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Health and functional status in oral potentially malignant disorders: a questionnaire-based study

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ABSTRACT

Background and Objective: Oral potentially malignant disorders (OPMDs) are a group of oral mucosal abnormalities with an increased risk of malignant transformation. Their high prevalence, especially in Asia, poses a significant public health concern. Beyond disease control, understanding the impact of OPMDs on patients' health-related quality of life (HRQoL) is essential for guiding treatment decisions and optimizing care. This study aimed to identify factors that could effect HRQoL in patients with OPMDs in the local population.

Methods: A cross-sectional study was conducted over 8 months at Ziauddin University and Abbasi Shaheed Hospitals, enrolling 83 patients aged >20 years with clinically and histologically confirmed OPMDs. Patients with other medical conditions or prior treatments were excluded. Written informed consent was obtained. HRQoL was assessed using the Short Form-36 questionnaire across eight domains. Analysis of variance was used to compare HRQoL domains, and Pearson's correlation tested associations between variables. A p-value <0.05 was considered statistically significant.

Result: Actinic cheilitis was the most common lesion, predominantly affecting patients aged 51-60 years. Physical health was the most impaired HRQoL domain (p = 0.001), while mental health was the least affected (p = 0.02). Patients ≥40 years reported poorer physical health, whereas those aged 41-50 experienced greater mental health and activity limitations. Pain showed a positive correlation with social health (r = 0.426, p < 0.01) and a negative correlation with emotional health (r = -0.291, p < 0.01). Mental and emotional health were strongly correlated (r = 0.741, p < 0.01).

Conclusion: OPMDs significantly impair HRQoL, particularly physical health and daily functioning. Pain adversely affects social and emotional well-being, while mental and emotional health are closely linked. Findings highlight the need for targeted HRQoL assessment and patient-centered care to optimize outcomes.

Keywords: Quality of life, health impact, oral potentially malignant disorders, physical health, mental health.

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Introduction

Oral cancer is increasingly recognized as a major public health concern due to its significant contribution to morbidity and mortality worldwide. The incidence of oral cancer continues to rise across all age groups.[1] According to the estimates reported by the International Agency for Research on Cancer through the GLOBOCAN, global cases of oral cancer were projected to increase by 46.5% in 2020, affecting more than 553,481 individuals worldwide.[2]

In Pakistan, oral potentially malignant disorders (OPMDs) represent a significant clinical and public health challenge. A tertiary care study reported that 54.4% of patients referred for surgical biopsy were diagnosed with OPMDs, with leukoplakia (42.6%) being the most frequently observed lesion, followed by oral lichen planus (23.5%) and oral submucous fibrosis (18.4%).[3] Similarly, a cross-sectional study conducted across various clinical settings in Karachi identified oral submucous fibrosis (28.6%) as the most prevalent lesion, with leukoplakia and lichen planus reported at comparatively lower frequencies.[4] These findings highlight the considerable burden of OPMDs within the local population.

Oral cancer is commonly preceded by precursor lesions collectively referred to as OPMDs. These include conditions such as leukoplakia, oral lichen planus, and oral submucous fibrosis, which carry varying degrees of risk for malignant transformation.[5] Patients diagnosed with OPMDs frequently experience physical discomfort as well as psychological distress due to the fear of disease progression to malignancy.

A recent systematic review has highlighted that health-related quality of life (HRQoL) among patients with OPMDs remains inadequately studied, particularly in Asian populations where the prevalence of these conditions is highest.[1]

Quality of life (QoL), as defined by the World Health Organization, refers to an individual's perception of their position in life within the context of the cultural and value systems in which they live, and in relation to their goals, expectations, standards, and concerns.[6] Assessing HRQoL is essential for several reasons. First, HRQoL outcomes should be incorporated into therapeutic trials to evaluate treatment effectiveness, which requires the use of validated HRQoL assessment tools. Second, HRQoL data can provide valuable insights into the equitable allocation of healthcare resources. Third, identifying factors that influence HRQoL may help in developing targeted interventions to improve patient well-being, particularly in conditions where curative treatments are limited.[7] HRQoL is a multidimensional construct encompassing physical, psychological, and social aspects of health and well-being.[8]

