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Evaluation of the Community Periodontal Index of Treatment Needs (CPITN) in Dialysis Patients Referring to the Hemodialysis Department of 5th Azar Hospital in Gorgan City, 2017- 2018

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ABSTRACT

Background and aim: Patients who undergo hemodialysis treatment have problems like periodontal diseases because of the side effects of their illness or their drugs. This study evaluates periodontal problems and their therapeutic needs by assessing the CPITN index in patients with dialysis to take a step toward the periodontal health of these patients.

Materials and methods: This study was performed on 55 dialysis Patients admitted to the ward of hemodialysis of the 5th Azar Gorgan Hospital, who were eligible. After giving necessary explanations, the day after their dialysis treatment, they received a periodontal examination. We used SPSS18 for statistical analysis of the data.

Results: Measurement of the CPITN index showed that normal periodontal status (code 0): 7.3%, bleeding on probing (code 1): 10.9%, dental calculus (code 2): 49.1%, low depth pockets (code 3): 27.3%, deep pockets (code 4): 5.5%. In other words, four patients (7.3%) didn't need any treatments, 6 of them (10.9%) needed oral hygiene instruction, 42 of them (76.4%) needed oral hygiene instruction and scaling, and 3 of them (5.5%) needed advanced periodontal treatments.

Conclusion: This study shows that most hemodialysis patients were not in a good situation for periodontal diseases and needed treatments. Also, it was found that the CPITN index does not matter on the sex or age, but it has a meaningful relationship with the duration of dialysis treatment; in other words, the longer duration of dialysis treatment causes more periodontal problems.

1. Introduction

The disease of supporting tooth tissue and their causative agents is among the widespread diseases in epidemiological studies worldwide. Epidemiological research in dentistry, especially about prevention, is fundamental because training health and prevention in a wide range of society, dental problems, or the progression of the disease, its destructive course or the progression of the disease, and its destructive course can be controlled. In recent years, various health organizations have widely used the Community Periodontal Index of Treatment Needs (CPITN) to study periodontal status and community needs. Due to the large number of chronic kidney patients undergoing dialysis, and their progress in their treatment, the longevity of these patients has increased significantly. Since dialysis patients typically suffer from unwanted complications, including periodontal problems, various factors such as immune deficiency, drug use, bone destruction, and the periodontal disease itself. By increasing the potential for atherosclerosis, the condition can be created to make or worsen kidney disease. Periodontal disease is a type of infectious disease that environmental, physical, chemical, social agents, and

host stresses may affect its manifestation or change it.^[1] On the other hand, to achieve health and prevention programs and provide valuable therapeutic services, as well as to estimate the severity and prevalence of the disease. In the society discussed before, everything should be comprehensive and complete by international standards. An accurate assessment of this information has been found to provide appropriate ways of protecting or maintaining health in the community through preventive or advanced methods with predetermined treatments.^[2] According to the World Health Organization, one of the most important and most commonly used indicators for determining periodontal treatment needs is the CPITN index, which was commissioned by Ainamo et al. (1982).^[3] In recent years, various health organizations have widely used the CPITN index to examine people's periodontal status in the community. In this index, according to the periodontal condition of individuals, their therapeutic needs are also determined.^[4,5] The introduction and widespread use of this indicator in epidemiological studies have led researchers to use the clinic's CPITN index to determine the patient's therapeutic needs. For this purpose, using CPITN

