Revista Española de Enfermedades Digestivas
The Spanish Journal of Gastroenterology

Title:
The impact of oral health-related quality of life and country-level context on patients with cirrhosis: a cross-sectional study

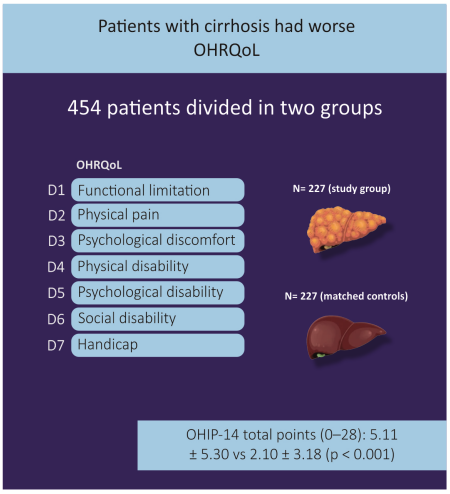
Authors:
Janaina B. Medina, Amanda dos Santos Matioli, Maria Gabriela Haye Biazevic , Edgard Michel-Crosato , Alba Pérez-Jardón , Juliana B. Franco, Mario Pérez-Sayáns , Karem López Ortega

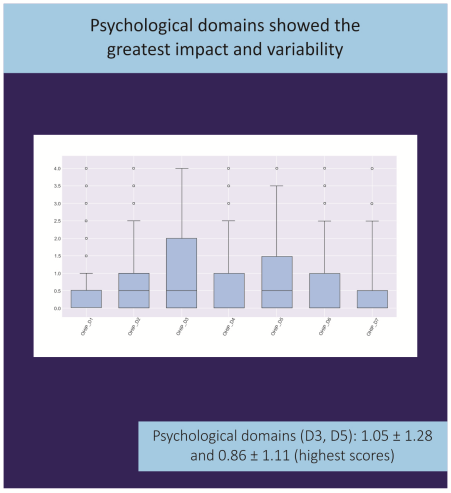
DOI: 10.17235/reed.2026.11829/2026
Link: PubMed (Epub ahead of print)

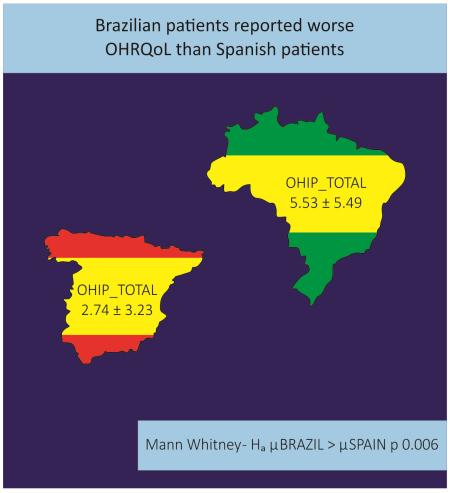
Please cite this article as:
Medina Janaina B., dos Santos Matioli Amanda, Haye Biazevic Maria Gabriela , Michel-Crosato Edgard, Pérez-Jardón Alba, Franco Juliana B., Pérez-Sayáns Mario, López Ortega Karem. The impact of oral health-related quality of life and country-level context on patients with cirrhosis: a cross-sectional study. Rev Esp Enferm Dig 2026. doi: 10.17235/reed.2026.11829/2026.

Revista Española de Enfermedades Digestivas
The Spanish Journal of Gastroenterology

The Impact of Oral Health-Related Quality of Life and Country-Level Context on Patients with Cirrhosis: a cross-sectional study







Medina, et al.

Revista Española de Enfermedades Digestivas (REED)
The Spanish Journal of Gastroenterology

Revista Española de Enfermedades Digestivas
The Spanish Journal of Gastroenterology

The impact of oral health-related quality of life and country-level context on patients with cirrhosis: a cross-sectional study

Janaina B. Medina[1,2,3] Amanda dos Santos Matioli[2], Maria Gabriela Haye Biazevic[4], Edgard Michel-Crosato[4], Alba Pérez-Jardón[1,5], Juliana B. Franco[6,7,8], Mario Pérez-Sayáns[1,5,9], Karem L. Ortega[1,2,3]

[1] Oral Medicine, Oral Surgery and Implantology Unit (MedOralRes), Faculty of Medicine and Dentistry, 15782, Universidad de Santiago de Compostela, Santiago de Compostela, Spain.

[2] Special Care Dentistry Centre (CAPE), School of Dentistry (FOUSP), University of São Paulo, São Paulo, Brazil.

[3] Department of Stomatology, School of Dentistry (FOUSP), University of São Paulo, São Paulo, Brazil.

[4] Department of Community Dentistry, School of Dentistry (FOUSP), University of São Paulo, São Paulo, Brazil.

[5] ORALRES Group, Health Research Institute of Santiago de Compostela (FIDIS), 15706 Santiago de Compostela, Spain.

[6] Department of Dentistry, Children and Adolescents Institute, Clinical Hospital of Medical School of the University of São Paulo (HCFMUSP), São Paulo, SP, Brazil

[7] Department of Dentistry, Central Institute, Clinical Hospital of Medical School of the University of São Paulo (HCFMUSP), São Paulo, SP, Brazil.

[8] Clinics Hospital of the State University of Campinas (UNICAMP), Campinas, SP, Brazil.