Although several frameworks exist for selecting health measurement instruments, including the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN) and review criteria proposed by the Scientific Advisory Committee of the Medical Outcomes Trust, there is currently no universally accepted guideline for the selection of QoL instruments. Various reviews provide guidance to researchers in choosing appropriate tools while also outlining their limitations.[9,10]

Evaluating the impact of OPMDs on HRQoL is important for understanding patients' perceptions of their illness and their willingness to seek treatment or participate in early screening programs.[11,12] Therefore, the primary objective of the present study was to assess HRQoL among patients with OPMDs and to identify factors influencing HRQoL within the local population.

Methods

This cross-sectional study was conducted on 83 patients aged >20 years who presented with OPMDs at the outpatient departments of **Ziauddin University Hospital and Abbasi Shaheed Hospital, Karachi. The study was carried out over a period of 8 months, from December 2023 to August 2024, following approval from the Institutional Ethical Review Committee (Reference No. 2941220ZAPAT, approved in February 2021).

Diagnosis of OPMDs was established through clinical examination performed by an experienced oral and maxillofacial surgeon, followed by histopathological confirmation. Patients diagnosed with oral premalignant disorders who had no other oral mucosal conditions or systemic diseases and had not received prior treatment were included in the study. Exclusion criteria included patients with recurrent lesions, a history of head and neck malignancy, those who had previously received radiotherapy or chemotherapy, and individuals who were unwilling or unable to complete the HRQoL assessment.

Written informed consent was obtained from all participants before enrollment. HRQoL was assessed using the Short Form-36 (SF-36) questionnaire, a validated health survey consisting of 36 items covering eight domains of HRQoL.[13]

Statistical analysis

Data were analyzed using the IBM SPSS Statistics version 21. Descriptive statistics were used to summarize demographic and clinical variables. The chi-square test was applied to examine associations between categorical variables at a 95% confidence interval. Analysis of variance (ANOVA) was used to compare differences among HRQoL domain scores, while Pearson's correlation test was applied to assess relationships between variables. A *p*-value <0.05 was considered statistically significant.

Results

Demographic characteristics

The demographic distribution of the study population is presented in Table 1. Among the 83 patients with OPMDs, 48 (57.83%) were males, and 35 (42.16%) were females. The highest proportion of patients belonged to the 51–60 years

Table 1. *Demographic characteristics of patients presenting with OPMDs.*

Characteristics	Frequency	Percentages
Gender	*N*	%
Male	48	57.83%
Female	35	42.16%
Age groups		
20-30	7	8.4%
31-40	18	21.6%
41-50	14	16.8%
51-60	29	34.9%
>60	15	18%
OPMD type		
Leukoplakia	19	22.8%
Actinic cheilitis	27	32.5%
Oral submucous fibrosis	22	26.5%
Oral lichen planus	19	22.89%
Erythroplakia	10	12%

Table 2. *Association of OPMDs with SF-36 questionnaire domains.*

Domains	Range	Minimum	Maximum	Mean	Std. Deviation	*p*-value
Pain status	3.00	1.00	2.00	2.6325	1.34	1.099
Energy and emotions	5.00	1.00	5.00	3.2590	1.72	0.03
Mental health	5.00	1.00	5.00	3.9759	1.09	0.02
Limited activities	2.00	1.00	3.00	2.3584	1.34	0.001
Social health	3.00	1.00	4.00	1.7771	1.89	0.004
Emotional health	5.00	1.00	4.00	3.9759	1.56	0.01
Physical health	1.00	1.00	2.00	1.4940	1.22	0.001
Health	4.00	1.00	5.00	3.6430	1.32	0.04

Chi-square test applied; p-value <0.05 considered statistically significant.

age group (34.9%), followed by individuals aged 31–40 years (21.6%) and >60 years (18%).

With respect to the type of OPMD, actinic cheilitis was the most frequently observed lesion (32.5%), followed by oral submucous fibrosis (26.5%), leukoplakia (22.8%), oral lichen planus (22.89%), and erythroplakia (12%).

