



ORAL HEALTH ASSESSMENT OF PATIENTS ON CHRONIC HEMODIALYSIS AND PERITONEAL DIALYSIS

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SUMMARY – Patients on peritoneal and hemodialysis represent a risk group for developing changes of the oral cavity, which ultimately lead to the loss of teeth and affect the overall health of patients. The basis of this research is a WHO (World Health Organization) survey on adults' oral hygiene to determine its state and the habit of its maintenance in this group of patients. The sample consisted of 59 subjects on dialysis at Sestre milosrdnice UHC (48% female) aged 25-85 (median 66 years), 14% of which was on peritoneal dialysis. Most patients reported adequate oral hygiene. Nonetheless, half of the patients complained to have functional problems in the oral cavity. Their last visit to the dentist is also taken into account as most of the respondents (27.1%) reported it within the last six months, while 23.7% of respondents reported it between 2 and 5 years.

Insight into the state of the oral cavity is the first step towards improving both the oral and the overall health of patients on dialysis, which is why we find the education of this group of patients about the importance of maintaining oral hygiene necessary.

Key words: *Oral health; Dialysis; Surveys and questionnaires*

Introduction

In the dialysis population, a high incidence of periodontitis, an irreversible inflammation of the gingiva, has been demonstrated, which indicates impaired oral health and can also impact the overall health of the patients themselves. Thus, Schmalz et al.¹ in their 2016 study on the sample of 70 subjects (35 of whom were on hemodialysis and 35 after kidney transplantation), showed that the majority developed clinically moderate or severe periodontitis, thus indicating the importance and need for periodontal therapy in as many as 57% of subjects on hemodialysis and 71% of subjects after kidney transplantation. Furthermore, several medications that are frequently used by dialysis patients can cause or exacerbate existing xerostomia. Xerostomia (dryness of the mucous membranes of the

oral cavity) is a relatively common phenomenon that mainly affects patients on peritoneal and hemodialysis and results in difficulty chewing, swallowing, tasting, and speech, as well as in an increased risk of many oral infections and diseases while reducing the quality of life of this group of patients². On the other hand, the prevalence of caries in patients undergoing HD is similar to that in the healthy control group³. The reason why this research was conducted is the fact that there are no data regarding the oral health of this population of patients in Croatia. The study aims to determine the state of oral hygiene and habits of its maintenance in patients on peritoneal and hemodialysis, as well as to estimate the need for additional education of this group of patients.

Methods

The World Health Organization (WHO) survey "Self-assessment of oral health through the use of

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Table 1. Distribution of the research population based on the number of teeth present (question-3)

			Sex		Total
			M	F	
Number of teeth present	0	Count	3	0	3
		% within sex	9.7%	0.0%	5.1%
	1-9	Count	9	9	18
		% within sex	29.0%	32.1%	30.5%
	10-19	Count	12	5	17
		% within sex	38.7%	17.9%	28.8%
≥20	Count	7	14	21	
	% within sex	22.6%	50.0%	35.6%	
Total		Count	31	28	59
		% within sex	100.0%	100.0%	100.0%

questionnaires" (Annex 7)⁴ was utilized for this study. The sample consisted of 59 subjects on dialysis at Sestre milosrdnice University Hospital, Zagreb. The study was performed according to the ethical standards of the Declaration of Helsinki and was reviewed and approved by the Ethics Committee of the Sestre milosrdnice University Hospital Centre (Ethics Committee Certificate no. EP-6532 / 19-5). There were 69 patients altogether on hemodialysis at the Sestre milosrdnice University Clinical Hospital and 18 on peritoneal dialysis. Eighteen patients on hemodialysis and 10 on peritoneal dialysis did not participate in the survey research since they could not be reached or were declined due to poor physical condition. The purpose and main objectives of this study were explained to the study respondents when informed consent was obtained. Descriptive statistics and the χ^2 test for the comparison between sexes were used in commercial statistical software IBM SPSS 22 (IBM SPSS, Vermont, USA). As the respondents varied in their education level, the questionnaires were filled in during an interview conducted by the researchers for several minutes.