[9] Instituto de los Materiales de Santiago de Compostela (iMATUS), Avenida do Mestre Mateo, 25, 15782 Santiago de Compostela, Spain

Janaina B. Medina – jbm@usp.br - https://orcid.org/0000-0002-2879-4784

Amanda dos Santos Matioli - mandsfo@alumni.usp.br - https://orcid.org/0009-0006-0580-6857

Maria Gabriela Haye Biazevic - biazevic@usp.br - https://orcid.org/0000-0001-6326-5805

Edgard Michel-Crosato - michelcrosato@usp.br - https://orcid.org/0000-0001-8559-9769

Alba Pérez-Jardón - perlopjm@gmail.com - https://orcid.org/0000-0001-5174-8922

Revista Española de Enfermedades Digestivas
The Spanish Journal of Gastroenterology

Juliana B. Franco - juliana.franco@hc.fm.usp.br - https://orcid.org/0000-0001-7787-4062
Mario Pérez-Sayáns - mario.perez@usc.es - https://orcid.org/0000-0003-2196-9868
Karem L. Ortega – klortega@usp.br - https://orcid.org/0000-0002-9573-2858

Author Contributions

Janaina B. Medina: conceptualization, research, writing, revision, edition, formal analysis, review and approval of the final version. Amanda dos Santos Matioli: research, methodology, writing, revision, edition, funding, review and approval of the final version. Maria Gabriela Haye Biazevic and Edgard Michel-Crosato: formal analysis, draft and definitive writing, revision review and approval of the final version. Alba Pérez Jardón: conceptualization, methodology, research, writing, revision, edition, review and approval of the final version. Juliana Bertoldi Franco: conceptualization, methodology, research, writing, revision, edition, review and approval of the final version. Mario Perez Sayáns and Karem L. Ortega: project management, formal analysis, conceptualization, data preservation, draft and definitive writing, revision, edition, research, methodology, resources, supervision, validation, revision review and approval of the final version.

Corresponding author:
Mario Pérez Sayáns
Calle de Entrerríos, s/n
Santiago de Compostela - C.P. 15782 - Spain.
E-mail address: mario.perez@usc.es

Abbreviation list

HRQoL: health-related quality of life, OHRQoL: Oral health–related quality of life, HCFMUSP: Clinical Hospital of the University of São Paulo School of Medicine, HCUS: University Clinical Hospital of Santiago, MELD: model for end-stage liver disease, DMFT: decayed, missing and filled teeth index, SOHI: simplified oral hygiene index, GI: gingival index: OHIP-14: oral health impact profile instrument with 14 questions, WHO: World Health Organization, SG: study group, CG: control group, GDP: gross domestic product.

Revista Española de Enfermedades Digestivas
The Spanish Journal of Gastroenterology

Lay summary

People living with liver cirrhosis often experience many health problems that affect their daily lives. Oral health problems, such as missing teeth, gum disease, pain, and difficulty eating, can further worsen their well-being, but they are frequently overlooked in routine medical care. This study aimed to evaluate how oral health affects the quality of life of people with liver cirrhosis and to compare their experiences with those of individuals without liver disease.

This study included adults with liver cirrhosis who were receiving medical follow-up and a comparison group without cirrhosis. Participants answered a questionnaire about how oral conditions influenced their daily activities, emotional well-being, and social interactions. Clinical and demographic information was also collected. The results were analyzed to identify differences between groups and to explore factors associated with poorer oral health-related quality of life.

The findings showed that people with liver cirrhosis reported a significantly worse quality of life related to oral health compared with individuals without cirrhosis. Difficulties were particularly evident in emotional and psychological aspects, such as worry, discomfort, and reduced confidence related to oral problems. These negative impacts were observed even in patients who did not report severe dental symptoms, suggesting that oral health issues may have a broader effect on daily life than expected.

In conclusion, oral health problems substantially affect the quality of life of people with liver cirrhosis. Integrating dental care into the routine management of these patients may help improve not only oral health but also overall well-being.

Abstract

Background: Oral health has a well-established impact on physical and psychological aspects of quality of life. However, evidence on oral health–related quality of life (OHRQoL) in patients with cirrhosis remains limited, and whether differences in country-level socioeconomic context influence patients' perceptions has not yet been investigated.

Objective: The aim of this cross-sectional study was to analyse the impact of OHRQoL and country-level socioeconomic context on patients with cirrhosis.

Methods: This cross-sectional, matched case–control study included 454 patients from

Revista Española de Enfermedades Digestivas
The Spanish Journal of Gastroenterology

Brazil (n=386) and Spain (n=68), comprising patients with cirrhosis (study group-SG) and controls without cirrhosis (CG). Data collection included medical history, clinical oral examination, the decayed, missing and filled teeth (DMFT) index, simplified oral hygiene index (SOHI), gingival index (GI), periodontal status, and the Oral Health Impact Profile-14 (OHIP-14).

Results: SG patients showed unsatisfactory SOHI (65.20%), gingivitis (75.33%) and periodontal disease (53.37%). Brazilian patients had a higher DMFT (18±6.32) compared to Spanish ones (10.2±8.86) (P<0.001) as well as a higher OHIP-14 score (p=0.006). SG patients scored higher than the controls in all domains of OHIP-14 (P<0.001), except for physical pain. Psychological discomfort (1.046±1.277) and psychological disability (0.863±1.112) were the domains most impacting the patients.

Conclusions: Patients with cirrhosis reported poorer OHRQoL than matched controls, with a predominantly psychological pattern of impact. Differences between countries suggest that broader contextual factors may shape how oral health problems are perceived and reported. These findings support greater awareness, routine screening, and integration of oral health assessments into multidisciplinary care.

Keywords: Oral health. Quality of life. Liver cirrhosis. Health status indicators.

Key Points:

1. Patients with cirrhosis have worse oral health–related quality of life than people without cirrhosis.

2. The impact of oral health in cirrhosis is perceived mainly in psychological aspects, rather than physical pain.

3. Overall oral health–related quality of life differed between countries, reflecting differences in country-level socioeconomic context.

Revista Española de Enfermedades Digestivas
The Spanish Journal of Gastroenterology

INTRODUCTION

Serious chronic diseases, such as cirrhosis, are associated with impaired health-related quality of life (HRQoL), reflecting their systemic nature, frequent comorbidities, and the burden of complex treatments, including polypharmacy, invasive procedures, and recurrent hospitalizations(1).

Psychological and psychiatric effects of cirrhosis have long been recognized as relevant determinants of HRQoL. Hepatic encephalopathy affects daily functioning and autonomy, while anxiety and depression are highly prevalent and associated with perceived stigmatization, poorer quality of life, and an increased risk of suicide attempts(2).

Oral health–related quality of life (OHRQoL) reflects the impact of oral conditions on psychological well-being and physical functioning. Poor OHRQoL has been associated with psychological distress, including anxiety and depression, and with functional impairments that may restrict food intake, thereby contributing to nutritional compromise(3,4).