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indexes from different clinical aspects were considered.^[6] According to current statistics, kidney diseases are in fourth place in terms of prevalence. A group of these diseases is classified as acute and chronic renal failure. Acute renal failure can be reversible in most cases.^[7, 8] While Chronic Kidney Disease (CKD) is a structural change in the kidneys (glomerular, tubular, and endocrine), it is generally progressive and irreversible. It reduces or restricts the ability to filter kidneys. As a result, with the accumulation of substances in the blood, uremia (increased urea accumulation) is caused. The Uromy causes immunodeficiency due to increased toxicity in the bloodstream. Therefore, patients with this disorder are suppressed by humoral and immune responses.^[9] The most common primary causes of chronic renal failure are diabetes, hypertension, pyelonephritis, glomerulonephritis, nephrosclerosis, polycystic kidney disease, and vascular collagen.^[10] Patients with the last stages of chronic renal failure usually require hemodialysis, peritoneal dialysis, and kidney transplantation. Hemodialysis is a process in which blood is distributed throughout the membrane of a semi-permeate. It is used to remove unwanted combinations of blood and add the required material.^[11] Although hemodialysis is a great help to patients and their life, they have complications like other therapies. The most important complications of hemodialysis include irregularity syndrome, arrhythmia, decreased blood pressure, insanity, osteomalacia, increased prevalence of hepatitis, internal bleeding, cardiac and myocardial infarction, and an increased risk of infection of the organs Different^[12]. Patients with kidney failure have many oral symptoms, one of which is gum disease.^[13, 14] Periodontal disease is a group of inflammatory diseases that affect the tissues that support the tooth. 58.5% of patients with moderate to severe periodontitis are hemodialysis patients.^[15] The incidence of various oral and dental problems such as periodontal disease, pulp chamber loss, loss of premature teeth, and dry mouth in dialysis patients is higher than healthy subjects.^[16,17] Several studies have argued that serum IgG, IgA, IgM concentrations in one-third of dialysis patients are lower than normal and that the level of complementary 3C is reduced in 90% of patients.^[18] In renal patients, increasing the production of acute-phase protein (C-reactive protein) causes atherosclerosis, which predisposes a person to periodontal disease. It has also been shown that increased levels of acute-phase protein and inflammatory cytokines in response to periodontal pathogenic lipoplasty saccharides can increase the potential for atherosclerosis to cause or worsen the renal disease.^[19] Certain therapies are required in these patients because they have a complex clinical situation. Hypotension, high blood pressure, anemia, drug intolerance, or exacerbation of drug use are among these patients' problems.^[12]

2. Materials and methods

Regarding the literature review, the relative frequency of abnormal CPITN cases was similar in 89.4%. Considering the confidence level of 0.95 and the accuracy of 0.089, the sample size required was 46 in the study using the following formula. The 20% drop in samples, the final sample size was 55.

$$n = \frac{Z_{1-\alpha/2}^2 P(1-p)}{d^2}$$

This cross-sectional study was performed on 55 dialysis patients referred to the hemodialysis department of 5th Azar Hospital in Gorgan City. The sampling method was non-random. After receiving permission to enter the section, the medical records of patients with dialysis were studied. Patients entering the study included people aged between 20 and 70 who had chronic

kidney disease and undergoing dialysis and had at least two functional teeth in at least one sextant. If any of the following were, the sample would be excluded:

1. Having an uncontrolled systemic disease affecting the periodontal tissue (diabetes, hyperparathyroidism, leukemia, leukemia disorders)
2. Having Infectious Diseases (HIV, Hepatitis C, B)
3. Periodontal drugs (immunosuppressants, antiepileptic drugs).
4. Smoking or drug addiction or alcohol
5. Pregnant and lactating women
6. Use antibiotics for one week in the last three months
7. Perform periodontal treatment in the last six months
8. Having an implant prosthesis or orthodontic applicator
9. Having long spans

The descriptions were then given to the subjects for the study. After obtaining written informed consent, they were given a form (demographic information) of age, sex, medical history, dentistry, and history of periodontal therapies was recorded. They were referred to the dental faculty for periodontal examinations of the day after dialysis, which the effect of heparin therapy has been gone out. A senior dentist did all examinations. In the periodontal examination, the whole mouth was divided into six sextants. Measure the CPITN, all teeth were examined. PD was measured on six levels of each tooth, including buccal, mesiobuccal, distobuccal, lingual and mesiolingual and distal by using the WHO 612 CPITN prop. Then, after 30 seconds, the presence or absence of bleeding was recorded. In patients with no apparent calculus, a probe was used to detect germs, especially gingival calculus. Of course, there was no need to record the presence of bleeding in patients with clear calculus since they were generally rated 2. Finally, the CPITN index was determined on each tooth, and the highest CPITN was recorded in a sextant as its sextant grade. The largest sextant identifies the individual's therapeutic needs. Data was collected by SPSS Version 18 software, and then the data were analyzed using the Chi-Square test. P values less than 0.05 were considered significant. The research permission from the Ethics Committee was conducted in the university research and respected authorities to conduct the research. After giving explanations about the purpose of this study, all patients received informed consent. The subjects were assured that the information collected would be kept confidential until the end of the study, and whenever they wish, they can leave the study. Each patient received code in the form of a number, and the name of the patient was not taken. The consent form is listed in the attachment.