Results

Respondents were in the age group of 25-85 years (median 66 years). A total of 59 subjects were included in the study, 31 of which were male and 28 were female. Out of the total number of respondents, the largest share were those with completed secondary

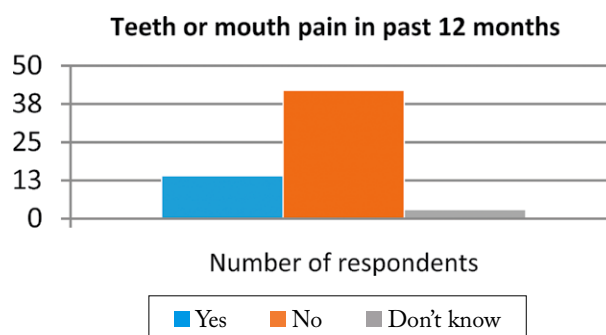


Figure 1. Distribution of study population based on the answer to the question, "During the past 12 months, did your teeth or mouth cause any pain or discomfort?" (Question-4)

education (M 64.5%, F 53.6%), while the next in terms of representation were respondents with completed higher education (M 19.4%, F 21, 4%). The distribution of the studied population by the number of teeth present is shown in Table 1. Of the total number of respondents, 5.1% are edentulous (M 9.7%, F 0.0%), while 35.6% have 20 or more teeth of their own. As many as 77.4% of men report having less than 19 of their teeth, while 50% of women have more teeth, or 20 or more. Figure 1 shows the population surveyed in response to the question, "Have you experienced any pain or discomfort in your teeth or oral cavity in the last 12 months/a year?" Considering the overall surveyed population, 80% of men reported feeling no pain or discomfort, while there were only 60% women with that answer. A partial denture was owned by 10 sub-

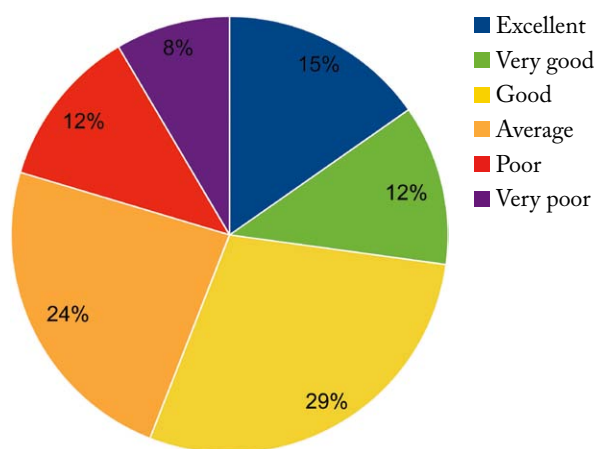


Figure 2. Self-reported tooth condition

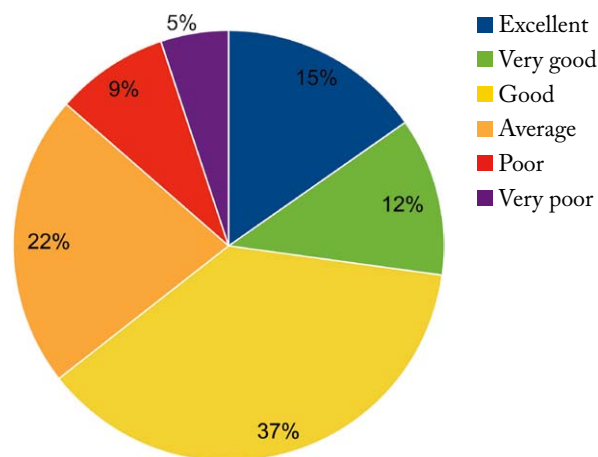


Figure 3. Self-reported state of gums

Table 2. Distribution of the study population when asked. "How long has it been since you last saw the dentist?" (Question-10)

