

Prevalence of systemic diseases in 82,363 patients at a dental school in San Luis Potosí, Mexico: A cross-sectional study

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Abstract

Background. The prevalence of medically compromised patients seeking dental care varies across different countries. There have been no published reports about this clinical topic in Mexico.

Objectives. We aimed to determine the prevalence of systemic diseases in patients who attended the Diagnostic Clinic at the Faculty of Dentistry of the Autonomous University of San Luis Potosí in Mexico from 2011 to 2019.

Material and methods. The study was based on the analysis of electronic files from 82,363 medically compromised patients registered in the clinic during the aforementioned period. Each file was entered into an electronic medical record using the Microsoft Visual Basic.NET software and completed by an undergraduate student based on a personal interview. The collected information was then analyzed with the use of Stata 14 statistical package.

Results. The global prevalence of medically compromised patients among the patient population was 39.1%. Comorbidities were more prevalent in female patients (71.9%) compared to male patients (28.1%). The most prevalent diseases in adults were gastrointestinal diseases (16.5%), arterial hypertension (14.1%) and diabetes mellitus (8.6%).

Conclusions. In a third of the registered cases, an associated comorbidity was identified. It is therefore necessary for dental undergraduate students to receive comprehensive training during their academic formation to facilitate the timely and accurate diagnosis of systemic diseases, as part of the dental care protocol for adult patients.

Keywords: prevalence, dental care, systemic diseases, school setting

Cite as

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Highlights

- The detection of systemic diseases in dental patients is essential to ensure comprehensive and safe care.
- A third of registered dental patients report having at least one comorbidity, with a higher prevalence in women.
- The high incidence of gastrointestinal diseases in dental patients in Mexico enables clinicians to investigate dietary habits, make oral diagnoses and develop comprehensive treatment plans.

Introduction

On a global scale, there has been an observed increase in the number of elderly individuals with compromised medical conditions, largely attributable to the improved socioeconomic status, enhanced access to healthcare facilities and advancements in medical technology. These factors have contributed to an increase in life expectancy.^{1–3} The prevalence of systemic diseases among dental patients in different countries has been previously reported.^{4,5} Diverse epidemiological studies have provided essential information, facilitating an extensive understanding of the medical profile of the patients seeking dental treatment. During the initial diagnostic process, it is crucial to detect the most common clinical systemic conditions to ensure that dental care protocols for medically compromised patients are safe and adequate.² Clinicians must be aware of the effects of medical conditions and their interactions as part of the dental treatment plan.^{6,7} Moreover, it is important to acknowledge that a significant proportion of the global population, particularly in developing countries, does not receive routine medical checkups. This indicates that patients with asymptomatic diseases may remain unaware of their systemic health status.^{8,9}

Given the potential for systemic diseases to manifest through oral symptoms, dental care professionals have the capacity to detect some signs suggestive of comorbidities through oral examination. For example, it has been demonstrated that periodontal disease has a substantial impact on an individual's general health and well-being.¹⁰ The etiology of this multifactorial disease is believed to involve a host–microbial interaction in dysbiosis, leading to tissue degradation and an increase in gum permeability (leaky gum) associated with chronic periodontitis.¹¹ Its prevalence ranges from 20% to 50% worldwide, and one of its etiological processes is a persistent inflammatory response triggered by various mediators. Furthermore, a number of systemic disorders have been associated with the microbial spread that occurs during periodontal infections.^{12,13} Recent studies have identified a correlation between infectious oral diseases, such as periodontal disease, and chronic degenerative conditions, cardiovascular diseases, and autoimmune diseases.¹⁴ In a recent study, Lanau et al. reported that patients with moderate to severe periodontitis had a threefold increased risk of elevated blood pressure measurements.¹³

To the best of our knowledge, there is only 1 published broad epidemiological study on the subject.⁴ Dhanuthai et al. reported the prevalence of compromised medical conditions in 58,317 patients seeking dental treatment at the Faculty of Dentistry in Chulalongkorn University, Bangkok, Thailand, from 2002 to 2004.⁴ To date, no previous epidemiological reports have been conducted on the systemic medical conditions present in adult patients attending a university or private dental clinic in Mexico. Thus, the present study aimed to determine the prevalence of systemic diseases among 82,363 dental school patients residing in San Luis Potosí, Mexico, from 2011 to 2019.

