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Assessment of periodontal health among the inpatients with schizophrenia

Procena periodontalnog zdravlja hospitalizovanih bolesnika sa shizofrenijom

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Abstract

Background/Aim. Many studies on oral health of psychiatric inpatients reported schizophrenia as the most common psychiatric disorder among their sample population. The available evidence suggests the higher prevalence and severity of periodontal disease among the psychiatric inpatients. The aim of this study was to evaluate periodontal health among the inpatients with schizophrenia and to consider possible risk factors for their current periodontal diseases. **Methods.** This cross-sectional study comprised 190 inpatients with schizophrenia at the Clinic for Psychiatric Disorders "Dr Laza Lazarevic" in Belgrade, and 190 mentally healthy patients at the Clinic for Periodontology and Oral Medicine, Faculty of Dental Medicine, University in Belgrade. The Community Periodontal Index for Treatment Needs (CPITN) and sociodemographic characteristics were registered in both groups as well as the characteristics of the primary disease among the inpatients with schizophrenia. **Results.** The patients in the study group had significantly higher scores of the CPITN (2.24 ± 0.98) than the patients in the control group (1.21 ± 1.10). Most of the patients in the study group had supra- , or subgingival calculi (46.8%), in contrast to the control group patients, who had in most cases gingival bleeding (45.8%). The periodontal pockets where detected in 35.8% of schizophrenic inpatients. The linear regression analysis showed that the gender and age were statistically significant predictors of the CPITN value among the inpatients with schizophrenia. **Conclusion.** The results of this study generally indicate the need for continuous research of psychiatric patients' oral health, in order to determine the modes of its improvement. Similar studies should elucidate significance of psychiatric patients' periodontal health and sensitize psychiatrists and psychiatric nurses to the oral problems of their patients.

Key words:
age factors; hospitals, psychiatric; oral health; periodontal diseases; periodontal index; risk factors; schizophrenia; sex.

Apstrakt

Uvod/Cilj. Mnogobrojna istraživanja oralnog zdravlju hospitalizovanih psihijatrijskih bolesnika pokazala su da je shizofrenija najčešći psihijatrijski poremećaj među njima. Dostupni podaci ukazuju na veliku prevalenciju i težinu periodontopatije kod bolesnika sa psihijatrijskim poremećajima. Cilj ove studije bio je da se proceni periodontalno zdravlje hospitalizovanih osoba sa shizofrenijom, kao i da se ukaže na moguće faktore rizika od oboljenja potpornog aparata zuba tih bolesnika. **Metode.** Studijom preseka obuhvaćeno je 190 osoba sa shizofrenijom, hospitalizovanih u Klinici za psihijatrijske bolesti „Dr Laza Lazarević" u Beogradu i 190 mentalno zdravih osoba, pacijenata Klinike za parodontolo-giju i oralnu medicinu Stomatološkog fakultet, Univerziteta u Beogradu. U obe grupe ispitanika registrovane su vrednosti Zajenički periodontni indeks potreba tretmana – *Community Periodontal Index for Treatment Needs* (CPITN), kao i sociodemografska obeležja, dok su karakteristike primarne bolesti beležene u studijskoj grupi. **Rezultati.** Ispitanici studijske grupe su imali znatno veće vrednosti CPITN (2,24 ± 0,98) u odnosu na ispitanike kontrolne grupe (1,21 ± 1,10). Kod većine ispitanika studijske grupe registrovano je prisustvo supra- i subgingivalnog kamenca (46,8%), za razliku od ispitanika kontrolne grupe koji su češće imali gingivalno krvarenje (45,8%). Periodontalni džepovi su registrovani kod 35,8% hospitalizovanih osoba sa shizofrenijom. Linearna regresiona analiza pokazala je da su pol i starost ispitanika

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bili statistički značajni prediktori vrednosti CPITN hospitalizovanih osoba sa shizofrenijom. **Zaključak.** Rezultati ovog istraživanja ukazuju na postojanje potrebe za kontinuiranim istraživanjem stanja oralnog zdravlja psihijatrijskih bolesnika, kako bi se odredili načini za njegovo unapređenje. Slične studije bi trebalo da razjasne značaj peridodontalnog zdravlja psihijatrijskih bolesnika, kako bi se psihijatrima i medicinskim sestrama ukazalo na postojanje problema oralnog zdravlja njihovih bolesnika.