			Sex		Total
			M	F	
Dentist appointment	less than 6 months	Count	8	7	15
		% within sex	25.8%	25.0%	25.4%
	6-12 months	Count	6	6	12
		% within sex	19.4%	21.4%	20.3%
	more than a year and less than 2 years	Count	1	4	5
% within sex		3.2%	14.3%	8.5%	
more than 2 years. but less than 5	Count	7	6	13	
	% within sex	22.6%	21.4%	22.0%	
5 years and more	Count	9	5	14	
	% within sex	29.0%	17.9%	23.7%	
Total		Count	31	28	59
		% within sex	100.0%	100.0%	100.0%

jects (16.9%), with equal distribution between sexes. The upper complete denture was owned by 11 subjects (18.6%) and the lower by 8 (13.6%). When they were asked the question, "How would you describe the condition of your teeth and gingiva?", 51.7% of men estimated the state of their teeth as average or worse than that, while most women (35.7%) rated it as good. Most of the respondents (males 32.3%, females 42.9%) evaluated their gingival condition as good. (Figures 2 and 3) According to the questionnaire, respondents were asked about the frequency of teeth cleaning (Question-7) (Figure 4). Most men (58.1%) and women (75.0%) brush their teeth 2 or more times a day. Nevertheless, 3.6% of women brush their teeth once a month, and 3.2% of men 2-3 times a month. Of the

additional oral hygiene products, the most commonly used was wooden toothpick (men 35.5% and women 42.9%), while the oral antiseptic (mouthwash) was used by 6.5% of men and 14.3% of women. Most respondents do not know if the toothpaste they use contains fluoride (males 64.5% and females 57.1%) (Figure 5). In order to find out more about their visit to the dentist, the respondents were asked, "How long has it been since your last visit to the dentist?" The distribution of the respondent population according to the answer is shown in Table 2. By processing statistical data, we found that, with age, the number of examinees' teeth decreases proportionally, but their visits to the dentist also decrease. For example, all respondents in the age group 25-34 years and 66.67% of respondents

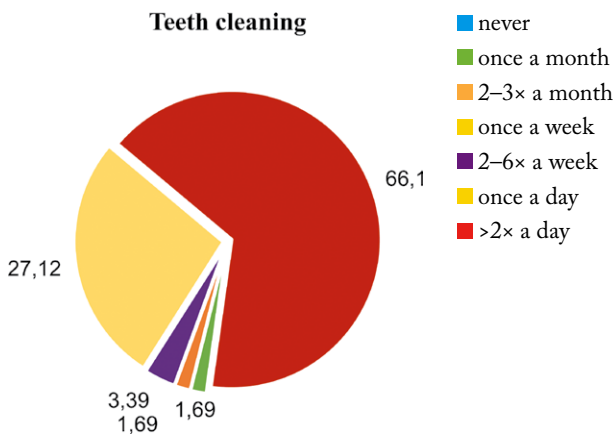


Figure 4. Self-reported frequency of oral hygiene maintenance

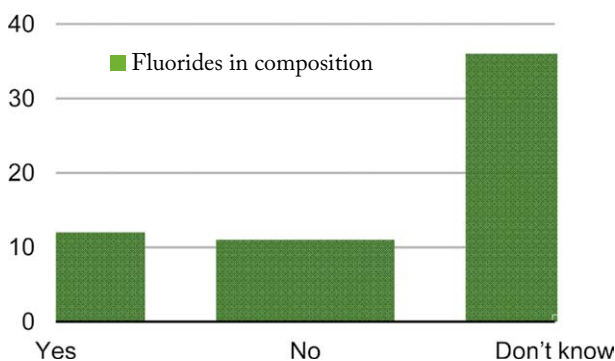


Figure 5. Distribution of study population based on the response to the question. "Does the toothpaste you use contain fluoride?" (Question-9)

in the age group 35-44 years report 20 or more teeth. In contrast, the age groups 55-64 and 65-74 years where the majority (44.44% and 43.75%) report 1-9 teeth. All respondents aged 25-34 and 35-44 report their last visit to the dentist in the past six months, while 44.44% of respondents aged 55-64 report it in the past 6-12 months, and 37.5% of respondents aged 65-74 report that their last visit occurred more than five years ago. All respondents had been to a dentist and received dental care at least once in their lifetime. They were then asked, "What was the reason for your last visit to the dentist?" The most common reason was some kind of procedure or examination after the procedure (45.8%), while 3.2% of men and 14.3% of women attended consultations with the dentist. Oral pain as a reason for the last visit to the dentist was observed in 16.9% of the population, with approxi-

