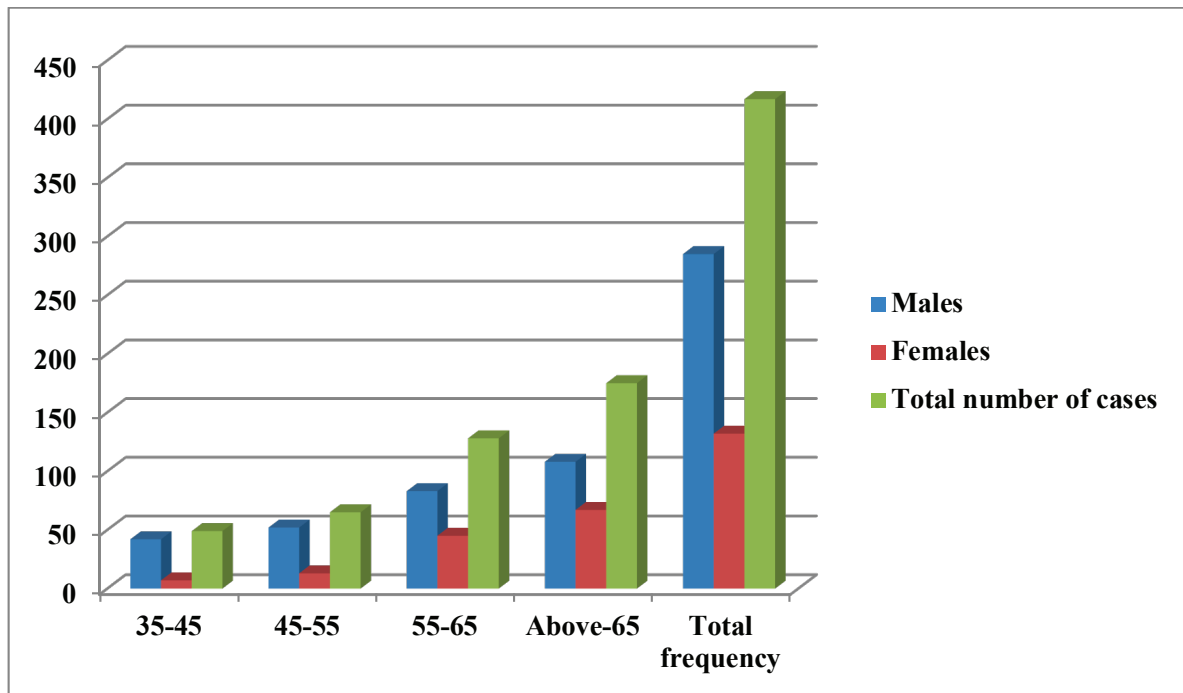


Figure 1. Frequency and distribution of gender and age groups of completely edentulous patients.

Table 2. The frequency and percentage of systemic disorders within completely edentulous patients

Medical illness						
	Males (N)		Females (N)		Total (N%)	
	Yes	No	Yes	No	Yes	No
Under medical care	285	0	132	0	417(100)	0
Diabetes Mellitus	265	20	112	20	377(90.5)	40(9.5)
Hypertension	205	80	97	35	302(72.5)	115(27.5)
Cardic problems	78	207	53	79	131(31.5)	286(68.5)
Rheumatoid arthritis (RA)	83	202	75	57	158(38)	259(62)
Liver diseases	73	212	57	75	130(31.2)	287(68.8)
Cancer	48	227	68	64	116(28)	301(72)
Kidney diseases / Renal problems	37	248	45	87	82(19.7)	335(80.3)
Rheumatic fever	55	230	15	117	70(16.7)	347(83.2)
Epilepsy	17	268	9	123	26(6.3)	391(93.7)
Total	285(68.2)		132(31.8)		417(100)	
Chi-square	8466.6139 ^a					
P-value	<0.0001					
Statistic significance	Significant					