Material and methods

Study design and ethical considerations

The present cross-sectional study was conducted based on the electronic medical histories of patients registered at the Diagnostic Clinic at the Faculty of Dentistry of the Autonomous University of San Luis Potosí, Mexico, from February 2011 to October 2019. The study adhered to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines¹⁵ and considered several methodological aspects of similar investigations on disease prevalence that have been recently published.^{13,16} Only complete files were reviewed for demographic information and the occurrence of self-reported systemic diseases. The study included the electronic clinical histories of adult patients (aged ≥ 18 years) who provided their complete medical information in accordance with the Official Mexican Standard NOM-004-SSA3-2012. The data of the patients was recorded with the use of Microsoft Visual Basic.NET software, v. 16.0 (Microsoft Corporation, Redmond, USA). The present study involved minimal risk for the participants and was conducted in accordance with the Declaration of Helsinki principles. All personal information was handled anonymously and confidentially. The exported data did not include the patient's name and address or any other type of personal information. The study protocol was previously reviewed and approved by the Faculty of Dentistry's Ethics and Investigation Committee (CEI-FE-026-021).

San Luis Potosí is a city located in the central region of Mexico, with an estimated population of 2,000,000

people. The Faculty of Dentistry at the Autonomous University of San Luis Potosí primarily serves patients from low socioeconomic strata who do not have access to private dental care. During their initial visit, patients are registered in the diagnostic clinic for a complete oral and medical examination. Undergraduate fifth-year dental students receive adequate training in conducting comprehensive clinical histories obtained through direct interviews as part of their academic curriculum. During this process, students are taught to collect information about systemic diseases, which are classified into 12 categories: gastrointestinal diseases; arterial hypertension; diabetes mellitus; psychiatric disorders; renal diseases; thyroid disorders; neurological disorders; cardiovascular diseases; cancer; sexually transmitted diseases; tuberculosis; and typhoid fever. In instances where a positive answer is obtained, the students inquire further about the medical condition and its management to establish whether any modifications to the dental treatment plan are required. Afterward, the digital signature of the patient is obtained to confirm the accuracy of the provided data. Finally, when the clinical history is completed, the patient undergoes an examination by the responsible physician. The record is then electronically stored until its subsequent use.

In accordance with the recommendations of the World Health Organization (WHO),¹⁷ the extracted data from the clinical histories was categorized into 7 age groups (18–29, 30–39, 40–49, 50–59, 60–69, 70–79, and ≥80 years) to describe the demographic characteristics and systemic disease prevalence per group. Furthermore, we registered supplementary data concerning the primary motivations for seeking dental care, encompassing education level, type of settlement, body mass index (BMI), tobacco and/or alcohol consumption, and illegal drug use.

Statistical analysis

The data was described and summarized using the mean (*M*), standard deviation (*SD*), ranges, frequencies, percentages, and confidence intervals (*CI*s). For the purpose of inferential statistics, the study population was categorized according to the age group and compared by sex using the Mann–Whitney non-parametric test for continuous variables. The χ^2 test was used to evaluate the differences among categorical variables determined by patients' age. The data was exported to Microsoft Excel® (Microsoft Corporation) and analyzed using Stata 14 software (StataCorp LLC, College Station, USA).

Results

The study participants were adult patients who provided complete data on their general health, age and sex. Sixty-five individuals were excluded due to incomplete

information, and 9,815 individuals were under 18 years old. The final sample size of the study was 82,363 individuals.

Demographic characteristics

A statistically significant difference was observed in the sex distribution across the age groups, with a higher percentage of female participants ($p < 0.001$) (Fig. 1). The mean age of the study population was 40.01 years ($SD = 16.7$; range = 18–107 years), while 62.6% (95% *CI*: 62.2–62.9) of the patients were female. Furthermore, 36.7% of the individuals reported having a bachelor's degree. The predominant type of settlement was urban (Table 1). The main reasons for seeking dental care were routine dental checkups, acute oral pain, infection, and dental rehabilitation (Table 2).

General health status

The prevalence of overweight patients among individuals aged 30–79 years was observed to range between 40.0% and 44.5%. In the group aged ≥80 years, the prevalence was 39.0%. The majority of the participants denied smoking cigarettes, consuming alcohol, or illicit drugs (Table 3).

Among the study population, 13.1% (95% *CI*: 12.9–13.5) of participants reported the presence of more than 1 systemic disease. The overall prevalence of medical conditions was 39.1% (95% *CI*: 38.8–39.5), with the highest prevalence recorded in the year 2018 (41.1%; 95% *CI*: 40.2–42.1) (Fig. 2). The conditions reported most frequently were gastrointestinal diseases (16.5%; 95% *CI*: 16.2–16.8; gastritis was reported in 56% and colitis in 34%), arterial hypertension (14.1%; 95% *CI*: 13.8–14.3) and diabetes mellitus (8.6%; 95% *CI*: 8.4–8.8). Furthermore, a statistically significant difference was observed in the prevalence of systemic diseases between men and women ($p < 0.001$) (Table 4). The gastrointestinal diseases were reported among all age groups, while the prevalence of hypertension, diabetes mellitus and psychiatric disorders increased with the patient's age (Fig. 3).

