Original Article

Oral health-related quality of life in chronic kidney disease patients

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ABSTRACT

Background: Chronic kidney disease (CKD) is a systemic disease with a major burden on several life aspects, including oral health. As life expectancy has improved in CKD patients, oral health status has become important regarding their quality of life. The aim of this study was to investigate oral health and oral health-related quality of life (OHRQoL) in CKD patients.

Materials and Methods: This was a cross-sectional study. Patients' age, gender, and estimated glomerular filtration rate (eGFR) stage were recorded. Oral Health Impact Profile-14 (OHIP-14) was used to evaluate OHRQoL. Decayed, missing, and filled teeth (DMFT) index was utilized to record oral health status. SPSS software was used to analyze data. One-way ANOVA, t-test and Pearson/Spearman correlations were used. $P < 0.05$ was considered statistically significant.

Results: One hundred and four patients participated; 60.6% male versus 39.4% female. Mean age was 52.1 ± 18.1 years. The most frequent eGFR stage was 5 (41.2%). Mean DMFT score was 18.7 ± 8.5. Mean OHIP-14 score was 14.82 ± 5.86. DMFT score was significantly correlated with OHIP-14 total score as well as its physical domains ($P < 0.05$). The correlation between eGFR stage and OHIP-14/DMFT score was both statistically significant ($P = 0.03/P = 0.02$, respectively).

Conclusion: DMFT score was significantly correlated with OHRQoL in CKD patients, especially regarding its physical domains. Paying attention to fulfill dental treatment needs seems mandatory to improve OHRQoL and overall quality of life in these patients.

Key Words: Oral health, quality of life, renal insufficiency

INTRODUCTION

Chronic kidney disease (CKD) is a common disorder that often occurs as a complication of other systemic conditions such as diabetes, obesity, hypertension, or heart failure.[1] CKD is defined as abnormalities of kidney structure or function, present for more than 3 months with complications for health.[2] The global estimated prevalence of CKD is 13.4%,[3] while it affects more than 20 million Americans, with over 500,000 end-stage renal disease.[4]

Estimated glomerular filtration rate (eGFR) is categorized into five stages in CKD patients. In stage 1, GFR is normal or increased with signs of kidney damage. In stage 2, GFR is mildly decreased, whereas in stage 3 and 4, GFR is moderately and severely decreased, respectively. The last stage is kidney failure with the need of kidney transplant or dialysis.[4,5]

Oral health status in CKD patients does not seem promising.[6] The most common oral manifestations

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are gingival overgrowth, periodontitis, oral pain, dry mouth, taste change, pale mucosa, uremic odor, mycotic infections, and bone lesions.[7-11]

The prevalence of depression in patients with stage 5 eGFR is higher compared to the general population.[12] Camacho-Alonso *et al*. showed that quality of life, anxiety, and depression are worse in patients on hemodialysis.[7] Anxiety and depression can negatively affect oral health-related quality of life (OHRQoL).[13,14]

OHRQoL portrays patients' comprehension of oral health status and dental treatments on psychosocial life.[15,16] Different dimensions of OHRQoL cover subjects such as presence of teeth with appropriate function, absence of disease, discomfort and pain, normal social interactions, and smiling.[17] One of the methods to measure OHRQoL is Oral Health Impact Profile (OHIP)-14.[18] OHIP-14 has been translated into Persian, and its reliability and validity have been approved.[19] The questionnaire has been widely used among chronic systemically compromised patients to assess OHRQoL.[7,8,15,18-20]

Considering the move of the burden of CKD toward increased life expectancy[3] and lack of oral hygiene in these patients,[10] in addition to the inadequacy of clinical examinations in explaining patient' contentment with their oral health, assessing the influence of patient's oral health on OHRQoL could be important.[21] The present study evaluates oral health and OHRQoL in CKD patients.

MATERIALS AND METHODS

This *in vitro* study was approve in research and ethics committee of Isfahan (NO:140094). This was a cross-sectional study carried out from June 2019 to June 2020.