Ključne reči:
životno doba, faktor; bolnice, psihijatrijske; usta, zdravlje; periodontalne bolesti; periodontalni indeks; faktori rizika; shizofrenija; pol.

Introduction

Mental health is a state of well-being in which an individual realizes how can cope with usual life stresses with his or her own abilities, how can work productively and fruitfully, and make a contribution to his or her community [1]. Several studies on oral health of psychiatric inpatients reported schizophrenia as the most common psychiatric disorder among their sample population [2–4]. Schizophrenia is a mental disorder characterized by a disintegration of thinking processes and emotional responsiveness [5]. The disease occurs in 1% of the general population and it is one of ten leading causes of disability in the population between 15 and 44 years of age [6].

Oral health is a significant part of general health and should not be separated from mental health [7]. The available evidence suggests the higher prevalence and severity of periodontal disease among the psychiatric inpatients [3, 8–13]. A bacterial role in the initiation and progression of periodontal disease is essential, but most of the nonbacterial risk factors appear to act as the disease modifiers that may alter the clinical effects of bacterial challenge [14]. There are many factors associated with the poor periodontal status among the psychiatric inpatients: sociodemographic characteristics like age [8, 15, 16], gender [10, 15] and educational level [15]; characteristics of schizophrenia like duration of disease [16], length of hospitalization [8] and psychotropic medications [15]; and, the oral health habits like frequency of tooth brushing [10], tooth brush technique [15] and smoking [10].

In Serbia, no research has been conducted on periodontal health of this vulnerable group of psychiatric inpatients, although the prevalence of the disease is 1% of the whole population [6]. Therefore, the aim of the present study was to evaluate periodontal health among the inpatients with schizophrenia, and to consider possible risk factors that might contribute to the current periodontal health status of this group of psychiatric inpatients.

Methods

Study population

The study was conducted as an observational cross-sectional study. It was adjusted to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for improving the quality of observational studies [17]. The approval for the study was obtained from the Ethics Committee of the Clinic for Psychiatric Disorders "Dr. Laza Lazarević" in Belgrade, Serbia (No. 7221) and the Faculty of Dental Medicine, University of Belgrade, Serbia (No. 36/10). The research was conducted in accordance with the Declaration of Helsinki [18].

Each subject participated voluntarily and was informed, through a special brochure, of the type of the research and the data collection procedure. The written consent was obtained from all subjects, or their legal representatives to use the personal data for the research purposes.

The study group size was determined according to the prevalence of schizophrenia in the general population in the Republic of Serbia, with 95% confidence level. Consequently, the study group comprised 190 randomly selected inpatients with schizophrenia (95 males and 95 females, aged 19 to 67 years; mean age 43.59 ± 11.96 years) hospitalized at the Clinic for Psychiatric Disorders "Dr. Laza Lazarević" in Belgrade, Serbia. The inclusion criteria for entering the study were that a patient was hospitalized, older than 18 years and diagnosed with schizophrenia (according to the 10th Revision of the International Classification of Diseases) [19] at least two years prior to the study. The exclusion criteria were: a primary diagnosis of another mental disorder, the inpatients diagnosed with schizophrenia in the period shorter than two years from the time of the survey, simultaneous presence of severe somatic illnesses or severe disability, and inability to communicate, or refuse to cooperate.