Importantly, perceptions of OHRQOL may also vary according to socioeconomic and cultural contexts, even among patients with the same underlying disease(5). However, in severe chronic diseases, the burden of illness itself may outweigh contextual differences as suggested by multinational studies in advanced cancer(6).

Although previous studies have reported impaired OHRQoL in patients with cirrhosis, most of this evidence comes from small, single-center samples and has primarily focused on overall or physical aspects of impairment(7–10). Consequently, little is known about the dimensional pattern of OHRQoL in this population, particularly regarding the relative contribution of psychological versus physical domains, and whether these perceptions differ across distinct national contexts. In this large, matched, bi-national cross-sectional study, we aimed to comprehensively evaluate OHRQoL in patients with cirrhosis compared with controls, with special emphasis on the distribution of impacts across OHIP-14 domains and on potential differences between two countries with contrasting socioeconomic and healthcare settings.

Revista Española de Enfermedades Digestivas
The Spanish Journal of Gastroenterology

MATERIALS AND METHODS

Ethics

This project was approved by the Research Ethics Committee of the Clinical Hospital of the University of São Paulo School of Medicine (HCFMUSP) (CAAE 70741017.1.0000.0068) and by the Research Ethics Committee of Santiago-Lugo (2019/536). Written informed consent was obtained from all participants in accordance with the Declaration of Helsinki.

Study Design and Sample

This cross-sectional study included a convenience sample of 454 participants, comprising 227 patients with cirrhosis (study group, SG) and 227 individuals without cirrhosis (control group, CG). Patients in the SG were recruited from the HCFMUSP (Brazil) and the University Clinical Hospital of Santiago (Spain), while controls were recruited from the HCFMUSP and the Faculty of Medicine and Dentistry of the University of Santiago de Compostela.

Methodology

Clinical Examination

For control participants, only sex, age and country were recorded to allow matching with the study group. For patients with cirrhosis, clinical and demographic data were retrieved from medical records, including sex, age, country of origin, smoking status, xerostomia, comorbidities, cirrhosis aetiology, presence of decompensation-related complications, and Model for End-Stage Liver Disease (MELD) score.

Periodontal disease was defined as clinical attachment loss >4 mm, furcation involvement, or grade II–III tooth mobility. Oral clinical assessment included the decayed, missing and filled teeth (DMFT) index, simplified oral hygiene index (SOHI), and gingival index (GI) (11). Hyposalivation was evaluated by unstimulated sialometry (12).

Oral Health Impact Profile 14 (OHIP-14)

To assess oral health–related quality of life (OHRQoL), the 14-item short version of the Oral Health Impact Profile (OHIP-14), originally developed by Slade and Spencer(13), was used. Validated versions were applied according to language, including Brazilian Portuguese and Spanish(14,15).

For each item, participants reported the frequency of oral health–related problems experienced over the previous 12 months using a 5-point Likert scale ranging from 0 ("never") to 4 ("very often"). Total OHIP-14 scores (OHIP-TOTAL) range from 0 to 56, with higher scores indicating worse OHRQoL(13).

The questions were grouped consecutively in pairs to form seven domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Domain scores were calculated as the mean of the two corresponding items, ranging from 0 to 4. The total sum of all domains ranges from 0 to 28(13).

Definition and Treatment of Study Variables

Oral hygiene was considered unsatisfactory when SOHI was ≥3. Gingivitis was defined by GI scores of 2 or 3. Patients using complete or partial dentures were classified as removable prosthesis users.

The MELD score was categorized as A (<10), B (10–19), and C (20–29), corresponding to three-month mortality rates of 4%, 27%, and 76%, respectively(16). Age was dichotomized as <60 and ≥60 years, according to the elderly classification proposed by World Health Organization(17).

OHIP-14 scores were analyzed as both ordinal and continuous variables. DMFT was treated as a continuous variable, while SOHI, GI, periodontal disease, and use of removable prostheses were treated as nominal variables.

Statistical analysis

Oral health outcomes in the study group included OHIP-14, DMFT, SOHI, GI, periodontal disease, and use of removable dentures. Quantitative variables were analyzed using Student's t test or ANOVA for normally distributed data and the Mann–Whitney test for non-normally distributed data. Normality and homogeneity of variances were assessed using the Kolmogorov–Smirnov and Levene tests, respectively. Associations between qualitative variables were evaluated using the chi-square test.

The Mann–Whitney test was used to compare OHIP-14 scores between Brazilian and Spanish participants and between the study and control groups.

Revista Española de Enfermedades Digestivas
The Spanish Journal of Gastroenterology

Exploratory multivariable modeling was performed to identify independent factors associated with OHRQoL among patients with cirrhosis. Multivariable linear regression models were fitted for OHIP-TOTAL, and additional domain-level models were conducted for the two OHIP-14 domains showing the greatest impact in exploratory descriptive analyses. Covariates were selected based on clinical relevance and data availability.

Statistical analyses were performed using Jamovi (version 2.3.28).

RESULTS

Analysis of the Cirrhotic Population (SG)

Among the 227 participants of the study population, 85% were from Brazil (n = 193) and 15% from Spain (n = 34).

The cirrhotic group was predominantly male (n = 156; 68.7%), with a mean age of 55.9 years (minimum = 20; maximum = 75) and median MELD score of 15 (minimum = 7; maximum = 29). Alcoholic liver disease was the most frequent aetiology of cirrhosis (n = 71; 31.38%), followed by infection with hepatitis B and C viruses (n = 64; 28.19%). The clinical profile of the participants was characterized by decompensation (n = 140; 61.67%), reflecting the presence of severe cirrhosis complications such as ascites (n = 122; 53.74%), hepatic encephalopathy (n = 25; 11.01%) and spontaneous bacterial peritonitis (n = 17; 7.49%), in addition to comorbidities present in 112 participants (49.33%).

Data on oral characteristics were collected only from participants from Brazil and revealed that 96 (49.74%) had xerostomia, 94 (48.70%) had hyposalivation and 68 (35.23%) had fetor hepaticus.

Overall, patients with cirrhosis showed poor oral health, with a mean DMFT of 16.9 and high frequencies of unsatisfactory oral hygiene, gingivitis, and periodontal disease (Table 1).