HRQoL assessment using SF-36

The mean scores of the SF-36 domains in relation to OPMDs are summarized in Table 2. Significantly higher mean scores were observed in the energy and emotions domain (mean = 3.2590, p = 0.03) and the mental health domain (mean = 3.9759, p = 0.02), indicating that these aspects of HRQoL were comparatively less affected by the disease.

Conversely, the physical health domain demonstrated the lowest mean score (1.4940) and was most adversely affected by OPMDs (p = 0.001). Significant associations were also observed in limited activities (p = 0.001), social health (p = 0.004), emotional health (p = 0.01), and general health (p = 0.04) domains.

Age-wise association with HRQoL domains

The association between patient age groups and SF-36 domains is presented in Table 3. A significant decline in physical health scores was observed among patients aged ≥40 years ($p < 0.05$).

Furthermore, mental health and limitation of activities were most affected in patients aged 41-50 years, demonstrating statistically significant associations ($p < 0.01$). These findings indicate that advancing age may contribute to deterioration in certain domains of HRQoL among OPMD patients.

Correlation between HRQoL domains

The heat map represented the relationship of health related QoL domains in OPMD as shown in Figure 1. There is a moderate positive correlation (r = 0.426, $p < 0.01$) found between pain status and social health. Moreover, a moderate negative correlation (r = -0.291, $p < 0.01$) was significantly associated with pain and emotional health indicating that higher pain was associated with worse emotional health. Whereas, no significant correlation with other variables like energy and emotions found. Furthermore, a strong positive correlation (r = 0.741, $p < 0.01$) was observed between mental and emotional health. However, physical health has a small but significant positive relationship with limited activities.

Physical health demonstrated a small but statistically significant positive correlation with limited activities (r = 0.235, p = 0.002), indicating that deterioration in physical health may contribute to increased activity limitations.

However, no significant correlations were observed between several other domains, including energy and emotions, with most HRQoL parameters.

Discussion

The perception of disease impact on daily functioning has increasingly been recognized as a crucial component in evaluating disease progression, treatment outcomes, and patient care requirements. Individuals with oral mucosal disorders frequently report higher levels of anxiety and depression along with a diminished QoL.[14] These psychological challenges are closely associated with overall QoL, emphasizing the importance for clinicians to consider the psychological well-being of patients with oral mucosal lesions during clinical evaluation and management.[15]

The present study highlights two principal findings. First, patients with OPMDs demonstrated an overall reduction in HRQoL, with the most pronounced impairment observed in the physical health domain. In contrast, mental health, emotional well-being, and energy levels appeared comparatively less affected. Furthermore, a moderate positive correlation between pain status and social health was identified, suggesting that increased pain may negatively influence social interactions in patients with OPMDs. Previous investigations have similarly reported that individuals with

Table 3. *Association of patients age group with domains of SF-36 questionnaire.*