mately the same gender distribution. Numerous answers were given to the group of questions, "Given your oral and dental condition, how often have you experienced the following problems in the last 12 months?" Significant answers were given with the onset of severe biting (19.4% of men sometimes), dry mouth, and interrupted sleep (17.9% of women). Dry mouth as one of the possible side effects of dialysis is noted by 49.2% of respondents, of which 51.7% report it often. People on dialysis generally never or rarely consume cakes/biscuits, jam/honey, sugary chewing gum, sugary soft drinks, sugary tea and coffee, and cigarettes. Fresh fruits are mostly eaten daily (61.0%). Furthermore, 22% of patients, mostly men, consume cigarettes on a daily basis, while the majority (74.6%) reports non-use of cigarettes. Most did not consume alcohol in the last 30 days (55.9%), women significantly more frequently than men ($p = 0.043$). The level of education in the subjects did not show any significant role in maintaining the oral hygiene of this specific population.

Discussion

The analysis of the data revealed that these patients visit the dentist mostly when there is a problem in their oral cavity. On the other hand, they are not keen on consultations and routine examinations. However, these patients are at a higher risk of acquiring periodontal diseases than the healthy population. Thus, the oral health status of these patients should be further evaluated in clinical treatments. Rodakowska *et al.*⁵ in their study of a sample of 72 dialysis patients in Białystok, Poland, show that although 81.9% of respondents have their teeth, only 22.2% of them have more than 20 teeth, which is positively correlated with our survey, indicating the same pattern in these patient groups. Similar results have been presented by Djemal *et al.*⁶ in London on a sample of 200 dialysis patients as those patients were more likely to be toothless, and in the case of dentition, they have fewer teeth. Krmek *et al.*⁷ in their study, conducted at the Community Health Center Knin on 414 respondents of the general population (age groups 18-65 years), state that wearing partial dentures of both jaws was reported in 13%, and upper-complete dentures in 10% of patients. That indicates a positive correlation with a group of respondents from our study in which 16.9% reported wearing

a partial denture and 18.6% the upper-complete denture. Rodakowska *et al.*⁵ indicate that 44.1% of respondents report wearing dentures, with a higher frequency in women (60.7%) than in men (29.0%), while in our study, 49.15% of respondents wear dentures, with a relatively equal distribution among the sexes (M 51.72 %, F 48.28%). Djemal *et al.*⁶ report that the average frequency of brushing teeth in dialysis patients is two times a day. That is also consistent with the oral hygiene results in our survey. That is similar to the research of Bots *et al.*⁸ wherein a sample of 84 patients on dialysis with chronic renal failure or renal replacement therapy in Amsterdam showed that 64.3% of subjects brush their teeth twice a day. On the other hand, the study of Dumitrescu *et al.*⁹ on a sample of 161 dialysis patients in Romania shows that the majority of respondents reported brushing their teeth once a day and less frequently (34.5%). Schmalz *et al.*¹ have noticed that neither hemodialysis nor kidney transplantation patients seem to have an increased oral health behavior, although this is suggested in the literature and based on the current study's findings. Consequently, improved early treatment and prevention of dental and periodontal disease, e.g., in the form of special care programs, are needed. Moreover, 20.3% of all participants in our study reported that the toothpaste they use contains fluoride. The significant advantage of fluoride-containing dental products is the prevention of dental caries in people of all ages. Standard toothpaste contains approximately 1,000 to 1,500 ppm, which can be a significant source of exposure for people unable to control the ingestion reflex. Furthermore, fluoride can also worsen the existing chronic kidney disease – mineral and bone disorder (CKD-MBD), a state in which kidneys can not properly balance the mineral levels in the body. Dumitrescu *et al.*⁹ indicate that as many as 94.4% of respondents are not satisfied with the appearance of their teeth, in contrast to our group of patients where it is not expressed, i.e., 46.0% rate the condition of their teeth as good upwards. A possible explanation for such results is an underdeveloped awareness of the importance of oral hygiene and the opinion that oral health is secondary compared to the current or permanent ailments (acute or chronic conditions) due to which they receive dialysis treatment. In the same study in the Romanian group of patients, 92.5% of respondents reported non-use of dental floss and 78.3% mouthwash in oral hygiene,