DMFT values differed according to country of origin, being higher among Brazilian than Spanish patients. Higher DMFT values were also observed in patients without hepatic encephalopathy.

Gingivitis was more frequent among individuals aged ≥60 years, while periodontal disease was associated with male sex and decompensated cirrhosis. The use of removable dentures was associated with older age and non-smoking status. Detailed results are presented in Supplementary Table S1.

Supplementary Table S1. Oral Health in Patients with Cirrhosis (n=227).

		DMFT – Mean*	**SOHI - Unsatisfactory‡**	**GI - with Gengivitis‡**	**Periodontal disease‡**	**Complete or partial dentures ‡**
		(N=227)	**(N=193)**	**(N=193)**	**(N=193)**	**(N=206)**
Sex	Male	17	102 (52.85%)	74 (38.34%)	78 (40.41%)	39 (73.5%)
	Female	16.55	46 (23.83%)	46 (23.83%)	25 (12.95%)	14 (26.4%)
	P	0.68	0.78	0.54	**0.02**	0.38
Age	≥ 60 years	18.4	71 (36.79%)	98 (50.78%)	40 (20.73%)	38 (71.69%)
	<60 years	15.7	89 (46.11%)	22 (11.40%)	63 (32.64%)	20 (37.73%)
	P	0.82	0.59	**0.03**	0.53	**<0.001**
Country	Brazil	18	148 (76.68%)	120 (62.18%)	103 (68.91%)	40 (75.47%)
	Spain	10.02	No data	No data	No data	7 (13.20%)
	p	**<0.001**	No data	No data	No data	0.82
Smoking	Yes	17.1	10 (5.18%)	11 (5.70%)	7 (3.63%)	5 (9.43%)
	No	17.3	138 (71.50%)	131 (80.37%)	51 (26.42%)	46 (86.79%)
	p	0.065	0.94	0.47	0.48	**0.004**
MELD	A	17.8	20 (10.36%)	18 (9,32%)	12 (6.22%)	7 (3.63%)
	B	18.6	97 (50.26%)	76 (39.38%)	69 (35.75%)	30 (15.54%)
	C	16.5	31 (16.06%)	26 (13.47%)	22 (11.4%)	10 (5.18%)

	p	0.21†	0.55	0.80	0.37	0.91
Complications of cirrhosis	Ascites	16.6	83 (43.00%)	83 (43.00%)	62 (32.12%)	20 (37.53%)
	p	0.61	0.56	0.74	0.12	0.35
	Hepatic encephalopathy	14	10 (5.18%)	20	9 (4.66%)	4 (7.54%)
	p	**0.04**	0.34	0.71	0.59	0.87
	Spontaneous bacterial peritonitis	16.8	11 (5.70%)	11 (5.70%)	10 (5.18%)	3 (5.66%)
	p	0.41	0.22	0.82	0.64	0.68
	Upper gastrointestinal bleeding	18.1	32 (19.63%)	36 (18.65%)	28 (14.51%)	7 (13.20%)
	p	0.17	0.19	0.41	0.24	0.66
Compensation status	Yes	16.7	58 (30.05%)	58 (30.05%)	32 (16.58%)	25 (47.16%)
	No	16.9	90 (46.63%)	169 (87.56%)	71 (36.79%)	32 (60.37%)
	p	0.87	0.48	0.67	**0.04**	0.78
Oral characteristics	Xerostomia	18.4	76 (39.38%)	61 (31.61%)	49 (25.39%)	17 (32.07%)
	p	0.39	0.42	0.70	0.52	0.31
	Hyposalivation	18.3	74 (38.34%)	59 (30.57%)	49 (25.39%)	15 (28.30%)

	p	0.59	0.52	0.87	0.74	0.06
	Fetor hepaticus	17.8	53 (27.46%)	41 (21.24%)	39 (20.21%)	11 (20.75%)
	p	0.74	0.76	0.69	0.42	0.67
Total		16.9	148 (65.20%)	171 (75.33%)	103 (53.37%)	53 (23.35%)

DMFT: decayed, missing, and filled teeth; SOHI, simplified oral hygiene index; GI, gingival index; MELD: model of end stage liver disease; A (MELD<10); B (MELD de 10 a 19); C (MELD de 20 a 29); * Student's t-test; †ANOVA; ‡Chi-square test

The distribution of OHIP-14 responses showed a predominance of psychological items with higher frequencies of negative impact responses, particularly those related to self-consciousness, difficulty relaxing, and embarrassment. The distribution across Likert categories is shown in Figure 1.

Psychological domains (D3 and D5) showed the greatest perceived impact, while functional limitation (D1) and handicap (D7) showed the lowest scores. Physical and social domains displayed similar distributions (Figure 2).

Comparison between Brazil and Spain in the SG

OHIP-TOTAL was higher in Brazilian patients than in Spanish patients. This difference was observed across most OHIP-14 domains, except D1 and D2 (Table 1).

Table 1 – Comparison of patients with cirrhosis from Brazil and Spain according to the domains of OHIP-14 (n = 227).

Domain	**Brazil (Mean ± SD)**	**Spain (Mean ± SD)**	**p-value**
D1 – Functional limitation	0.51 ± 0.86	0.34 ± 0.74	0.102
D2 – Physical pain	0.72 ± 0.93	0.82 ± 0.95	0.756
D3 – Psychological discomfort	1.13 ± 1.34	0.57 ± 0.70	0.050
D4 – Physical disability	0.78 ± 0.98	0.09 ± 0.23	<0.001
D5 – Psychological disability	0.94 ± 1.15	0.46 ± 0.77	0.008
D6 – Social disability	0.71 ± 1.07	0.28 ± 0.67	0.008
D7 – Handicap	0.74 ± 1.06	0.18 ± 0.42	0.002
OHIP_TOTAL	5.53 ± 5.49	2.74 ± 3.23	0.006

OHIP_D1: Functional limitation; OHIP_D2: Physical pain; OHIP_D3: Psychological discomfort; OHIP_D4: Physical disability; OHIP_D5: Psychological disability; OHIP_D6: Social disability; OHIP_D7: Handicap; IQR: interquartile range. OHIP_D_TOTAL: sum of the dimensions. Mann Whitney - H_a μ BRAZIL > μ SPAIN

Comparison between SG and CG

To better interpret the results of OHIP-14, the study group was compared with a control group matched by gender, age and country. The comparison showed that the former had statistically higher values than the latter in all domains, except D2 (Table 2).