Dependent variable	Age	Mean difference	Std. Error	p-value	95% confidence interval	
					Lower bound	Upper bound
	20-30	0.19454	0.6777	0.829	-0.3235	0.9146
	31-40	0.01587	0.6402	1.23	-1.772	1.8037
Pain status	41-50	-0.21429	0.66532	0.098	-2.0723	1.6437
	51-60	-0.11823	0.60525	1.09	-1.8085	1.572
	61 and above	-0.22857	0.65788	0.997	-2.0658	1.6086
	20-30	0.18254	0.22777	0.929	-0.4535	0.8186
	31-40	0.00587	0.6402	0.932	-1.872	1.7037
Physical health	41-50	0.18254	0.18222	0.054	-0.3263	0.6914
	51-60	0.09387	0.15344	0.03	-0.3346	0.5224
	61 and above	0.07778	0.17877	0.992	-0.4215	0.577
	20-30	1.0873	0.74897	0.017	-1.0043	3.1789
	31-40	0.0487	0.7402	0.032	-1.862	1.607
Emotional health	41-50	0.01587	0.59918	1.134	-1.6574	1.6891
	51-60	-0.33142	0.50454	0.965	-1.7404	1.0776
	61 and above	-0.05556	0.58783	1.245	-1.6972	1.586
	20-30	0.14286	0.41837	0.197	-1.0255	1.3112
	31-40	0.0187	0.5302	0.02	-1.862	1.5337
Social health	41-50	-0.21429	0.3347	0.068	-1.149	0.7204
	51-60	0.06897	0.28183	0.09	-0.7181	0.856
	61 and above	-0.13333	0.32836	0.994	-1.0503	0.7837
	20-30	-0.23016	0.28574	0.928	-1.0281	0.5678
	31-40	0.0637	0.9322	0.06	-1.942	1.907
Limited activities	41-50	-0.01587	0.22859	0.001	-0.6542	0.6225
	51-60	-0.01341	0.19249	0.001	-0.5509	0.5241
	61 and above	-0.21111	0.22426	0.88	-0.8374	0.4152
	20-30	-0.68254	0.78098	0.906	-2.8635	1.4984
	31-40	0.00627	0.5102	0.012	-1.886	1.797
Mental health	41-50	-0.46825	0.62479	0.04	-2.213	1.2765
	51-60	0.0613	0.5261	0.05	-1.4079	1.5305
	61 and above	0.15556	0.61296	0.999	-1.5562	1.8673
	20-30	-0.57143	0.70119	0.025	-2.5296	1.3867
	31-40	0.0787	0.9412	0.02	-1.912	1.937
Energy and emotions	41-50	0.320	0.56096	0.01	-1.5665	1.5665
	51-60	-0.55172	0.47235	0.769	-1.8708	0.7674
	61 and above	0.2	0.55034	0.196	-1.2369	1.669
	20-30	-0.602	0.6809	0.806	-2.4635	1.984
	31-40	0.01627	0.5302	0.013	-1.786	1.97
Health	41-50	-0.3682	0.7247	0.05	-2.113	1.65
	51-60	0.0513	0.261	0.04	-1.3079	1.05
	61 and above	0.25556	0.1276	0.91	-1.562	1.73

ANOVA and Post Hoc applied, *p*-value of 0.05 considered statistically significant.

Correlations								
Pain status	Pearson Correlation	1	-.007	-.226**	-.017	.426**	-.002	-.291**
	Sig. (2-tailed)		.924	.003	.824	.000	.979	.000
Energy and emotions	Pearson Correlation	-.007	1	-.015	.033	-.260**	.075	-.104
	Sig. (2-tailed)	.924		.844	.675	.001	.337	.181
Mental health	Pearson Correlation	-.226**	-.015	1	-.050	-.046	.031	.741**
	Sig. (2-tailed)	.003	.844		.523	.559	.690	.000
Physical health	Pearson Correlation	-.017	.033	-.050	1	-.096	.235**	.036
	Sig. (2-tailed)	.824	.675	.523		.220	.002	.646
Social health	Pearson Correlation	.426**	-.260**	-.046	-.096	1	.020	.005
	Sig. (2-tailed)	.000	.001	.559	.220		.797	.952
Limited activities	Pearson Correlation	-.002	.075	.031	.235**	.020	1	.080
	Sig. (2-tailed)	.979	.337	.690	.002	.797		.309
Emotional health	Pearson Correlation	-.291**	-.104	.741**	.036	.005	.080	1
	Sig. (2-tailed)	.000	.181	.000	.646	.952	.309	
**. Correlation is significant at the 0.01 level (2-tailed).								

Figure 1. *Relationship between health related QoL domains in OPMD patients. Pearson correlation applied.*

advanced oral cancer often exhibit poorer HRQoL compared with those diagnosed at earlier stages or with OPMDs.[7,16]

A multicenter cross-sectional study conducted in the United Kingdom involving 1,047 patients with oral and oropharyngeal cancers assessed HRQoL using the University of Washington QoL questionnaire. The authors reported significantly lower HRQoL scores in patients with late-stage disease compared with early-stage disease, particularly in social and functional domains (mean social-emotional score: Stage I-II = 78.3 ± 11.2 *vs.* Stage III-IV = 52.6 ± 14.5; $p < 0.001$). These findings highlight that increasing symptom severity, particularly pain, is strongly associated with deteriorating social functioning and overall well-being.[17]