The control group comprised of 190 patients suffering from localized or generalized chronic periodontitis [20] (95 males and 95 females, aged 19 to 72 years; mean age 43.20 ± 11.89 years), without any psychiatric or somatic illness, who were consecutively recruited from the pool of patients at the Department of Periodontology and Oral Medicine, Faculty of Dental Medicine, University of Belgrade, Serbia. The patients in the control group did not use any medication that could affect oral health [21]. Both, the study and the control groups were age and gender matched.

A questionnaire for both groups was designed in order to record the sociodemographic characteristics (gender, age, educational level, marital status and residence), oral health habits (frequency of brushing teeth and tooth brushing technique) and smoking habits. The data about schizophrenia in the study group were taken from the medical records and included the duration of schizophrenia, number of hospitalizations and current psychotropic medication.

Clinical examination

All patients were subjected to the thorough dental clinical examination in accordance with the criteria recommended by the World Health Organization [22]. The dental

clinical examinations were carried out by two trained and calibrated examiners (V.Dj. and M.J.) at the dental office at the Clinic for Psychiatric Disorders "Dr. Laza Lazarević" in Belgrade, Serbia, and the Department of Periodontology and Oral Medicine, Faculty of Dental Medicine, University of Belgrade, Serbia. The examiners were calibrated twice, before and during the study, by assessing the Community Periodontal Index for Treatment Needs (CPITN) [23], with a degree of agreement with ± 1 mm of 94%. The clinical measurements were performed by using the periodontal probe graded in mm (WHO 621 Trinity probe) on the sextants, scoring on the scale from 0 to 4. In each sextant, all teeth were examined and only the highest value for each sextant was scored and recorded.

Statistical analysis

All collected data were organized and evaluated using the dedicated software (SPSS 17.0 Inc, Chicago, IL, USA) and were analysed by the descriptive statistical parameters and regression models. The descriptive statistical methods were represented by the measures of central tendency (mean and median), measure of variability (standard deviation and var-iation interval) and were expressed in the percentages. The methods for testing the difference of numerical data (age and CPITN) were represented by the t-test of independent groups. For testing the data of different categories (gender, education level, employment status, marital status, residence, smoking, brushing teeth, tooth brush technique), the χ^2-test was used. The level of significance was set at $p \leq 0.05$.

Results

The groups where comparable in terms of age ($p = 0.747$ for the t-test of independent groups) and gender ($p = 1.000$ for χ^2-test). The distribution of sociodemographic characteristics and oral health habits of the enrolled subjects are shown in Table 1. The statistically significant differences between the groups were observed for all sociodemographic characteristics and oral health habits (Table 1). The educational structure of inpatients with schizophrenia was lower than of the control group patients. Furthermore, the percentage of employees among the inpatients with schizophrenia was significantly lower than in the study group. Most of the patients of the study group were smokers (74.7%) as opposed to the control group patients (39.5%).

Table 1

Sociodemographic characteristics, smoking habits, and oral health hygiene among the participants

Variables	Study group n (%)	Control group n (%)	p (χ^2 test)
Sociodemographic characteristics			
Education			
elementary school	40 (21.1)	6 (3.2)	
junior high school	109 (57.4)	93 (48.9)	0.000
high school	16 (8.4)	33 (17.4)	
college	25 (13.2)	58 (30.5)	
Employment			
unemployed	117 (61.5)	99 (52.1)	
employed	10 (5.3)	73 (38.4)	0.000
invalid retirement	37 (19.5)	3 (1.6)	
age or survivor retirement	26 (13.7)	15 (7.9)	
Marital status			
married	21 (11.1)	67 (35.3)	
divorced / detached	30 (15.8)	31 (16.3)	0.000
unmarried / alone	131 (68.9)	86 (45.3)	
widow	6 (4.2)	6 (3.2)	
Residence			
own property	64 (33.7)	100 (52.6)	
parents property	101 (53.2)	40 (21.1)	0.000
rent or other	25 (13.2)	50 (26.3)	
Smoking habits			
yes	142 (74.7)	75 (39.5)	0.000
no	48 (25.3)	115 (60.5)	
Oral hygiene habits			
Frequency of brushing teeth			
no	104 (54.7)	0 (0)	
yes, several times per month	21 (11.1)	0 (0)	0.000
yes, once a day	38 (20.0)	28 (14.2)	
yes, twice or more per day	27 (14.2)	163 (85.8)	
Tooth brushing technique			
correct	52 (27.4)	102 (53.7)	0.000
incorrect	138 (72.6)	88 (46.3)	