Table 2 – Comparison between study group (SG) and control group (CG) according to OHIP-14 domains (N=454).

Domain	**CG (Mean ± SD)**	**SG (Mean ± SD)**	**p-value**
D1 – Functional limitation	0.15 ± 0.46	0.49 ± 0.85	<0.001
D2 – Physical pain	0.63 ± 0.81	0.74 ± 0.93	0.154
D3 – Psychological discomfort	0.28 ± 0.65	1.05 ± 1.28	<0.001
D4 – Physical disability	0.31 ± 0.58	0.68 ± 0.94	<0.001
D5 – Psychological disability	0.33 ± 0.58	0.86 ± 1.11	<0.001
D6 – Social disability	0.24 ± 0.49	0.65 ± 1.03	<0.001
D7 – Handicap	0.16 ± 0.39	0.66 ± 1.02	<0.001
OHIP TOTAL	2.10 ± 3.18	5.11 ± 5.30	<0.001

CG: control group; SG: study group; OHIP_D1: Functional limitation; OHIP_D2: Physical pain; OHIP_D3: Psychological discomfort; OHIP_D4: Physical disability; OHIP_D5: Psychological disability; OHIP_D6: Social disability; OHIP_D7: Handicap; OHIP_D_TOTAL: sum of the dimensions. SD: standard deviation; IQR: interquartile range. Mann Whitney - $H_a\ \mu_{CG} < \mu_{SG}$

Exploratory multivariable models

In exploratory multivariable linear regression models including patients with cirrhosis from both countries, no variable remained independently associated with OHIP-TOTAL after simultaneous adjustment (e.g. Spain vs Brazil: β = −3.99; 95% CI: −9.70 to 1.72; p = 0.170; MELD: β = 0.15; 95% CI: −0.15 to 0.46; p = 0.324). Domain-level analyses showed no independent predictors for psychological discomfort (D3), whereas female sex was independently associated with higher psychological disability (D5) scores (β for male vs female = −0.341; 95% CI: −0.669 to −0.014; p = 0.041).

In an evaluation restricted to Brazilian patients with cirrhosis and including oral health variables only (xerostomia, hyposalivation, DMFT, oral hygiene status [IHOS], gingivitis, periodontal status, and removable dentures), higher OHIP-TOTAL was independently associated only with gingivitis (β = 4.964; 95% CI: 1.208 to 8.720; p = 0.010). In domain-level analyses, psychological discomfort (D3) was also independently associated with gingivitis (β = 0.671; 95% CI: 0.191 to 1.151; p = 0.006). For psychological disability (D5) and higher DMFT was independently associated with worse scores (β = 0.031 per unit; 95% CI: 0.002 to 0.061; p = 0.040).

DISCUSSION

Patients with cirrhosis consistently presented poorer OHRQoL than matched controls, with impairment observed across nearly all OHIP-14 domains, except physical pain. The greatest burden was concentrated in psychological domains, particularly psychological discomfort and psychological disability, which showed the highest scores and the widest variability. Overall OHRQoL was worse in the Brazilian cohort than in the Spanish cohort, suggesting that broader contextual factors may modulate how oral health impacts are perceived. Although impaired OHRQoL in this population has been previously reported(7–10), most prior studies were based on small, single-center samples and focused primarily on overall or physical aspects of impairment. By combining a large sample size, a matched control group, and a bi-national design, the present study extends this evidence by providing a domain-specific and cross-national characterization of OHRQoL in patients with cirrhosis.

In advanced chronic systemic disease, the burden of complex treatments, frequent hospitalizations, and life-threatening complications often leads patients to prioritize

survival-related issues, rendering oral health a secondary concern(18–20). As a result, oral health guidance and dental referral may not be consistently incorporated into routine follow-up, as medical management understandably focuses on controlling severe systemic conditions(21). This scenario has evolved in recent years, particularly in transplant settings, where dental evaluation is increasingly integrated into multidisciplinary care(22)(22). Nevertheless, barriers in general dental practice, such as limited training in managing medically complex patients and concerns regarding bleeding or infectious risks, may still contribute to delayed oral care before transplantation(23,24).

Between-country differences in OHRQoL may partly reflect each nation's socioeconomic context, which can influence how quality-of-life impacts are perceived and reported(25–28). This factor should be considered when interpreting patient-reported outcomes(29). In practical terms, this context includes broader indicators of standard of living, such as education, health literacy, and access to dental care, which may shape how oral symptoms are perceived, tolerated, and prioritized, as well as patients' expectations regarding their impact on daily life. In more socially vulnerable settings, oral problems may accumulate and be experienced as more disruptive, particularly in psychological and social domains. Importantly, individual-level socioeconomic indicators were not systematically collected, and these interpretations should therefore be viewed as contextual rather than causal.

A central finding of this study is the greatest perceived impact of psychological domains in OHRQoL(9). This pattern was previously reported by Zahed et al.(9) in a smaller sample and contrasts with earlier studies that also described impaired OHRQoL in cirrhosis but predominantly attributed this impairment to physical and functional aspects(7,8,10). Symptoms of anxiety and depression are highly prevalent among patients with cirrhosis and may influence OHRQoL not only by amplifying the subjective perception of oral symptoms, but also by reducing coping capacity, motivation for self-care, and adherence to preventive behaviors. Feelings of embarrassment, social withdrawal, and reduced self-esteem, common features of anxiety and depressive states, may further intensify the perceived psychosocial burden of oral conditions, even when their objective clinical severity is similar(30).

From a clinical perspective, this interaction suggests that OHRQoL impairments in cirrhosis cannot be fully understood or addressed through dental treatment alone.