In Pakistan, evidence evaluating HRQoL in patients with OPMDs remains limited. A cross-sectional study conducted in Karachi reported that patients with oral submucous fibrosis experience significant impairment in HRQoL, particularly in domains related to physical pain, social interaction, and psychological distress.[18]

The influence of OPMD severity on the physical component of HRQoL observed in the present study is consistent with previous research on burning mouth syndrome (BMS), where physical symptoms significantly affected QoL.[15] In that study, 26 individuals with BMS (mean age 63.6 ± 11.0 years; 93% females) demonstrated significantly lower scores across all SF-36 domains ($p < 0.00625$) and higher scores in OHIP-49 domains ($p < 0.00714$) compared with 27 age- and gender-matched healthy controls, indicating a substantial negative impact of the condition on HRQoL.[19]

Similarly, a 2023 study evaluating QoL in patients with potentially malignant oral lesions reported that individuals with oral premalignant conditions had comparatively higher QoL scores than patients with epithelial dysplasia, particularly within the 40-64 year age group.[20] Furthermore, evidence suggests that psychological distress associated with chronic oral conditions such as OPMDs may exert a greater influence on QoL than physical or functional limitations alone.[5,9] Comparable findings have been reported in studies from India and Sri Lanka, where OPMDs were shown to substantially affect daily activities, nutritional status, and psychological well-being.[14,21]

These findings highlight the importance of incorporating HRQoL assessment tools such as the SF-36 questionnaire to facilitate comparisons across diseases and research settings. However, although SF-36 provides valuable information regarding general health status, it may not fully capture disease-specific factors associated with OPMDs. Therefore, the development of a specialized HRQoL instrument tailored to OPMD patients could enhance the accuracy and clinical relevance of QoL assessments.[22] Future research should focus on designing and validating OPMD-specific HRQoL tools to

better evaluate disease burden and treatment outcomes in this patient population.[23]

The present study also observed that patients aged above 40 years experienced a significant decline in physical health scores. Interestingly, the mental health component remained relatively stable among older patients, which may be explained by the concept of "response shift." This phenomenon describes how patients adjust their internal standards, expectations, and perceptions as they adapt to chronic illness and its consequences.[24] Given that OPMDs are typically slow-progressing conditions, patients may gradually develop coping mechanisms that help maintain psychological stability despite physical limitations.[1] Interventions that support these adaptive responses may therefore contribute to improved QoL among individuals with oral disorders.[25]

Physical disability and functional limitations were commonly reported concerns among patients in the present study. Nevertheless, the burden of OPMDs extends beyond physical impairment and encompasses psychological and social dimensions of health as well.[26] These findings suggest that clinical decision-making should incorporate patient-reported outcomes rather than relying solely on clinical indicators or disease severity. Addressing both the physical and psychological health needs of patients with OPMDs is therefore essential to improving HRQoL.

Limitations of the study

This study has several limitations. The relatively small sample size may limit the generalizability of the findings. In addition, the cross-sectional study design restricts the ability to establish causal relationships between the severity of OPMDs and HRQoL outcomes. Furthermore, important variables such as socioeconomic status, educational level, and lifestyle habits (including tobacco use, betel quid consumption, and areca nut chewing) were not evaluated, which may have influenced both the occurrence of OPMDs and the HRQoL of the participants.

Conclusion

This study demonstrates a significant reduction in HRQoL among individuals with OPMDs, with the greatest impact observed in physical health and daily functional activities. Pain exhibited a moderate association with reduced social interaction and poorer emotional well-being, while mental and emotional health domains showed a strong interrelationship. In addition, physical health demonstrated a modest association with limitations in daily activities.

Overall, these findings highlight the multidimensional impact of OPMDs on physical, emotional, and social aspects of health. The results emphasize the need for disease-specific HRQoL assessment tools and integrated patient-centered management strategies to better address the comprehensive needs of individuals with OPMDs and to improve clinical outcomes.

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List of Abbreviations

HRQoL	Health-related quality of life
OPMDs	Oral potentially malignant disorders
QoL	Quality of life
SF-36	Short Form (36) health survey

Conflict of interest

None to declare.