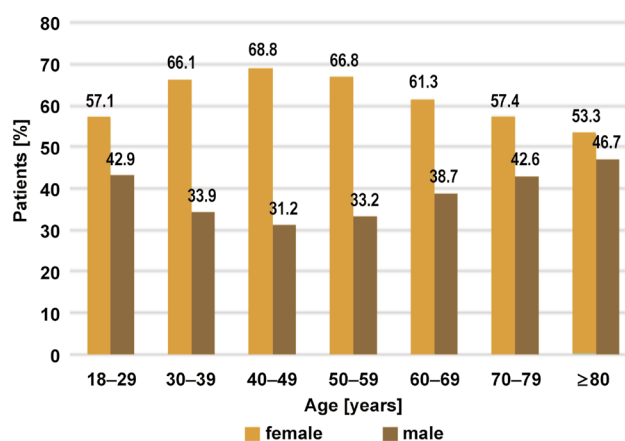


Fig. 1. Distribution of patients treated from 2011 to 2019 by age group and sex

Table 1. Descriptive characteristics of the study participants

Variable		Total	Age group [years]						
			18–29	30–39	40–49	50–59	60–69	70–79	≥80
Participants, <i>n</i>		82,363	28,839	13,896	15,461	12,220	7,394	3,520	1,033
Age [years] <i>Me</i>		38	22	35	44	54	64	73	83
Sex [%]	female	62.6	57.1	66.1	68.8	66.8	61.3	57.4	53.3
	male	37.4	42.9	33.9	31.2	33.2	38.7	42.6	46.7
Education level <i>n</i> (%)	illiterate	754 (0.9)	25 (0.1)	40 (0.3)	82 (0.5)	143 (1.1)	187 (2.5)	203 (5.8)	74 (7.2)
	reads or writes	78 (0.1)	1 (0.0)	1 (0.0)	8 (0.1)	10 (0.1)	13 (0.2)	34 (1.0)	11 (1.1)
	elementary	12,849 (15.6)	723 (2.5)	1,524 (11.0)	2,392 (15.5)	3,194 (26.1)	2,924 (39.6)	1,580 (44.9)	512 (49.6)
	secondary (junior high school)	18,440 (22.4)	3,884 (13.5)	4,596 (33.1)	5,211 (33.7)	2,922 (23.9)	1,325 (17.9)	415 (11.8)	87 (8.4)
	high school	17,131 (20.8)	8,226 (28.5)	3,118 (22.4)	3,040 (19.7)	1,749 (14.3)	713 (9.6)	239 (6.8)	46 (4.4)
	bachelor's degree	30,242 (36.7)	15,558 (54.0)	4,162 (30.0)	4,325 (28.0)	3,682 (30.0)	1,728 (23.4)	657 (18.7)	130 (12.6)
	postgraduate	1,221 (1.5)	309 (1.1)	353 (2.5)	224 (1.4)	220 (1.8)	87 (1.2)	21 (0.6)	7 (0.7)
	unregistered	1,648 (2.0)	113 (0.4)	102 (0.7)	179 (1.2)	300 (2.4)	417 (5.6)	371 (10.5)	166 (16.1)
Human settlement <i>n</i> (%)	rural	6,297 (7.6)	1,552 (5.4)	1,211 (8.7)	1,268 (8.2)	1,042 (8.5)	733 (9.9)	383 (10.9)	108 (10.5)
	urban	75,622 (91.8)	27,149 (94.1)	12,606 (90.7)	14,110 (91.3)	11,113 (90.9)	6,606 (89.3)	3,123 (88.7)	915 (88.6)
	unregistered	444 (0.5)	138 (0.5)	79 (0.6)	83 (0.5)	65 (0.5)	55 (0.7)	14 (0.4)	10 (1.0)

Me – median.