which correlates positively with the respondents in our study, further indicating the need for education on the importance of oral hygiene. Also, only 13% of respondents are regular users of the Romanian dental care system (i.e., they had at least one dental visit in the last year) in contrast to our sample in which even 45.7% report their last visit to the dentist in the last year or less. Nevertheless, from our survey, we cannot determine with certainty whether the respondents are regular users of the dental care system in Croatia or go to the dentist only in case of oral problems, but not for a check-up. Using the Geriatric/General Oral Health Assessment Index (GOHAI), Rodakowska *et al.*⁵ found that functional limitations represent one of the most commonly reported and pronounced events in dialysis patients (88.9%). They manifest as difficulties in biting and chewing food, discomfort when swallowing, and speech difficulties. The most frequently reported of these were discomfort when swallowing food (70.8%) and trouble biting or chewing food (44.4%), which is not the case in our sample as only 18.7% of all patients report difficult biting and 13.6% difficult chewing. As a possible reason for this, we attribute the fact that the respondents have been exposed to this functional limitation for a long time and have adapted to it. In addition to the GOHAI scale, Rodakowska *et al.* also used the Oral Health Impact Profile (OHIP-14) scale, and the reflection of the results of both scales indicated the occurrence of chewing problems in hemodialysis patients, confirming the importance of chewing as a physiological function of the stomatognathic system. Chewing difficulty is often associated with xerostomia, which is one of the common frustrating occurrences in hemodialysis patients since salivation in these groups of patients is reduced compared to the healthy population. A study by Rodakowska *et al.* reports xerostomia in 58.3%, whereas ours in 49.2% of respondents. The reason why the proportion of reported mouth dryness is not higher, we assume that patients on hemodialysis might have adapted to this side effect, without considering it a negative symptom anymore. Yu IC. *et al.*¹⁰ comparing pure water and liquorice mouthwash revealed an improvement in salivary flow in both tested groups, but only liquorice mouthwash caused a subjective sense of xerostomia relief. That suggests that the use of such mouth wash can effectively alleviate mouth dryness in hemodialysis patients. It is necessary to improve their oral hygiene

and raise awareness of oral antiseptics use, not only for xerostomia but for reducing plaque. Plaque is a substantial contributor to periodontal disease development, and its prevalence is high in these patients¹¹. The results of our study could be influenced by the fact that only relatively healthy and mobile patients on hemodialysis and peritoneal dialysis participated in this study, excluding those in poor physical condition. Besides, one of the possible limitations of our research is the small number of respondents from only one dialysis centre. The group of patients on peritoneal and hemodialysis is a high-risk group for oral diseases, so we believe that education about the importance of maintaining oral hygiene is necessary. There is a need to raise awareness of the risk of periodontal disease for these patients and advise them to visit the dentist more frequently for routine examinations so they can be detected on time and subsequently medicated. Considering the connection between oral health, general health, and the increasing incidence of oral diseases, a close cooperation between dental and medical practitioners is necessary in order to prevent the occurrence and complications of these diseases.