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None to disclose.

Ethical approval

This study was approved by the Institutional Review Board of Ziauddin University Karachi vide Letter No 2941220ZAPAT granted on February 2021.

Author's contributions

SZA: Conceptualization, study design, data collection, manuscript drafting, **NR:** Methodology, data analysis, interpretation, and critical review of the manuscript.

HA: Supervision, validation, analysis of data, and revision of the manuscript for important intellectual content.

FR: Data acquisition, literature review, and assistance in drafting the results, **KL:** Statistical support, interpretation of findings, and manuscript editing.

SA: Acquisition of data, important intellectual content, drafting of manuscript.

ALL AUTHORS: Approval and full responsibility of the final version of the manuscript to be published.

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References

1. Kumar K, Khandpur M, Khandpur S, Mehrotra D, Tiwari SC, Kumar S, et al. Quality of life among oral potentially malignant disorder patients: a prospective study. J Oral Biol Craniofac Res. 2021;11(1):88–91. https://doi.org/10.1016/j.jobcr.2020.11.009
2. Cirillo N. Precursor lesions, overdiagnosis, and oral cancer: a critical review. Cancers (Basel). 2024;16(8):1550. https://doi.org/10.3390/cancers16081550
3. Warnakulasuriya S. Clinical features and presentation of oral potentially malignant disorders. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2018;125(6):582–90. https://doi.org/10.1016/j.oooo.2018.03.011
4. Akhlaq H, Khan MSU, Nasir M, Sheikh H, Mehmood N, Sajjad I, et al. Prevalence and risk factors of oral mucosal lesions: a retrospective study of patients attending oral diagnosis department of SIOHS, Karachi, Pakistan. J Pak Dent Assoc. 2021;38(1):11–6.
5. Arboleda LP, Pereira TC, Epstein JB, Migliorati CA, Warnakulasuriya S, Diniz-Freitas M, et al. Clinical and psychosocial impact of oral potentially malignant disorders communication: a scoping review. J Oral Pathol Med. 2023;52(7):641–50. https://doi.org/10.1111/jop.13321
6. Gondivkar SM, Gadbail AR, Gondivkar RS, Sarode SC, Sarode GS, Patil S. Impact of oral potentially malignant disorders on quality of life: a systematic review. Future Oncol. 2018;14(10):995–1003. https://doi.org/10.2217/fon-2017-0577
7. Raman S, Shafie AA, Abraham MT, Kiong SC, Maling TH, Rajendran S, et al. Health-related quality of life among patients with oral potentially malignant disorder and oral cancer in Malaysia. Asian Pac J Cancer Prev. 2022;17(1):101–11. https://doi.org/10.21315/aos2022.1701.OA06
8. Ahmad MR, Abd Hamid IJ, Zainudeen ZT, Hashim IF, Azizuddin MNA, Mangantig E, et al. Health-related quality of life of patients and families with primary immunodeficiency in Malaysia: a cross-sectional study. Clin Dev Immunol. 2023;43(5):999–1006.
9. Ashshi RA, Stanbouly D, Chuang SK, Takako TI, Stoopler ET, Sollecito TP, et al. Quality of life in patients with oral potentially malignant disorders: oral lichen planus and oral epithelial dysplasia. Oral Surg Oral Med Oral Pathol Oral Radiol. 2023;135(3):363–71. https://doi.org/10.1016/j.oooo.2022.12.015
10. Wan Puteh SE, Razali H, Ismail A, Zulkifli MJ. Health status based on EQ-5D-5L for the cancer patient population in Malaysia. Health Qual Life Outcomes. 2024;14(1):8152. https://doi.org/10.1186/s12955-024-8152-5
11. Tadakamadla J, Kumar S, Lalloo R, Johnson NW. Development and validation of a quality-of-life questionnaire for patients with oral potentially malignant disorders. Oral Surg Oral Med Oral Pathol Oral Radiol. 2017;123(3):338–49. https://doi.org/10.1016/j.oooo.2016.10.025