Table 2. Main reasons for dental consultations reported by the study participants (*N* = 82,363)

Reason	Total	Age group [years]						
		18–29	30–39	40–49	50–59	60–69	70–79	≥80
Routine dental checkup	26,373 (32.0)	10,113 (35.1)	4,265 (30.7)	4,655 (30.1)	3,758 (30.8)	2,271 (30.7)	1,026 (29.1)	285 (27.6)
Prophylaxis/tooth whitening	9,298 (11.3)	6,239 (21.6)	1,018 (7.3)	1,058 (6.8)	677 (5.5)	220 (3.0)	74 (2.1)	12 (1.2)
Acute oral pain and/or infection	24,293 (29.5)	7,499 (26.0)	5,203 (37.4)	5,292 (34.2)	3,628 (29.7)	1,818 (24.6)	693 (19.7)	160 (15.5)
Dental rehabilitation	22,145 (26.9)	4,890 (17.0)	3,379 (24.3)	4,418 (28.6)	4,115 (33.7)	3,051 (41.3)	1,717 (48.8)	575 (55.7)
Others	87 (0.1)	47 (0.2)	10 (0.1)	9 (0.1)	9 (0.1)	11 (0.2)	1 (0.03)	0 (0.0)
Unregistered	167 (0.2)	51 (0.2)	21 (0.2)	29 (0.2)	33 (0.3)	23 (0.3)	9 (0.3)	1 (0.1)

Data presented as frequency (percentage) (*n* (%)).

Table 3. Body mass index (BMI) and harmful habits of the participants (*N* = 82,363)

Variable		Total	Age group [years]						
			18–29	30–39	40–49	50–59	60–69	70–79	≥80
BMI	<18.50 underweight	2,254 (3.0)	1,774 (6.0)	162 (1.0)	93 (1.0)	80 (1.0)	58 (0.8)	43 (1.0)	44 (4.0)
	18.50–24.99 normal weight	30,375 (36.9)	15,454 (54.0)	4,584 (33.0)	3,844 (24.9)	2,983 (24.0)	1,905 (26.0)	1,160 (33.0)	445 (43.0)
	25.00–30.00 overweight	30,490 (37.0)	7,849 (27.0)	5,554 (40.0)	6,669 (43.1)	5,225 (43.0)	3,290 (44.5)	1,499 (42.6)	404 (39.0)
	>30.00 obese	19,244 (23.4)	3,762 (13.0)	3,596 (26.0)	4,855 (31.4)	3,932 (32.0)	2,141 (29.0)	818 (23.2)	140 (14.0)
Cigarette smoking	yes	13,682 (16.6)	5,620 (19.5)	2,392 (17.2)	2,390 (15.5)	1,922 (15.7)	964 (13.0)	339 (9.6)	55 (5.3)
	no	68,681 (83.4)	23,219 (80.5)	11,504 (82.8)	13,071 (84.5)	10,298 (84.3)	6,430 (87.0)	3,181 (90.4)	978 (94.7)
Alcohol consumption	yes	14,866 (18.0)	7,462 (25.9)	2,379 (17.1)	2,125 (13.7)	1,566 (12.8)	885 (12.0)	367 (10.4)	82 (7.9)
	no	67,497 (82.0)	21,377 (74.1)	11,517 (82.9)	13,336 (86.3)	10,654 (87.2)	6,509 (88.0)	3,153 (89.6)	951 (92.1)
Illegal drug use	yes	621 (0.8)	404 (1.4)	93 (0.7)	62 (0.4)	42 (0.3)	15 (0.2)	4 (0.1)	1 (0.1)
	no	81,742 (99.2)	28,435 (98.6)	13,803 (99.3)	15,399 (99.7)	12,178 (99.7)	7,379 (99.8)	3,516 (99.9)	1,032 (99.9)

Data presented as frequency (percentage) (*n* (%)).

Table 4. Prevalence of diseases among the study participants

Disease	Patients		Gender				
	[%]	95% CI	female [%]	95% CI	male [%]	95% CI	p-value
Total	39.10	38.79–39.46	43.90	43.46–44.32	31.20	30.63–31.67	<0.001*
Gastrointestinal diseases	16.50	16.25–16.76	19.80	19.46–20.15	10.98	10.63–11.33	<0.001*
Arterial hypertension	14.06	13.82–14.30	15.37	15.06–15.68	11.88	11.62–12.24	<0.001*
Diabetes mellitus	8.58	8.40–8.77	8.94	8.70–9.19	7.98	7.70–8.29	<0.001*
Psychiatric disorders	4.11	3.97–4.25	5.25	5.06–5.45	2.19	2.03–2.36	<0.001*
Renal diseases	3.08	2.97–3.21	3.07	2.93–3.22	3.11	2.91–3.31	0.764
Thyroid disorders	2.91	2.80–3.03	4.23	4.01–4.41	0.70	0.06–0.08	<0.001*
Neurological disorders	2.43	2.32–2.54	2.88	2.74–30.29	1.67	1.53–1.82	<0.001*
Cardiovascular diseases	2.27	2.20–2.40	2.19	2.06–2.32	2.41	2.24–2.59	<0.005*
Cancer	1.32	1.24–1.40	1.61	1.50–1.71	0.83	0.07–0.94	<0.001*
Sexually transmitted diseases	1.01	0.94–1.08	1.23	1.13–1.33	0.65	0.57–0.75	<0.001*
Tuberculosis	0.70	0.64–0.76	0.81	0.74–0.89	0.51	0.44–0.60	<0.001*
Typhoid fever	0.36	0.32–0.40	0.44	0.38–0.50	0.22	0.17–0.28	<0.001*