Screening for psychological distress and closer integration between dental and mental health care may be particularly relevant for this population, especially when patients report disproportionate psychosocial impact relative to clinical findings. Accordingly, the predominance of psychological impact highlights the need for dentists to better understand patients' priorities, expectations, and subjective experiences, rather than focusing exclusively on pain control, infection prevention, and functional rehabilitation (31–34).

In exploratory multivariable analyses, we did not identify independent predictors of global OHRQoL (OHIP-TOTAL) among patients with cirrhosis, including traditional markers of liver disease severity such as MELD score and cirrhosis-related complications; however, higher psychological disability (D5) scores were associated with female sex, a pattern also reported in the general population(30,35).

This study has limitations. Its cross-sectional design and convenience sampling preclude causal inference, and reliance on medical record data may have limited the completeness of some clinical variables. No a priori sample size calculation was performed. However, based on the observed differences in OHIP-14 total scores, the available sample provided very high sensitivity for comparisons between cirrhotic patients and controls and adequate sensitivity for comparisons between Brazilian and Spanish cohorts. Despite matching by age, sex, and country, residual confounding remains possible, as individual-level socioeconomic conditions, access to care, and mental health comorbidities were not systematically assessed. The relatively small Spanish subsample represents an additional limitation, as it may reduce the precision of between-country comparisons and limit the generalizability of the findings across different national contexts. This imbalance should be considered particularly when interpreting domain-level contrasts, which are more sensitive to sample size variation. Therefore, the observed differences between Brazilian and Spanish cohorts should be interpreted with caution and viewed as exploratory rather than definitive.

Despite these limitations, the present findings emphasize the clinical relevance of OHRQoL assessment in patients with cirrhosis. The perceived oral health impact in this population is predominantly psychological, and differences across socioeconomic contexts further suggest that broader contextual factors may shape how oral health problems are experienced and reported. Together, these observations underscore the importance of considering oral health within a broader, patient-centered and multidisciplinary care framework for advanced liver disease. Given the cross-sectional design, these findings

should be interpreted with caution and considered as associations rather than causal relationships.

Key point table

Aspect	Key points
What was already known	Patients with liver cirrhosis frequently present poor oral health, including tooth loss, periodontal disease, and oral discomfort. Oral health problems are known to affect quality of life in the general population, but their specific impact on people with liver cirrhosis has been insufficiently explored.
What this study adds	This study demonstrates that people with liver cirrhosis experience significantly worse oral health-related quality of life compared with individuals without cirrhosis. The negative impact is particularly pronounced in emotional and psychological aspects, highlighting that oral health problems affect more than physical function alone.
How this may affect clinical practice	The findings emphasize the importance of integrating dental assessment and care into the routine management of patients with liver cirrhosis.

Statements

Acknowledgements

The authors would like to thank all patients who participated in this study and the clinical staff involved in patient care and data collection.

Funding statement: São Paulo Research Foundation – FAPESP (grant number: 2017/18938-6).

Conflict of interest disclosure: The authors declare no conflicts of interest.

Ethics Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the Helsinki Declaration and its later amendments. This project was approved by the Research Ethics Committee (CEP) of the Clinical Hospital of the University of São Paulo School of Medicine (HCFMUSP) (CAAE 70741017.1.0000.0068) and by the Research Ethics Committee of Santiago-Lugo (2019/536).

Patient consent statement: All patients read and signed an informed consent form.

Statement of Generative AI and AI-assisted technologies in the writing process". Declaration: During the preparation of this paper, the authors used Chatgpt for the purpose of support language refinement and stylistic editing. All scientific content, data analysis, interpretations, and conclusions were developed by the authors, who reviewed and approved the final version and assume full responsibility for the work. After using this tool/service, the authors reviewed and edited the content as necessary and take full responsibility for the content of the publication.

Data availability statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to ethical and legal restrictions related to the protection of patient privacy and confidential clinical information, the data are not publicly available.

Inclusion and Diversity Declaration: We support inclusive, diverse, and equitable research.

References were managed using **Zotero** reference management software and formatted according to the Spanish Journal of Gastroenterology modified Vancouver citation style using the journal's customized CSL file.

REFERENCES

1. Hu Y, Yang Y, Gao Y, et al. The impact of chronic diseases on the health-related quality of life of middle-aged and older adults: the role of physical activity and degree of digitization. BMC Public Health 2024;24:2335. DOI: 10.1186/s12889-024-19833-8

2. Yoon EL. A need for patient-centered care in managing patients with liver cirrhosis. Clin Mol Hepatol 2021;27:270–2. DOI: 10.3350/cmh.2021.0001

3. Alimoradi Z, Jafari E, Roshandel Z, et al. Meta-analysis with systematic review to synthesize associations between oral health related quality of life and anxiety and depression. BDJ Open 2024;10:9. DOI: 10.1038/s41405-024-00191-x

4. Budtz-Jørgensen E, Chung JP, Rapin CH. Nutrition and oral health. Best Pract Res Clin Gastroenterol 2001;15:885–96. DOI: 10.1053/bega.2001.0247

5. John MT, Patrick DL, Slade GD. The German version of the Oral Health Impact Profile – translation and psychometric properties. Eur J Oral Sci 2002;110:425–33. DOI: 10.1034/j.1600-0722.2002.21363.x

6. Gravier AL, Shamieh O, Paiva CE, et al. Meaning in life in patients with advanced cancer: a multinational study. Support Care Cancer 2020;28:3927–34. DOI: 10.1007/s00520-019-05239-5

7. Schmalz G, Meisel A, Kollmar O, et al. Oral health-related quality of life depending on dental and periodontal health in different patients before and after liver transplantation. Clin Oral Investig 2018;22:2039–45. DOI: 10.1007/s00784-017-2298-5

8. Santos-Lins LS, Aguiar ILS, Codes L, et al. Poor Oral Health-Related Quality of Life in Pre- and Post-Liver Transplantation Patients. Open Dent J 2021;15:196–203. DOI: 10.2174/1874210602115010196

9. Zahed M, Ranjbar MA, Azad A. Oral Health-Related Quality of Life in Chronic Liver Failure Patients Measured by OHIP-14 and GOHAI. Qi X, editor. BioMed Res Int 2020;2020:8835824. DOI: 10.1155/2020/8835824

10. Grønkjær LL, Vilstrup H. Oral health in patients with liver cirrhosis: Eur J Gastroenterol Hepatol 2015;27:834–9. DOI: 10.1097/MEG.0000000000000356

11. Galvão GS, Franco JB, Peres MPSDM, et al. Spontaneous bacterial peritonitis and soft tissue healing after tooth extraction in liver cirrhosis patients. Oral Surg Oral Med Oral Pathol Oral Radiol 2025;139:177–87. DOI: 10.1016/j.oooo.2024.09.003

12. Figueiredo MA, Andrade NS, Blanco Carrión A, et al. Bleeding during tooth extraction in patients with chronic kidney disease: A cross-sectional pilot study. Oral Dis 2024;30:2617–24. DOI: 10.1111/odi.14709

13. Slade GD, Spencer AJ. Development and evaluation of the Oral Health Impact Profile. Community Dent Health 1994;11:3–11.