In the study group, schizophrenia lasted, on average, 14.69 ± 9.61 years (range 2 to 45 years), and the average number of hospitalizations was 8.52 ± 5.71 (range 1 to 30 hospitalizations). The patients were treated with an average of 3.54 ± 0.87 psychotropic medications (range 2 to 6). The characteristics of primary disease in the study group are shown in Table 2.

The patients in the study group mostly did not brush their teeth (54.7%), unlike the patients in the control group. Among the inpatients with schizophrenia, even 72.6% were not familiar with a correct tooth brushing technique, as opposed to the patients in the control group (46.3%).

A statistical significance was observed in the CPITN values between the examined groups (Table 3). The patients in the study group had the significantly higher scores of the CPITN (2.24 ± 0.98, range 0 to 4) than the patients in the control group (1.21 ± 1.10, range 0 do 4). The patients in the study group had supra- or subgingival calculi more often (46.8%) than the control group patients, who demonstrated gingival bleeding more frequently (45.8%). Moreover, the periodontal pockets where detected in 35.8% of schizo-phrenic inpatients, much more frequently than in the control group patients (13.7%).

Analysing the mean of the CPITN in relation to the sociodemographic characteristics and oral health habits of subjects in both groups (Table 3), a statistically significant difference in the study group was observed in terms of gender, age, and tooth brushing. The older male inpatients with schizophrenia, who did not brush teeth, had the highest value of CPITN. In the control group, a statistically significant difference in the CPITN values was observed in terms of marital status and tooth brush technique (Table 4). The widowed patients in the control group, who used an incorrect tooth brush technique, had the highest value of CPITN.

In terms of characteristics of the primary disease, a statistically significant difference in the value of CPITN among the study group patients was observed in terms of number of hospitalizations (Table 5).

The impact of sociodemographic characteristics and oral health habits, as well as the characteristics of the disease, the CPITN values among the inpatients with schizophrenia was examined by the linear regression model (Table 6).

Table 2
Clinical characteristics of schizophrenia

Characteristics	Patients, n (%)
Duration of mental illness (years)	
≤ 10	67 (35.3)
≥ 11	123 (64.7)
Number of psychiatric hospitalizations	
≤ 10	129 (67.9)
≥ 11	61 (32.1)
Medications	
antipsychotics	
first generation	116 (61.1)
second generation	74 (38.9)
mood stabilizers	
no	55 (28.9)
yes	135 (71.1)
hypnotics	
no	127 (66.8)
yes	63 (33.2)
anxiolytics	
no	30 (15.8)
yes	160 (84.2)
antidepressants	
no	175 (92.1)
yes	15 (7.9)
antiparkinsonics	
no	80 (42.1)
yes	110 (57.9)

Table 3
The Community Periodontal Index for Treatment Needs (CPITN) values among the patients in the study and control groups

Groups	CPITN codes				
	0	1	2	3	4
Study (n = 190), n	9	25	89	46	21
Control (n = 190), n	50	87	22	15	11

Table 4

The Community Periodontal Index for Treatment Needs (CPITN) values in the patients of the study and control groups, in terms of sociodemographic characteristics, smoking habits and oral hygiene habits