Patients
Patients with a confirmed diagnosis of CKD, referred to the Department of Oral Medicine, Isfahan University of Medical Sciences, Isfahan, Iran, were invited to participate. Inclusion criteria were eGFR stage 2 or more, age >12 years, literacy, and informed consent. Exclusion criteria consisted of hypo/hyperdontia, syndromes affecting the oral region or dentition, and unfeasibility of performing oral examination due to mental retardation or psychiatric disorders. Patient age and gender were recorded. Further, patient's eGFR was categorized as follows:

- Stage 2: 60–89
- Stage 3: 30–59
- Stage 4: 15–29
- Stage 5: <15 ml/min/1.73m^2.[22,23]

Oral health-related quality of life
OHIP-14 was used to evaluate OHRQoL. It consists of 14 questions in seven domains: functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Each question is valued by a Likert scale from 0 (never) to 4 (almost always). Therefore, each domain scores a range from 0 to 8, and the total sum ranges from 0 to 56. Higher scores indicate lower OHRQoL.[24]

Oral examination
The decayed (D), missing (M), and filled (F) teeth (DMFT) index was used to calculate the patients' dental health. Teeth with cavity and/or undermined enamel were classified as D, missing teeth due to caries were classified as M, and teeth which were filled or crowned with restorative material were classified as F. The examination was carried out on a dental chair, under artificial light, with a pair of dental mirror and probe.[16,25,26]

Ethical considerations
The Ethics Committee of Isfahan University of Medical Sciences passed the study protocol (code: IR.MUI.RESEARCH.REC.1400.130). Each patient signed informed consent form. The treatment planned for each patient was not affected by whether he/she participated in the study or not.

Statistical analysis
SPSS software version 22 (IBM SPSS, Armonk, NY, USA) was used. One-way ANOVA, *t*-test, and Pearson/Spearman correlation were utilized to analyze data. $P < 0.05$ was considered statistically significant.

RESULTS

The sample was made up of 104 subjects, comprising 63 men (60.6%) and 41 women (39.4%), with a mean age of 52.1 ± 18.1 years. Stages 2, 3, 4, and 5 of eGFR consisted of 23.9%, 18.5%, 16.4%, and 41.2% of patients, respectively. The mean DMFT score was 18.7 ± 8.5. Table 1 lists the mean scores of OHIP-14 and its domains.

Age ($P = 0.82$) and gender ($P = 0.23$) were not in significant relationship with OHIP-14 score. DMFT

Table 1: Mean scores of oral health impact profile-14 domains and their correlation with decayed, missing, filled teeth

OHIP-14 domains	Mean score±SD	DMFT (*P*)	DMFT (*r*)
Functional limitation	2.59±1.13	<0.001*	0.342
Pain	2.30±1.03	0.001*	0.311
Psychological discomfort	2.55±1.10	0.33	-
Physical disability	2.41±1.22	<0.001*	0.358
Psychological disability	1.72±1.19	0.08	-
Social disability	1.87±1.14	0.006*	0.269
Handicap	1.36±0.69	0.006*	0.267
Total score	14.82±5.86	<0.001*	0.365

*Statistically significant. OHIP-14: Oral health impact profile-14, DMFT: Decayed, missing, filled teeth, SD: Standard deviation

and OHIP-14 scores were significantly correlated with eGFR stage (*P* = 0.02 and *P* = 0.03, respectively). The correlation between OHIP-14 domain/total scores and DMFT is shown in Table 1.

DISCUSSION

The aim of the present study was to assess oral health and OHRQoL in patients with CKD. The disease has a high burden on oral health status and may cause several oral manifestations,[6-11] which in turn can impact one's physical, social, or psychological daily functions related to oral health.[12-14]

Regarding the relationship between eGFR stage and DMFT index, our study showed a positive trend; as the chronic renal disease worsened, elicited by a higher eGFR stage, DMFT also showed a higher value. This finding is in agreement with Pakpour *et al.*'s results, who reported significantly higher caries experience in patients undergoing hemodialysis, with a mean DMFT index of 20.06 ± 11.16, compared to controls.[20]

On the other hand, Ausavarungnirun *et al.* described a sample of 129 patients divided into three groups based on eGFR, and no significant differences were found between DMFT in the three groups.[26] Conflicting results may be due to sample size diversity, as well as utilizing various factors to measure CKD severity.