CI – confidence interval; * statistically significant ($p < 0.05$, Mann–Whitney non-parametric test).

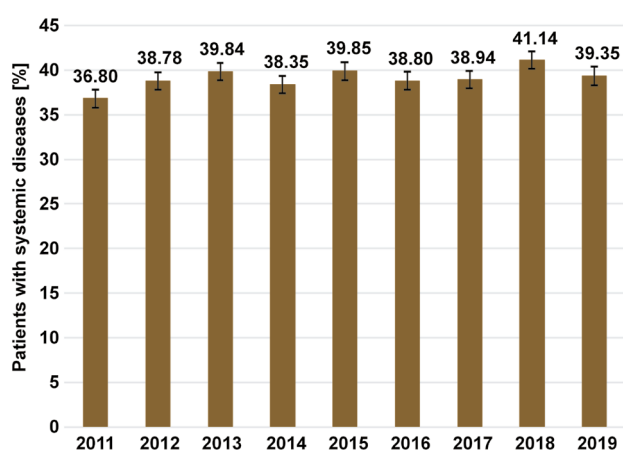


Fig. 2. Overall prevalence of systemic diseases self-reported by the patients from 2011 to 2019

Discussion

Dentists must be prepared to treat patients with different medical conditions, as these become more and more prevalent among individuals seeking dental care. The ability to identify patients with systemic diseases and compromised conditions that can have an impact on, and be influenced by, oral health care is becoming an increasingly important task for dentists, dental students and other oral healthcare practitioners. Prior to commencing any dental procedures, it is imperative to conduct a comprehensive history and physical examination to identify patients with potentially compromised conditions that may not be evident. To ensure optimal and safe oral care, dental management must be adapted to account for these systemic diseases. Medically fragile individuals require special attention during the prescription process to avoid potential interactions with other medications they are concomitantly taking.³

To the best of our knowledge, the present work is the first cross-sectional epidemiological study conducted in Mexico to determine the prevalence of self-reported medical conditions in patients seeking dental treatment over a period of 9 years. Our study was conducted on 82,363 participants, which, to the best of our knowledge, constitutes the highest number of patients reported in a single study to date. The global prevalence of systemic diseases found in our study was 39.1%, which is very similar to that previously reported by Javali et al.² In a study conducted in Saudi Arabia in 2017, the authors reported a global prevalence of 40.1%.² However, our findings do not concur with those reported by Bhateja in 2012.³ The author found a systemic disease prevalence of 1.02% in patients requesting dental treatment at the Hospital of Mathura City (India).³ However, Bhateja's research was conducted for 2 years only, on a total study population of 36,729 patients, which is smaller than that of the present study. According to the findings of another study, the prevalence of systemic diseases in dental patients tends to vary depending on the site at which the patients receive dental care.¹⁸ For example, some studies on the prevalence of systemic diseases in private dental offices have reported a prevalence of 27.6%, while in dentistry schools, the prevalence has been situated between 46.3% and 74.1%. The highest prevalence has been observed in dental clinics and hospital settings.^{19–22} This variation can be attributed to the higher proportion of older adults receiving dental care in a hospital setting, accompanied by an evident increase in associated comorbidities.¹⁸ The prevalence of systemic diseases in older adults aligns with our findings, wherein 75.9% of the adults aged ≥ 80 and attending clinics at our faculty presented any type of comorbidity. The prevalence of systemic diseases observed in older patients aligns with a report describing