3. Results

In this study, 55 patients were enrolled. The mean age of the subjects was 43.98 years, and the standard deviation of their age was 11.41 years. 32 (58.2%) were male, and 23 (41.8%) were female. The mean duration of dialysis was 70 months. The subjects were divided into two groups of age under 45 and 45 years of age or older. Thirty-one of them (56.4%) were under 45 years old, and 24 (43.6%) were upper 45 years old. Patients under 45, 16 (51.6%) were male, and 15 (48.3%) were female; among patients over the age of 45, 16 (66.6%) were male, and 8 (33.3%) were women. The subjects based on the duration of dialysis were divided into two groups of people under the age of 5 years and those who were treated for five years or more. 31 (56.4%) had a dialysis period of fewer than five years, and 24 (43.6%) had a dialysis

period of more than five years. The subjects' frequency distribution was divided into two groups: 45 subjects with calculus (81.8%) and ten without calculus (18.2%). 47 (85.5%) had bleeding after probing, and 8 of them (14.5%) had no bleeding. 35 (63.6%) had standard probing depth (3 and less than 3 mm), and 20 (36.4%) had an unobtrusive probing depth (greater than

3 mm. According to the data obtained from the study (Table 1), the relative level of gingival health (code 0) was 3.7%, bleeding on probing (code 1), 10.9%, dental calculus (code 2) 49.1%, low depth pocket (code 3) was 27.3%, the deep pocket (code 4) was 5.5%.

Table 1. The CPITN status of the subjects studied.

CPITN	Number	Percentage
0	4	7.3
1	6	10.9
2	27	49.1
3	15	27.3
4	3	5.5

Also according to Table 2, consideration of the treatment needs of the subjects showed that four of them (7.3%) did not need treatment, six subjects (10.9%) Oral hygiene education. On the other hand, Of the 55 subjects, 51 (92.7%) had therapeutic needs, and 4 (7.7%) did not have therapeutic needs.

needed oral health education, and 42 subjects (76.4%) needed oral hygiene education, and 3(5.5%) needed advanced therapies in addition to

Table 2. Condition of the therapeutic needs of the subjects.

TN	Number	Percentage
0	4	7.3
1	6	10.9
2	42	76.4
3	3	5.5

In this study, according to Table 3, the relationship between the CPITN index and variables (sex, age, duration of dialysis) was investigated. There was no significant correlation between the two in terms of Chi-Square test.

Table 3. Frequency distribution of CPITN index in the subjects studied by gender.

CPITN Code/ Sex		0	1	2	3	4	Total	P-Value
Male	Number	3	3	17	8	1	32	0.77
	Percentage	9.37	9.37	53	25	3.12	100	
Female	Number	1	3	10	7	2	23	
	Percentage	4.34	13.04	43.47	30.43	8.69	100	

Based on Table 4, the frequency distribution of the CPITN index was evaluated by the age group. Statistically, according to the the Chi-Square

test, there was no significant relationship between the two.

Table 4. Frequency distribution of CPITN index in subjects studied by age.

CPITN Code/ Age		0	1	2	3	4	Total	P- Value
Under 45 years	Number	4	5	16	5	1	31	0/07
	Percentage	12.9	16.1	51.6	16.1	3.2	100	
Up to 45 years	Number	0	1	11	10	2	24	
	Percentage	0	4.1	45.8	41.6	8.3	100	

According to Table 5, the relationship between the CPITN index and duration of dialysis shows that there is a significant correlation between the

two ($PV = 0.002$) according to the Chi-Square test. In other words, higher CPITN is associated with a more extended period of dialysis.

Table 5. Distribution of CPITN index in subjects studied by the duration of dialysis.