CKD is a progressive disease, and patients on early stages of the disease would be able to carry out oral hygiene routines more efficiently, rather than those on more progressive stages.[5] Literature explains that poor oral hygiene is more prominent in eGFR stage 3 and above.[27] In our study, 41.2% of the patients were labeled stage 5.

Saliva volume is reduced and xerostomia is more prevalent among CKD patients.[28] Besides, *Streptococcus mutans* colonizes the oral cavity of CKD patient in high amounts of colony-forming units compared to healthy matched controls.[29] These facts might explain why more severe CKD accompanies higher DMFT scores.

In accordance with Hajian-Tilaki *et al.* and Rodakowska *et al.* studies,[18,19] no statistically significant relationship was found between age/gender and OHIP-14 score in the present study. Surprisingly, Oliveira *et al.* concluded that OHRQoL is worse in younger individuals than the elders.[30] It seems that disease stage, rather than demographic state, influences oral health and its related quality of life in CKD patients.

Regarding possible influence of CKD on OHRQoL, our studied sample elicited a positive correlation between increased eGFR stage and poorer OHRQoL (*P* = 0.03). Our results are similar to the studies by Schmalz *et al.* and Pakpour *et al.*[6,20] In another study, Camacho-Alonso *et al.* observed the same pattern comparing the CKD group with healthy individuals.[7]

We obtained a significant positive correlation between DMFT index and OHIP-14 score (*P* < 0.001). In other words, having more DMFT accompanies poorer OHRQoL in CKD patients. While Hajian-Tilaki *et al.* and Guzeldemir *et al.* published same results,[8,19] the data described by Rodakowska *et al.* and Schmalz *et al.* on the associations between dental parameters and OHIP-14 in CKD patients did not reach statistical significance level.[6,18]

Of note, Schmalz *et al.* excluded edentulous patients, drug addicts, and patients with infectious diseases.[6] This fact can have a noticeable effect on the DMFT index measured, as well as OHRQoL, with respect to the patient's diet. What's more, poor overall health may impress a big impact on OHRQoL too.[5]

Extreme severity of CKD might not allow patients to care about their oral condition. Instead, early-stage CKD patients are able to go on with their normal life, except for some relatively minor changes. As the disease progresses, more oral morbidities and related worries come along that could affect OHRQoL in a negative way.

Our analysis elicited that all OHIP-14 domains were positively correlated to DMFT, except

for psychological ones. Results published by several others, reporting the same or even more impact of DMFT on psychological domains, are conflicting.[7,18,20,31] Cultural differences may explain this matter.

As the life expectancy increases, and people live more alongside medical problems, Persian families may have learned to support their chronically ill members in a way that prevents anxiety/depression. In other words, familial patience depth might handle psychological stresses experienced by CKD patients so that their impact on OHRQoL becomes ignorable. On the contrary, physical and social support, e.g., by means of medical insurance services, seems to be lacking for them.

This study was carried out within limitations of a cross-sectional design. Cause–effect relationships could not be interpreted, while some confounders may have influenced the results. Future studies may investigate such factors, e.g., periodontal status, denture wearing, or oral mucosal lesions that may impact OHRQoL in CKD patients, irrespective to DMFT. Comparing results with those of a matched control group might increase the external validity of them.

CONCLUSION

Our findings indicated a significant correlation between DMFT and OHIP-14 total, functional limitation, pain, physical disability, social disability, and handicap domain scores. It seems that management of the underlying medical condition along with satisfying oral and dental treatment needs improve OHRQoL in CKD patients, especially regarding its physical aspects.

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Conflicts of interest
The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or nonfinancial in this article.

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