Variables	CPITN index values			
	study group		control group	
	mean ± SD	p	mean ± SD	p
Sociodemographic characteristics				
Gender				
male	2.37 ± 0.96	0.040 [a]	1.21 ± 1.08	0.944 [a]
female	2.11 ± 0.98		1.22 ± 1.12	
Age (years)				
≤ 30	1.85 ± 0.70	0.001 [b]	1.15 ± 1.09	
31–40	1.96 ± 0.90	(1:2) 0.565 [a]; (2:3) 0.010 [a]	1.26 ± 1.14	
41–50	2.40 ± 0.90	(1:3) 0.002 [a]; (2:4) 0. 006 [a]	1.12 ± 1.18	0.457 [b]
≥ 51	2.52 ± 1.11	(1:4) 0.001 [a]; (3:4) 0.591 [a]	1.30 ± 0.97	
Education				
elementary school	2.14 ± 1.04		2.00 ± 1.10	
junior high school	2.18 ± 1.01		1.18 ± 0.98	
high school	2.25 ± 0.78		1.36 ± 1.17	0.173 [b]
college	2.08 ± 0.81	0.523 [b]	1.09 ± 1.22	
Employment				
unemployed	2.16 ± 0.95		1.21 ± 1.11	
employed	2.10 ± 0.88		1.08 ± 1.08	
invalid retirement	2.30 ± 1.05		1.33 ± 0.58	0.071 [b]
age or survivor retirement	2.54 ± 1.03	0.393 [b]	1.80 ± 1.08	
Marital status				
married	2.57 ± 0.98		1.42 ± 1.18	0.008 [b]
divorced / detached	2.37 ± 0.89		1.32 ± 0.91	(1:2) 0.855 [a]; (2:3) 0.018 [a]
unmarried / alone	2.15 ± 0.97		0.97 ± 1.05	(1:3) 0.007 [a]; (2:4) 0.247 [a]
widow	2.25 ± 1.39	0.277 [b]	1.83 ± 1.17	(1:4) 0.311 [a]; (3:4) [a] 0.050 [a]
Residence				
own property	2.38 ± 1.00		1.27 ± 1.17	
parents property	2.01 ± 0.98		1.03 ± 0.89	
rent or other	2.11 ± 0.60	0.243 [b]	1.27 ± 1.10	0.942 [b]
Smoking hybits				
yes	2.23 ± 0.99		1.31 ± 0.77	
no	1.98 ± 0.96	0.101 [a]	1.08 ± 0.75	0.853 [a]
Oral hygiene hobits				
Frequency of brushing teeth				
no	2.37 ± 0.93	0.007 [b]	/	
yes, several times per month	2.05 ± 1.02	(1:2) 0.219 [a]; (2:3) 0.804 [a]	/	
yes, once a day	2.00 ± 0.84	(1:3) 0.032 [a]; (2:4) 0.230 [a]	1.28 ± 0.89	0.220 [b]
yes, twice or more per day	1.70 ± 1.14	(1:4) 0.002 [a]; (3:4) 0.123 [a]	0.91 ± 0.74	
Tooth brushing technique				
correct	1.87 ± 1.01		0.76 ± 0.71	
incorrect	2.28 ± 0.94	0.020 [a]	1.43 ± 0.79	0.020 [a]

[a] **Mann-Whitney test;** [b] **Kruskal Wallis test.**

Table 5
The value of the Community Periodontal Index for Treatment Needs (CPITN) in the study group, in terms of medical characteristics

Clinical characteristics	CPITN index mean ± SD	p (Mann-Whitney test)
Duration of mental illness (years)	2.01 ± 0.83	
≤ 10	2.24 ± 1.04	0.146
≥ 11		
Number of hospitalizations		
≤ 10	2.05 ± 0.91	
≥ 11	2.41 ± 1.07	0.016
Antipsychotics		
first generation	2.16 ± 1.01	
second generation	2.18 ± 0.93	0.914
Mood stabilizers		
no	2.38 ± 0.93	
yes	2.07 ± 0.98	0.079
Hypnotics		
no	2.11 ± 0.99	
yes	2.27 ± 0.95	a0.241
Anxiolytics		
no	2.27 ± 1.11	
yes	2.14 ± 0.95	0.444
Antidepressants		
no	2.14 ± 0.99	
yes	2.47 ± 0.83	0.307
Antiparkinsonics		
no	2.09 ± 1.00	
yes	2.22 ± 0.96	0.459

The univariate regression analysis showed a statistical significance of the CPITN among the inpatients with schizophrenia in terms of gender ($p = 0.044$) and age ($p = 0.018$), brushing teeth (0.001), a tooth brush technique ($p = 0.009$), the duration of schizophrenia ($p = 0.002$), the number of hospitalizations (0.004) and the use of mood stabilizers ($p = 0.048$).