14. De Oliveira BH, Nadanovsky P. Psychometric properties of the Brazilian version of the Oral Health Impact Profile–short form. Community Dent Oral Epidemiol 2005;33:307–14. DOI: 10.1111/j.1600-0528.2005.00225.x

15. Montero-Martín J, Bravo-Pérez M, Albaladejo-Martínez A, et al. Validation the Oral Health Impact Profile (OHIP-14sp) for adults in Spain. Med Oral Patol Oral Cirugia Bucal 2009;14:E44-50.

16. Singal AK, Kamath PS. Model for End-stage Liver Disease. J Clin Exp Hepatol 2013;3:50–60. DOI: 10.1016/j.jceh.2012.11.002

17. Forman DE, Berman AD, McCabe CH, et al. PTCA in the Elderly: The "Young-Old" versus the "Old-Old." J Am Geriatr Soc 1992;40:19–22. DOI: 10.1111/j.1532-5415.1992.tb01823.x

18. Öçbe M, Çelebi E, Öçbe ÇB. An overlooked connection: oral health status in patients with chronic diseases. BMC Oral Health 2025;25:314. DOI: 10.1186/s12903-025-05673-4

19. Camolesi Gc, Ortega Kl, Medina Jb, et al. Therapeutic alternatives in the management of osteoradionecrosis of the jaws. Systematic review. Med Oral Patol Oral Cirugia Bucal 2021;e195–207. DOI: 10.4317/medoral.24132

20. Martins F, Casseb J, Penalva-de-Oliveira A, et al. Oral manifestations of human T-cell lymphotropic virus infection in adult patients from Brazil. Oral Dis 2010;16:167–71. DOI: 10.1111/j.1601-0825.2009.01638.x

21. Lauridsen MM, Grønkjær LL, Khraibut S, et al. The Multi-dimensional Challenge of Poor Oral Health in Cirrhosis—Disparities and Solutions. Gastroenterology 2024;166:717–22. DOI: 10.1053/j.gastro.2024.01.010

22. Kwak EJ, Kim DJ, Choi Y, et al. Importance of oral health and dental treatment in organ transplant recipients. Int Dent J 2020;70:477–81. DOI: 10.1111/idj.12585

23. Browne M, Bebb K, Macpherson A, et al. Managing the Medically Complex Patient: Risk Assessment and Information Gathering. Prim Dent J 2020;9:17–23. DOI: 10.1177/2050168420923847

24. Da Rosa SV, Moysés SJ, Theis LC, et al. Barriers in Access to Dental Services Hindering the Treatment of People with Disabilities: A Systematic Review. Int J Dent 2020;2020:1–17. DOI: 10.1155/2020/9074618

25. Malicka B, Skośkiewicz-Malinowska K, Kaczmarek U. The impact of socioeconomic status, general health and oral health on Health-Related Quality of Life, Oral Health-Related Quality of Life and mental health among Polish older adults. BMC Geriatr 2022;22:2. DOI: 10.1186/s12877-021-02716-7

26. United Nations. Human Development Data Center [Internet]. [cited 2025 Nov 23]. Available from: https://hdr.undp.org/data-center/country-insights#/ranks

27. International Monetary Fund. European Dept. Spain: 2025 Article IV Consultation-Press Release; and Staff Report. IMF Staff Ctry Rep 2025;2025:1. DOI: 10.5089/9798229012782.002

28. International Monetary Fund. Western Hemisphere Dept. Brazil: 2025 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Brazil. IMF Staff Ctry Rep 2025;2025:1. DOI: 10.5089/9798229017602.002

29. Knorst JK, Sfreddo CS, De F. Meira G, et al. Socioeconomic status and oral health-related quality of life: A systematic review and meta-analysis. Community Dent Oral Epidemiol 2021;49:95–102. DOI: 10.1111/cdoe.12616

30. Long J, Pei X, Jiang W, et al. Mental health disorder in chronic liver disease: a questionnaire survey. Front Psychiatry 2024;15:1469372. DOI: 10.3389/fpsyt.2024.1469372

31. Medina JB, Andrade NS, De Paula Eduardo F, et al. Bleeding during and after dental extractions in patients with liver cirrhosis. Int J Oral Maxillofac Surg 2018;47:1543–9. DOI: 10.1016/j.ijom.2018.04.007

32. De Oliveira Rech B, Rocha Tenório J, Bertoldi Franco J, et al. Risk of bleeding during oral surgery in patients with liver cirrhosis. J Am Dent Assoc 2021;152:46-54.e2. DOI: 10.1016/j.adaj.2020.09.018

33. Franco JB, Andrade NS, Bueno MVRDS, et al. Assessment of laboratory tests and intraoperative bleeding in patients with liver cirrhosis undergoing tooth extractions. Oral Surg Oral Med Oral Pathol Oral Radiol 2022;133:148–55. DOI: 10.1016/j.oooo.2021.05.010

34. Figueiredo M, Domingues Fink M, Castro T, et al. Detection of human polyomaviruses JC and BK in liver pretransplant patients. Oral Dis 2017;23:1127–33. DOI: 10.1111/odi.12707