CPITN Code/ Duration of dialysis		0	1	2	3	4	Total	P- Value
Less than 5 years	Number	4	6	17	3	1	31	0/002
	Percentage	12.9	19.3	54.2	9.6	3.2	100	
More than 5 years	Number	0	0	10	12	2	24	
	Percentage	0	0	41.6	50	8.3	100	

Table 6 shows the different scripts from S1 to S6 in terms of the CPITN index. S1 represents the upper right sextant, S2 upper anterior sextant, S3 upper left, S4 lower left, S5 lower anterior, and lower right S6. The following code (the presence of calculus in the upper gingiva or under gingiva) is standard in all

sextant except in the upper anterior sextant. It has the highest percentage in the lower anterior sextant. Code 0 (full gingival health) is more common in the anterior sextant, and code four is less common.

Table 6. Frequency distribution of subjects in terms of CPITN index per sextant.

Tooth Sextant	S1		S2		S3		S4		S5		S6	
	NO	%	NO	%	NO	%	NO	%	NO	%	NO	%
0	9	16.3	29	52.7	10	18.1	8	14.5	6	10.9	11	20
1	6	10.9	15	27.2	7	12.7	9	16.3	4	7.27	8	14.5
2	28	50.9	9	16.3	23	41.8	27	49	34	61.8	24	43.6
3	5	7.5	2	3.6	7	12.7	4	7.27	7	12.7	6	10.9
4	1	1.8	0	0	0	0	2	3.63	3	5.45	1	1.8
X	6	10.9	0	0	8	14.5	5	7.5	1	1.8	5	7.5
Total	55	100	55	100	55	100	55	100	55	100	55	100

4. Discussion

By increasing the production of C-Reactive Protein (C-reactive protein), these patients develop a higher risk of developing atherosclerosis, which, by damaging blood vessels, predisposes a person to periodontal disease. It has also been shown that increased levels of acute-phase protein and inflammatory cytokines in response to periodontal pathogenic lipolasty saccharides can increase the potential for atherosclerosis to cause or worsen the renal disease.^[19, 20] Also, abnormal mental conditions, stress, depression, excessive attention of patients to the main problem, and lack of attention to oral health and dietary restrictions can also increase.^[22] In this study, 55 patients with dialysis referred to the hemodialysis department of the 5th Azar Hospital were enrolled and examined. Measurement of CPITN indicates that the relative gingival health (code zero): 7.3%, bleeding after probing (code one): 10.9%, dental calculus (code two): 49.1% the low depth pocket (code three): 27.3%, deep pocket (code four): 5.5%. It can be concluded that four patients (7.3%) did not need treatment, 6 of them (10.9%) needed oral health education, 42 (76.4%) need oral health education and scaling and planning, and three people (5.5%) needed advanced therapies in addition to oral hygiene education. In other words, most patients (92.7%) needed treatment, and only a small number (7.3%) did not need treatment in a study by Farahani et al.^[21], 100 subjects were selected from two groups of 50, including hemodialysis and healthy subjects. Research findings indicate that gum disease is prevalent in the dialysis population. The zero and one code that indicate better gum status are more seen in the control group, and codes two and three are more common in the dialysis group. In Mortazavi et al. study^[22], all periodontal

health indicators (PD, GI, PI) have been increased in hemodialysis patients with prolonged dialysis periods. According to various studies, most patients who undergo hemodialysis have periodontal problems and require treatment. Differences in CPITN codes Different studies can be done due to differences in several samples, the different age range of subjects, duration of dialysis, and knowledge of individuals about their illness and its complications, and the importance of oral hygiene and referral dentistry. Our study results show that the CPITN index does not change with the gender and age of the patients, but has a significant relationship with the duration of dialysis; that is, periodontal diseases with prolonged dialysis periods have increased.

5. Conclusion

This study's results indicate that most patients undergoing hemodialysis for periodontal disease are not in desirable condition and need treatment. Therefore, given these patients' more exceptional ability to develop periodontal diseases, it is necessary to pay more attention to this group in educational, health, and therapeutic programs. The main objective is to design preventive plans and ultimately take the necessary treatment. On the other hand, several dialysis patients are candidates for renal transplantation who must undergo a complete clinical examination, including oral examinations.

Conflict of Interest

The authors declared that there is no conflict of interest.

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