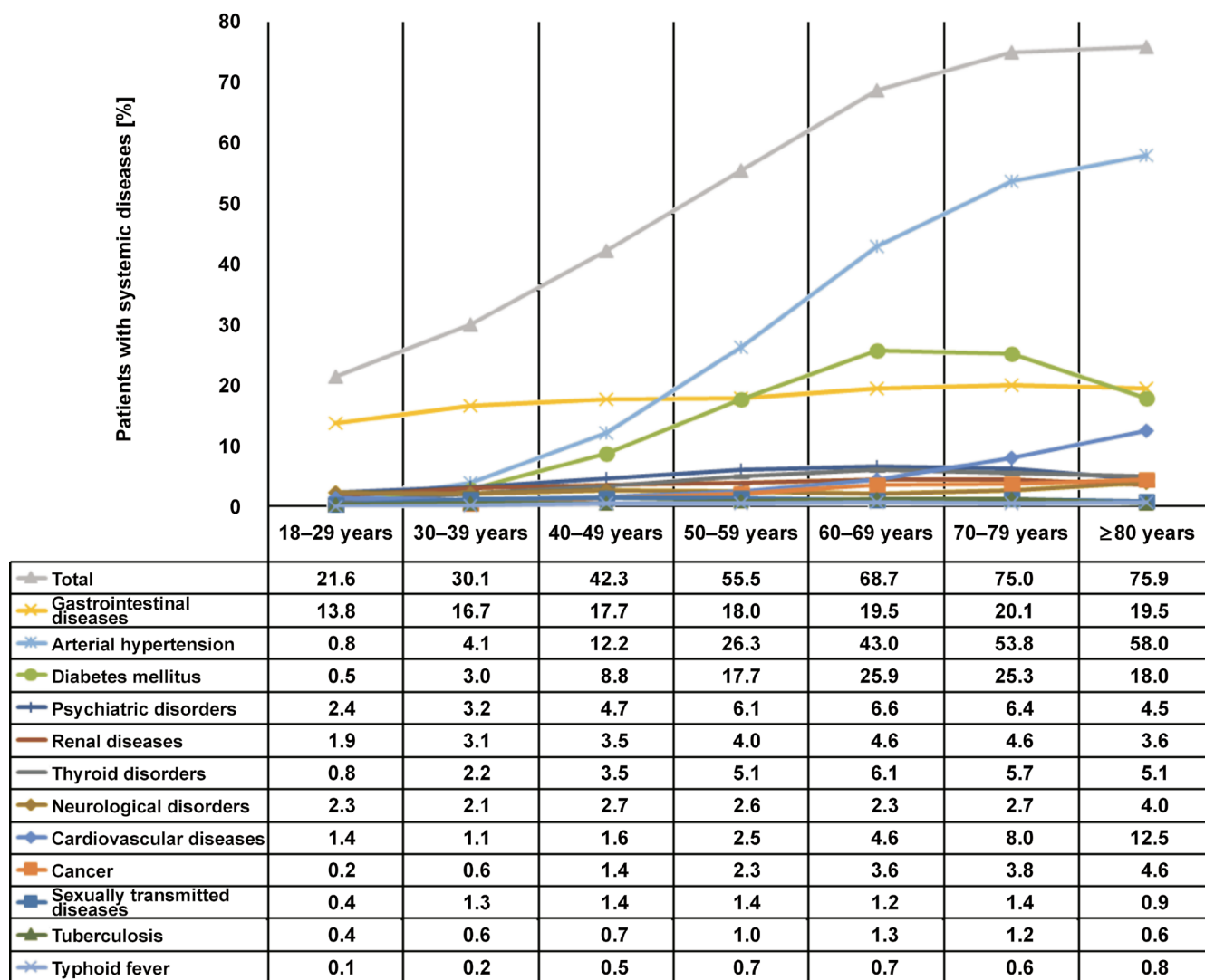


Fig. 3. Prevalence of systemic diseases stratified by type and age group

that significant changes in health occur with aging, including geriatric syndromes, cardiovascular disease, osteoporosis, and dementia, the most common chronic degenerative diseases in the ≥80-year-old group.¹⁹

In the present study, the most prevalent systemic conditions were gastrointestinal diseases (16.5%), arterial hypertension (14.1%) and diabetes mellitus (8.6%). Previous studies have reported variable frequencies for systemic diseases in adult patients seeking dental care.^{13,14} For instance, Parirokh et al. reported a higher prevalence of cardiovascular diseases, hypertension, allergies, and neurological disorders.²⁰ Similarly, Al-Bayaty et al. identified hypertension, diabetes mellitus and asthma as the most common conditions,²¹ while Dhanuthai et al. reported allergies, hypertension and diabetes as the most prevalent.⁴ Smeets et al. reported hypertension and cardiovascular diseases, neurological conditions, and endocrine conditions as the most common.²² Other related systemic conditions mentioned in the literature include pulmonary infections, liver diseases, ankylosing spondylitis,