References

- Schmalz et al. Oral behavior, dental, periodontal and microbiological findings in patients undergoing hemodialysis and after kidney transplantation. *BMC Oral Health*. 2016 Aug 17;16(1):72. doi: 10.1186/s12903-016-0274-0.
- Bossola M. Xerostomia in patients on chronic hemodialysis: An update. *Semin Dial*. 2019 Sep;32(5):467-474. doi: 10.1111/sdi.12821. Epub 2019 May 22.
- Xi W, Bo H, Haiyang P, Chang L, Jinlin S, Ming T. Hua Xi Kou Qiang Yi Xue Za Zhi. 2017;35(2):155-161. doi:10.7518/hxkq.2017.02.009
- World Health Organization. Annex 7, WHO Oral Health Questionnaire for Adults. 2013. http://www.who.int/oral_health/publications/pepannex7sohqbasicmethods.pdf?ua=1. Accessed 28 Dec 2017.
- Rodakowska E, Wilczyńska-Borawska M, Fryc J, Baginska J, Naumnik B. Patient Prefer Adherence. 2018 Jun 1;12:955-961. doi: 10.2147/PPA.S161638. eCollection 2018.
- Djemał S, Adam Rumjon A, Macdougall IC, Singh P, Warnakulasuriya S. Dental Attendance and Self-reported Oral Health Status of Renal Dialysis Patients: A Comparison of Results with the UK Adult Dental Health Survey. *Oral Health Prev Dent*. 2016;14(6):529-534. doi: 10.3290/j.ohpd.a37138.
- Krmek SJ, Marić R, Ivanišević AM, Matijević J. The Oral Status of Adult Population in the Croatian Town of Knin: a Cross Sectional Study. *Acta Stomatol Croat*. 2015 Jun; 49(2): 92-103. doi: 10.15644/asc49/2/2
- Bots CP et al. The oral health status of dentate patients with chronic renal failure undergoing dialysis therapy. *Oral Dis*. 2006 Mar;12(2):176-80. doi: 10.1111/j.1601-0825.2005.01183.x.
- Dumitrescu AL, Gârneață L, Guzun O. Anxiety, stress, depression, oral health status and behaviours in Romanian hemodialysis patients. *Rom J Intern Med*. 2009;47(2):161-8. PMID: 20067166
- Yu IC, Tsai YF, Fang JT, Yeh MM, Fang JY, Liu CY. Effects of mouthwash interventions on xerostomia and unstimulated whole saliva flow rate among hemodialysis patients: A randomized controlled study. *Int J Nurs Stud*. 2016;63:9-17. doi: 10.1016/j.ijnurstu.2016.08.009
- Altamimi AG, AlBakr SA, Alanazi TA, Alshahrani FA, Chalisserry EP, Anil S. Prevalence of Periodontitis in Patients Undergoing Hemodialysis: a Case Control Study. *Mater Sociomed*. 2018;30(1):58-61. doi: 10.5455/msm.2018.30.58-61

Sažetak

PROCJENA ORALNOG ZDRAVLJA PACIJENATA NA KRONIČNOJ HEMODIJALIZI I PERITONEJSKOJ DIJALIZI

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Pacijenti na peritonealnoj i hemodijalizi predstavljaju rizičnu skupinu za razvoj promjena u usnoj šupljini što u konačnici dovodi do gubitka zuba i utječe na cjelokupno pacijentovo zdravlje. Osnova ovog istraživanja je anketa WHO-a (Svjetske zdravstvene organizacije) o oralnoj higijeni odraslih kako bi se utvrdilo stanje i navika održavanja iste u ovoj skupini bolesnika. Uzorak se sastojao od 59 ispitanika na dijalizi u KBC-u Sestre milosrdnice (48 % žena) u dobi od 25 do 85 godina (medijan 66 godina) od čega 14 % na peritonejskoj dijalizi. Većina pacijenata prijavila je odgovarajuću oralnu higijenu. Ipak, polovica pacijenata žali se da ima funkcionalne probleme u usnoj šupljini. Također se uzimao u obzir i njihov posljednji posjet stomatologu. Najviše ispitanika (27,1 %) prijavilo je posjet u posljednjih šest mjeseci, dok ga 23,7 % prijavljuje između 2 i 5 godina.

Uvid u stanje usne šupljine prvi je korak k poboljšanju oralnog i cjelokupnog zdravlja pacijenata na dijalizi, zbog čega smatramo da je edukacija ove skupine pacijenata o važnosti održavanja oralne higijene neophodna.

Ključne riječi: *Oralno zdravlje; Dijaliza; Ankete i upitnici*