12. Truong HP, Nguyen KM, Tran HT, Hoang SV. Assessment of health-related quality of life in patients with chronic heart failure: a cross-sectional study in Vietnam. Health Qual Life Outcomes. 2023;21(1):61. https://doi.org/10.1186/s12955-023-02068-2
13. Mchorney CA, Johne W, Anastasiae R. The MOS 36-item short-form health survey (SF-36). Med Care. 1992;30(6):473–83. https://doi.org/10.1097/00005650-199206000-00002
14. Tadakamadla J, Kumar S, Lalloo R, Gandhi Babu DB, Johnson NW. Impact of oral potentially malignant disorders on quality of life. J Oral Pathol Med. 2018;47(1):60–5. https://doi.org/10.1111/jop.12620
15. Yang C, Liu L, Shi H, Zhang Y. Psychological problems and quality of life of patients with oral mucosal diseases: a preliminary study in Chinese population. BMC Oral Health. 2018;18(1):1–7. https://doi.org/10.1186/s12903-018-0496-2
16. Alkofahi H, Ebrahimi M. Potentially malignant disorders of the oral cavity. In: Assal R, editor. Early detection and treatment of head & neck cancers: theoretical background and newly emerging research. Berlin, Germany: Springer; 2021. pp 51–73.
17. Youssef S. The relationship between physical symptoms and health-related quality of life in oculopharyngeal muscular dystrophy. Phys Ther. 2016;96(5):694–9. https://doi.org/10.2522/ptj.20150352
18. Nassab ARG, Navabi N, Pour MM, Charrosta N, Hashemipour MA. Quality of life in patients with chronic oral mucosal conditions: a qualitative research. Patient Prefer Adherence. 2021;15:e0092.
19. Rogers SN, Lowe D, Yueh B, Weymuller Jr EA. The physical function and social-emotional function subscales of the University of Washington Quality of Life Questionnaire. Arch Otolaryngol Head Neck Surg. 2010;136(4):352–7. https://doi.org/10.1001/archoto.2010.38
20. Memon AB, Rahman AAU, Channar KA, Zafar MS, Kumar N. Assessing the quality of life of oral submucous fibrosis patients: a cross-sectional study using the WHOQOL-BREF tool. Int J Environ Res Public Health. 2021;18(18):9498. https://doi.org/10.3390/ijerph18189498
21. Souza FT, Santos TP, Bernardes VF, Teixeira AL, Kümmer AM, Silva TA, et al. The impact of burning mouth syndrome on health-related quality of life. Health Qual Life Outcomes. 2011;9(1):57. https://doi.org/10.1186/1477-7525-9-57
22. Frydrych AM, Van Schaijik B, Parsons R, Kujan O. Changes in quality of life over time in patients diagnosed with oral leukoplakia: a prospective longitudinal study. J Oral Pathol Med. 2023;52(3):226–31. https://doi.org/10.1111/jop.13220
23. Kularatna S, Whitty JA, Johnson NW, Jayasinghe R, Scuffham PA. A comparison of health state utility values associated with oral potentially malignant disorders and oral cancer in Sri Lanka assessed using the EQ-5D-3L and the EORTC-8D. Health Qual Life Outcomes. 2016;14(1):101. https://doi.org/10.1186/s12955-016-0507-6
24. Essex R, Govintharajah P, Issa R, Kalocsányiová E, Lakika D, Markowski M, et al. Health-related quality of life amongst refugees: a meta-analysis of studies using the SF-36. Health Qual Life Outcomes. 2024;26(5):925–35. https://doi.org/10.1007/s11136-024-0845-x
25. Gagliardi J, Brettschneider C, König HH. Health-related quality of life of refugees: a systematic review of studies using the WHOQOL-BREF instrument in general and clinical refugee populations in the community setting. Health Qual Life Outcomes. 2021;15(1):44. https://doi.org/10.1186/s12955-021-01695-5
26. Tadakamadla J, Kumar S, Lalloo R, Johnson NW. Qualitative analysis of the impact of oral potentially malignant disorders on daily life activities. PLoS One. 2017;12(4):175531. https://doi.org/10.1371/journal.pone.0175531