rheumatoid arthritis, pre-eclampsia, and preterm low birth weight.^{12,14} These differences are possibly due to each study population's characteristics, such as diet, education level and geographical region. Gastrointestinal diseases, predominantly gastritis or dyspepsia, emerged as the most prevalent comorbidities in our study population (16.5%), exhibiting variation according to age group. The prevalence of gastrointestinal diseases was particularly high among the 18–49 age group. Additionally, approx. 15–54% of the studied population exhibited dyspepsia symptoms, whereas the relative frequency of this condition in Mexico has been documented to be 8.5% among individuals aged 15.0–37.9 years. Dyspepsia predominates in the female population (65.5%).²³ The significant prevalence of this condition observed in our study can be attributed to the broad age range of the study population, which spanned from 18 to >80 years. In this regard, dyspepsia is the most commonly self-reported comorbidity among young adults, and its prevalence increases with age. Individuals over 70 years of age

exhibit the highest incidence of gastrointestinal diseases, including diabetes mellitus and arterial hypertension. The increased prevalence of gastrointestinal diseases in this age group may be attributable to the use of pharmacological treatments for other chronic medical conditions.⁴ It should be noted that dyspepsia exhibits a higher frequency among young adults, which may be due to lifestyle risk factors, including a diet high in fat and refined sugars, as well as stress and addictive behaviors, such as alcoholism (25.8%) and tobacco use (19.4%). In the present study, the disorder was the most prevalent among individuals aged 18–29. This fact should also be noted in the context of the prescription of non-steroidal anti-inflammatory drugs (NSAIDs) in dental practice, with a 41% prevalence of NSAID prescriptions among dental treatments.²⁴ These medications have the potential to exert a direct impact on the digestive tract. The adverse effects of NSAIDs on the gastrointestinal mucosa are well-documented, and are due to the gastric irritation caused by the inhibition of prostaglandins.²⁵ Therefore, the use of COX-2 selective NSAIDs has been recommended as a substitute medication.²⁶ Although it is usually difficult to ascertain the exact type of a gastrointestinal condition, colitis was self-reported by 34% of the patients. Irritable bowel syndrome is the other common condition in Mexico, with a prevalence of 35.5%.²³ This disorder is most common in young people and women, which aligns with our data. While the etiology of this condition is multifactorial, the role played by bacterial overgrowth or dysbiosis is significant in the alteration of the gut–brain axis.²⁷ Dysbiosis causes the intestinal permeability, with the release of toxins and pro-inflammatory cytokines, generating a chronic inflammatory state.²⁷ Recent studies have established an association between the intestinal permeability and chronic degenerative conditions, such as diabetes mellitus, hypertension and autoimmune diseases.²⁷ Thus, it is of great importance that these disorders are early recognized and disclosed, given that they increase the risk of developing other comorbidities as patients age. Arterial hypertension was the second most prevalent comorbidity, predominantly observed among adults over 60 years of age. Additionally, type II diabetes mellitus was identified as the second most common condition, primarily affecting individuals in the 60–69 years age group. These findings are consistent with the Mexico National Survey of Health and Nutrition 2018 (ENSANUT).²⁸

In the present study, the prevalence of comorbidities was higher in women than in men (43.9% vs. 31.2%), possibly due to the higher number of female patients seeking dental care at the faculty. This finding aligns with the data reported by ENSANUT in 2018, which indicated that women tend to use health services more frequently, both as outpatients (7.6%) and inpatients (5.8%).²⁸ In terms of the risk of developing systemic diseases by sex, the main influencing factors include the following: biological factors (genetic, physiological and hormonal); higher life expectancy

in women; changes in the proportion of men participating in women's labor; differences in women's access to social protection; cultural norms and religious and familial beliefs that determine gender behavior and roles; gender differences in education level; and income differences.^{29–33}

Among patients seeking dental care, 37.0% were overweight, a finding which concurs with the 39.1% prevalence reported by ENSANUT.²⁸ The prevalence of obesity in our sample was lower (23.4%) than that reported by ENSANUT, which was estimated at 36.1%. San Luis Potosí is a Mexican state with a 16.7% prevalence of obesity, while other states, such as Veracruz, Quintana Roo, Colima, Sonora, and Tabasco have a higher prevalence of obesity.²⁸ It is important to note that overweight or obese patients are at a greater risk of presenting comorbidities,³⁴ with a high percentage being unaware of their own health status. For this reason, a comprehensive clinical history and review of systems by the dentist are of great importance, along with laboratory tests, to ascertain the patient's overall health status.