However, in the multivariate regression analysis, only gender ($p = 0.013$) and age ($p = 0.010$) were the statistically significant predictors of the CPITN value among the inpatients with schizophrenia.

Discussion

The presented study was conducted to assess the periodontal health and possible risk factors that might influence periodontal health among the inpatients with schizophrenia. The principal finding in this study was a high prevalence of periodontal disease among the inpatients with schizophrenia. The average value of the CPITN in the inpatients with schizophrenia was a significantly higher than that of the control group, which is in accordance with similar study [15].

The CPITN revealed poor periodontal health of inpatients with schizophrenia, whereas the healthy periodontium was observed in only 4.7% of subjects, which is even lower in comparison to the previous studies [10, 15, 24–26]. The presence of calculi (46.8%) was the most common finding in the study group, in contrast to gingival bleeding (45.8%) which was observed in the control group.

Previous studies reported a significantly higher occurrence of calculi in the psychiatric inpatients (range 71.8% to 94.2%) [24, 25, 27]. The presence of shallow pockets was observed in 24.2% of patients in the study group, much more than in the control group (7.9%). Furthermore, the deep periodontal pockets were detected in 11.1% in the study group, while in the control group they were detected in 5.8% of cases. The occurrence of deep periodontal pockets in the study group is in accordance with previous studies [10, 11, 16, 24].

Table 6
The value of the Community Periodontal Index for Treatment Needs (CPITN) among the study group examined by the linear regression models

Observed characteristics	Univariate linear regression analysis		Multivariate linear regression analysis	
	#B (95%CI)	p	#B (95%CI)	p
Gender	-0.284	0.044	-0.334	0.013
Age	0.024	0.018	0.018	0.010
Education	-0.087	0.273	/	/
Employment	0.050	0.420	/	/
Marital status	-0.115	0.238	/	/
Residence	-0.094	0.386	/	/
Smoking cigarettes	-0.246	0.131	/	/
Brushing teeth	-0.209	0.001	-0.118	0.072
Tooth brushing technique	0.410	0.009	0.273	0.097
Duration of disease	0.022	0.002	-0.003	0.771
Number of hospitalizations	0.036	0.004	0.026	0.113
Antipsychotics	0.021	0.888	/	/
Antiepileptics	-0.308	0.048	-0.206	0.160
Hypnotics and sedatives	0.160	0.290	/	/
Benzodiazepines	-0.123	0.528	/	/
Antidepressants	0.330	0.210	/	/
Antiparkinsonics	0.131	0.363	/	/

 # – Uni-standardized coefficient B.

Higher occurrence of CPITN values among the inpatients with schizophrenia can be explained by several facts. First of all, in the present study, more than one half of inpatients with schizophrenia (54.7%) did not brush their teeth, which is in contrast to previous studies [2, 15, 24]. It has been already described that the neglected oral hygiene increases the accumulation of dental plaque, which leads to the gingival inflammation and periodontal disease [28]. The highest value of the CPITN was observed in the patients who did not brush their teeth, compared to those who brushed their teeth once a day, or twice, or more times per day. Likewise, 72.6% of inpatients with schizophrenia did not know how to perform a correct tooth-brushing technique.