35. Mc Grath C, Bedi R. Gender variations in the social impact of oral health. J Ir Dent Assoc 2000;46:87–91.

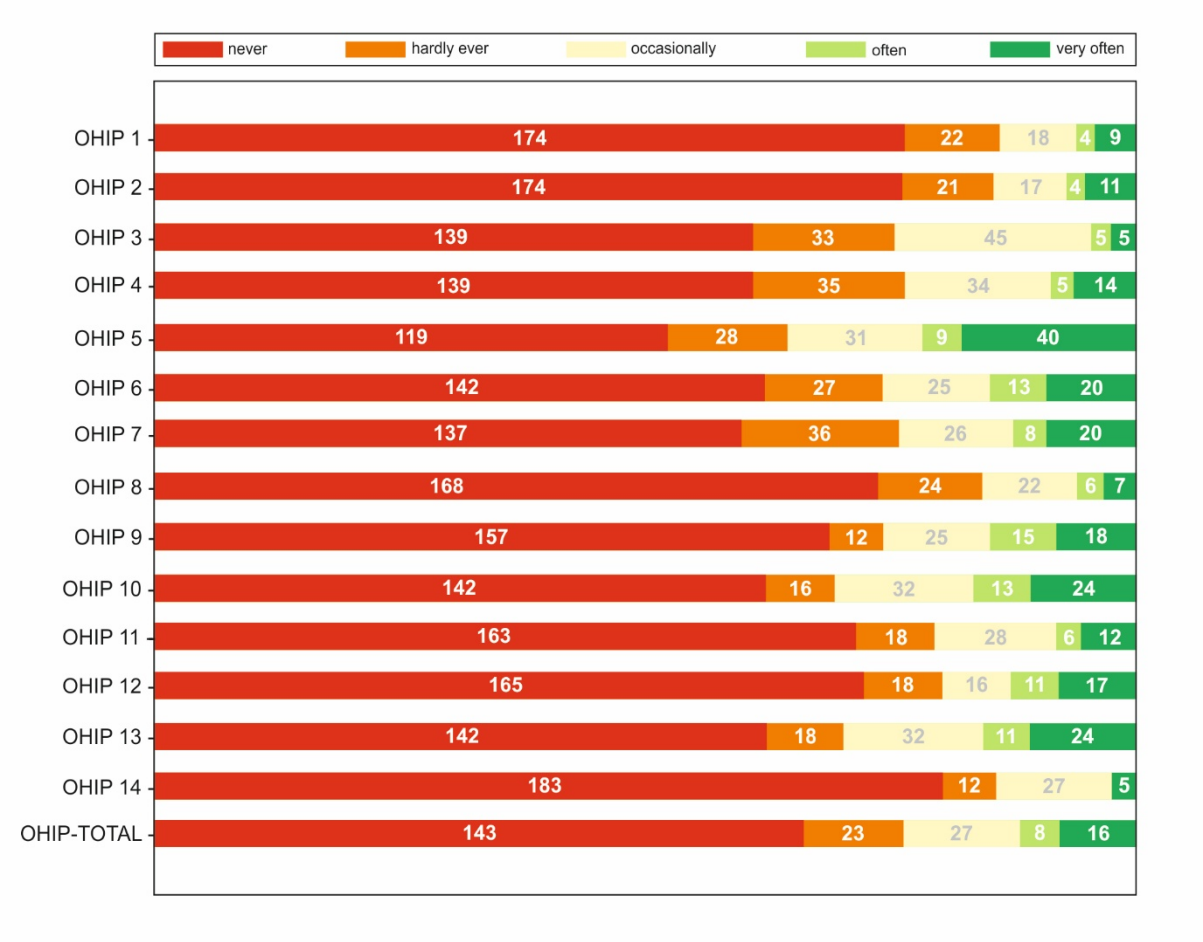
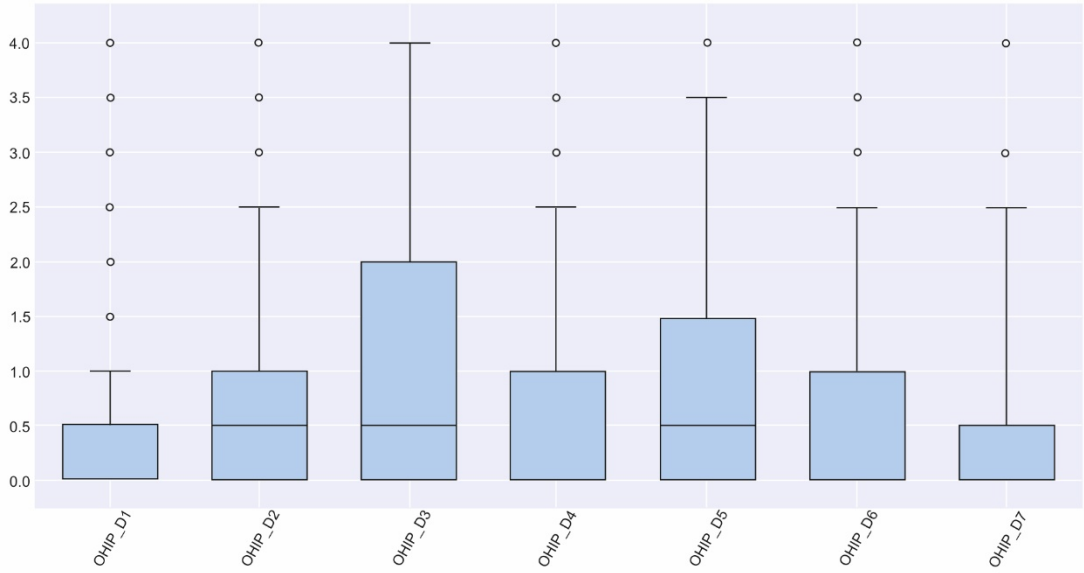


Figure 1. Absolute frequencies of the responses by the cirrhotic participants for each OHIP-14 question.



OHIP-14 Domains: D1 = Functional limitation; D2 = Physical pain; D3 = Psychological discomfort; D4 = Physical incapacity; D5 = Psychological Incapacity; D6 = Social incapacity; D7 = Deficiency.

Figure 2 - Box plot of the OHIP-14 domains. Overview of the variability and distribution of the data for each domain.