To lessen their influence on the environment, dentists have recently adopted several eco-friendly practices. Green dentistry is a modern concept that uses technology and ecological practices to promote pollution control and environmental sustainability. The primary goals of green dentistry include the utilization of technology, the recycling of dental materials, and the reduction of energy, water and radiation usage. The oral care segment of the green dentistry personal care market, which has shown exponential growth over the past 25 years, is predominantly driven by this need. According to Mazur et al., the criteria for categorizing a product as “green dentistry” include the following: the use of substances of natural origin characterized by ecological and skin compatibility as well as good aquatic toxicity performance; the absence of genetically modified organisms in the finished product or its components; the use of natural fragrances (e.g., essential oils); the use of biodegradable detergents and surfactants; the absence of ionizing radiation; and the use of natural substances originating from controlled organic farming certified by a recognized institution.³⁵ Biomaterials have numerous applications in various dental specialties for the restoration of the masticatory system.³⁶ For example, natural polymer coatings are frequently employed in oral surgery, periodontics and other dental specialties (e.g., chitosan, a marine polymer with a linear amino-polysaccharide structure). Furthermore, they have been increasingly used as a matrix for drug delivery.³⁶

In consideration of the study's limitations, it is important to acknowledge that in developing countries, a significant proportion of patients do not undergo routine medical checkups. Consequently, there is a possibility that asymptomatic patients with chronic comorbidities, such as diabetes mellitus, thyroid disorders and cardiovascular diseases, are unaware of their health status. On the other hand, the study's main strength lies in the meticulous

examination of 82,363 patient records, encompassing a 9-year period. This extensive data set provides a reliable foundation for analysis and reflects the health situation in the study population. The findings of this study may serve as a basis for the enhancement of undergraduate and postgraduate dentistry curricula, with the aim of effectively training students in the delivery of dental care and reducing the likelihood of adverse effects during dental treatment. Furthermore, the findings may contribute to the formulation of enhanced public health prevention policies.

Numerous epidemiological studies and systematic reviews have extensively defined and documented the relationship between dental health and general health. A multitude of systemic disorders have been associated with oral infections, including periodontal disease.¹² Affected patients often demonstrate worse oral hygiene, compromised dental and periodontal health, and increased bleeding, gingival inflammation and periodontal pocket depth. Additionally, the enhancement of oral hygiene and the initiation of non-surgical periodontal therapy have been demonstrated to attenuate the severity of systemic diseases.^{12–14} Dental caries is recognized as a multifactorial disease, implying that a variety of factors, including an individual's systemic state, may contribute to its development. Therefore, the literature has consistently supported the multimodal therapy for dental caries. Determining an individual's caries risk is essential for effective management and prevention, as well as for offering feasible justifications and recommendations.³⁷ Thus, patients who are medically compromised require a more thorough evaluation, necessitating a deeper understanding of their medical condition. Consequently, it is necessary to expand the scope of medical education programs in dental institutions. Expanding courses in pharmacology, medical emergencies, and the care of medically impaired patients should be mandatory for dental schools. These topics should be also emphasized in continuing education programs. A comprehensive curriculum transformation is imperative in the field of dentistry, with a shift toward a more medically focused dental education. Dental educators should reevaluate their educational materials and methodologies concerning systemic diseases and pharmaceutical agents.

It is recommended that the present study be continued by extending, for periods of approx. 5 years, the analysis undertaken on the medical records of patients requesting dental care. This will allow for the identification of possible changes in the prevalence of systemic comorbidities. The rationale underlying this approach is that the collected data can be used to develop additional epidemiological reports and studies exclusively for older adults, focusing on the primary diseases affecting the oral cavity. The electronic record serves as a crucial repository for data, which is instrumental in enhancing the training and education of dental students, ultimately contributing to the improvement of the overall health of the general population.

Conclusions

A third of the registered cases exhibited associated comorbidities. Therefore, it is necessary for dental undergraduate students to receive adequate training to facilitate a more precise and timely diagnosis of systemic diseases as part of the dental care protocol for adult patients.

Ethics approval and consent to participate

The present study involved minimal risk for the participants and was conducted in accordance with the Declaration of Helsinki principles. All personal information was handled anonymously and confidentially. The study protocol was approved by the Faculty of Dentistry's Ethics and Investigation Committee, Autonomous University of San Luis Potosí, Mexico (CEI-FE-026-021).

Data availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Consent for publication

Not applicable.

Use of AI and AI-assisted technologies

Not applicable.

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