In the present study, 74.2% of inpatients with schizophrenia were smokers. It is well-known that stress (like in the people with psychiatric diseases) can cause a behaviour modification, such as smoking, and may have an immunosuppressant effect (decreased leukocyte count, altered helper T1 cell/T2 cell ratio), which can result in more frequent recurrence of periodontal disease [28]. Smoking appear to be a periodontal disease modifier – do not cause periodontal disease, but it can increase the rate of progression of the disease, by determining the age of clinical diagnosis and the severity at given age [14]. The risk for periodontal disease is 2.5 to 7 times higher in smokers than in non-smokers [29]. Smokers have a clinically less pronounced inflammation and less gingival bleeding [29]. Vasoconstriction caused by nicotine reduces blood flow, leading to oedema and clinical signs of inflammation [29], which may be an explanation for lower rate of bleeding on probing in the study group.

Schizophrenia in the study group lasted 14.69 ± 9.61 years, on average, which is not in line with previous study [30]. The present study showed a large number of hospitalizations per patient (8.52 ± 5.71, range 1–30), which points to the fact that the patients were hospitalized for a proportionally long period of time, which is in accordance with the already published data [2, 4, 10, 11]. The inpatients with schizophrenia were treated by several psychotropic drugs. Previous study [4] reported some oral side-effects of psychotropic drugs on buccal mucosa, and revealed that antipsychotics, benzodiazepines, antidepressants and mood stabilizers were related to xerostomia, because they interfere with the salivary glands' function. Furthermore, another study [26] concluded that xerostomia was recognized as a high risk factor for development of periodontal disease in the patients with schizophrenia due to the decrease in the salivary flow rate. Xerostomia can also increase accumulation of dental plaque [21], which is one of the important causes of periodontal disease [27]. All these facts may explain the higher CPITN values in the study group.

In the present study, 50% of inpatients with schizophrenia were the females. Therefore, the gender could not influence the difference in the CPITN values between the patients in the study and control groups in this study, although it was noticed that the CPITN values were higher in the males [10, 15], probably due to the observed ignorance toward oral hygiene among the males [31]. Concerning the age, the mean age of patients in the study group was in line with the previous study [8]. The inpatients younger than 30 years had the lower CPITN than the patients older than 50 years of age, which is in accordance with the previous studies [16, 24]. The increased severity of periodontal disease in older age is probably related to the length of time of periodontal tissues exposure to dental plaque, which reflects the individual cumulative oral history [32].

By the stepwise multiple regression analysis, it was demonstrated that the gender and age of inpatients with schizophrenia could influence the CPITN values. The higher CPITN values were observed in the males compared to the females, and in the older compared to the younger inpatients with schizophrenia. This is in accordance with the previous findings [8, 10, 15, 16, 24]. In the present study, the sociodemographic characteristics, oral health habits and medical characteristics did not influence the mean value of the CPITN in the inpatients with schizophrenia, which is not in line with the previous studies [8, 10, 15, 16]. Our findings suggest that the underlying disease affects oral health indirectly, reducing the patients' motivation for the oral health maintenance.

Certain limitations should be considered when interpreting the results of this study. All subjects in the study group were hospitalized at the Clinic for Psychiatric Disorders, which possesses a dental office enabling dental care within the easy patients' reach. Therefore, it can be assumed that in other psychiatric hospitals, in country, the inpatients with schizophrenia could exhibit even poorer periodontal health. Also, the control group patients were the outpatients coming to the Department of Periodontology and Oral Medicine, Faculty of Dental Medicine, University of Belgrade, Serbia, who were very much familiar with the tooth brushing technique and oral hygiene maintenance. This fact could contribute to the differences between the CPITN values of the study and the control groups in this study.

Conclusion

The high CPITN values of inpatients with schizophrenia indicate a need for continuous considering the treatment needs of their oral and periodontal health improvement, especially during the hospitalization periods. Also, the results of this study indicate the need for a continuous research of psychiatric patients' oral health, in order to determine the modes of its improvement. Similar studies should elucidate a significance of psychiatric patients' periodontal health and sensitize the psychiatrists and psychiatric nurses to the oral problems of their patients.

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