* Significant, $p < 0.05$

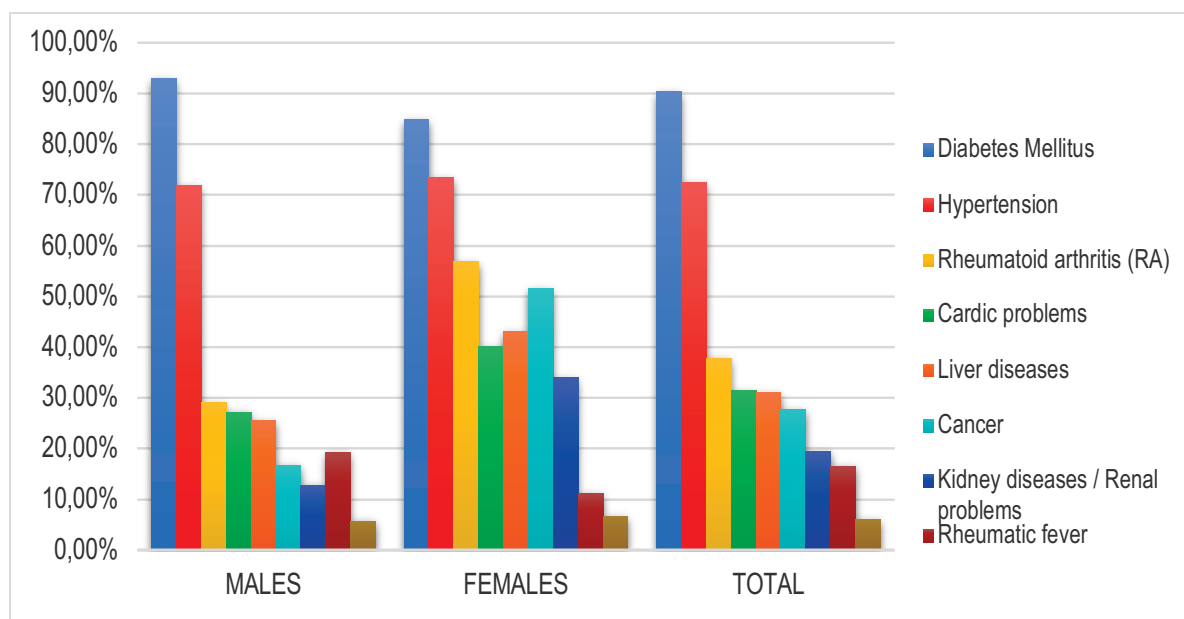


Figure 2. The percentage of systemic disorders within completely edentulous patients

more challenging.^{17,18} The prevalence of hypertension and cardiovascular diseases (CVD) was 72.5% and 31.5%, respectively. Tooth loss is associated with an increased risk of cardiovascular events through multiple pathways. Chronic oral infections such as periodontal disease can contribute to carotid artery plaque formation, endothelial dysfunction, and hypertension.¹⁹⁻²¹ Another pathway involves confounding factors like diabetes and smoking, which also link tooth loss to vascular diseases.^{22,23} Dietary quality and nutrient intake, affected by tooth loss, may further elevate vascular disease risk.²⁴⁻²⁶ In our study, 38% of participants had rheumatoid arthritis (RA), a systemic inflammatory disease affecting multiple joints. Previous studies show RA patients are 2.27 times more likely to be edentulous.²⁷ Another study identified a significant increase in RA risk among completely edentulous patients compared to those who lost fewer than five teeth. However, a direct link between edentulism and RA has not been definitively confirmed.¹⁵ The proportion of participants with liver disease was 31.2%, mainly due to periodontal issues. Bacteria such as *Porphyromonas gingivalis* and *Fusobacterium nucleatum* are associated with liver conditions.²⁹ Liver dysfunction can also worsen oral pathology.³⁰ Recent research suggests moderate to severe periodontitis raises the risk of liver fibrosis, liver disease, and liver cancer.^{31,32} Other studies report higher rates of non-alcoholic fatty liver disease (NAFLD) and NASH in patients with advanced periodontitis.^{33,34} Tooth loss impacts overall health-related quality of life and increases the risk of cancers in the oral cavity, esophagus, pancreas, stomach, lungs, and gallbladder.³⁵⁻³⁹ In our study, 28% of participants had cancer. A meta-analysis of eleven case-control and one cohort study showed an 89% increased risk of head and neck cancer (HNC) in individuals with more than 20 teeth, indicating tooth loss as a significant risk factor.⁴⁰ Possible mechanisms linking tooth loss

to esophageal and gastric cancers include swallowing poorly chewed food that irritates the esophagus and the overgrowth of oral bacteria producing carcinogenic nitrosamines, which enter the gastrointestinal tract during swallowing.^{41,42} Chronic kidney disease (CKD) is a progressive disorder characterized by decreased kidney function.⁴³ Hemodialysis helps remove harmful substances accumulated due to CKD.⁴³ Oral problems common in CKD patients include dry mouth, candida infection, periodontal disease, cavities, and often, premature or complete tooth loss.⁴⁴ A 2014 review indicated that one in five CKD patients is completely edentulous.⁴⁴ Our findings align with previous studies, showing a 22% prevalence of edentulism among CKD patients aged 32 to 86.^{45,46} High psychological stress and limited access to dental care contribute to these issues. Many dialysis patients seek urgent dental treatments, often opting for extractions due to cost and practicality.⁴⁶ Some dentists may refuse treatment due to concerns over systemic complications, further limiting dental visits among CKD patients.⁴⁷ In our study, 16.7% had rheumatic fever, likely related to high rates of rampant dental caries, gingivitis, and bacterial gum infections.^{48,49} Lastly, 6.3% of participants had epilepsy. Patients with epilepsy are more vulnerable to early tooth loss and edentulism because seizures increase injury risk to teeth and jaws, and anti-epileptic drugs can cause gingival hyperplasia and periodontal issues.⁵³ Additionally, many anti-epileptic medications worsen dry mouth and increase cavity risk.^{52,54} Dental practitioners often prefer tooth extractions over extensive treatments for epileptic patients to avoid complications, which contributes to higher rates of edentulism in this group.

Conclusion

The results of this study on a representative sample of Libyan adults support the link between systemic

disorders and/or their medications and edentulism. Diabetes mellitus and hypertension were the most common conditions (90.5% and 72.5%, respectively), with male patients primarily affected compared to females. Additionally, it emphasizes the importance of educating caregivers and patients about the complications of systemic diseases, their side effects on oral health, and the serious, long-term, and harmful effects of tooth extraction.

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