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Periodontal health and treatment needs among hospitalized chronic psychiatric patients in Istanbul, Turkey

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Objective: The aim of the study was to evaluate the periodontal health and treatment needs of chronically hospitalized psychiatric patients in Istanbul, Turkey. ***Method:*** The subjects' periodontal health was recorded by the CPI (Community Periodontal Index) method. ***Results:*** Of the 330 patients examined, 179 (52.5 %) were males and 151 (47.5%) females. The mean age of the patients was 49.2±11.7 years. The majority (61.8%) was diagnosed with schizophrenia and 30.6% diagnosed with mental retardation. The mean length of hospitalization was 16.0±10.9 years. Healthy periodontal tissues (CPI 0) were found in 8.8 % of the subjects. Bleeding on probing (CPI 1) was recorded in 6.3%, and dental calculus (CPI 2) in 51.8% of the subjects. These were determined as the worst findings. Altogether, 33% of the subjects had deep periodontal pockets, 14.2% with at least one 4- to 5-mm pocket (CPI 3), and 18.8% with at least one 6-mm pocket (CPI 4). The stepwise logistic regression analysis, between the final CPI score and seven variables including age, gender, psychiatric diagnosis, length of hospitalization, degree of helplessness, tooth brushing habits and smoking, showed that irregular tooth brushing habits and male gender were significant contributors to having a final CPI score of 2 or more. The regression analysis also showed that tooth brushing habits remained as an explanatory variable in CPI 0 coded subjects; helplessness and psychiatric diagnosis (mental retardation) in CPI 2; tooth brushing habits and psychiatric diagnosis (schizophrenia) in CPI 3; and only helplessness in CPI 4. ***Conclusion:*** The present study underlines a considerable need for prevention and treatment of periodontal disease among chronic psychiatric patients in Istanbul. Efforts need to be focused above all on raising this population's awareness of the importance of oral hygiene and on early diagnosis of periodontal problems.

Key words: Chronic psychiatric patients, CPI, mental retardation, periodontal disease, periodontal treatment, schizophrenia.

Introduction

Periodontal diseases that are characterized by inflammation of the supporting tissues of the teeth, are the most important causes of tooth loss in individuals over the age of 45 years (Aida *et al.,* 2006) and along with caries, are the most frequent oral health problems in the world (Armitage, 1999). Although several factors are related to the development of periodontal diseases, such as virulence of the microorganism, host, and environmental conditions (Albandar., 2002 ; Teng., 2003), there is great variability in the distribution and severity of the disease, so that different risk factors may be important at different times of the individual's life and in different population groups. Clinical observations and epidemiologic studies suggest that some negative life events and psychological factors may contribute to an increased susceptibility to periodontal disease (Hugoson *et al.,* 2002).

The mentally ill or psychiatric patients form a substantial section of the community deserving special attention. These people are amongst the most vulnerable groups to poor oral health because of the general self neglect, poor diet, heavy smoking, irregular oral hygiene habits and the side effect of medications (Brown *et al.,* 1999; Lewis *et al.,* 2001). Several researchers have identified oral health problems in psychiatric patients and have suggested that these people are at a greater risk of periodontal disease and have a greater need for periodontal treatment (Angelillo *et al.,* 1995; Velasco and Bullon 1999; Rekha *et al.,* 2002; Velasco Ortega *et al.,* 2005; Kumar *et al.,* 2006).

The purpose of the present study was to determine the periodontal health and treatment needs in a group of chronic psychiatric patients and to study the possible relationship between CPI scores and different variables. Another aim of the study was to record the periodontal health status of all the chronic psychiatric patients in the hospital.

Material and Methods

The population of this study comprised of the all chronic psychiatric inpatients at the Bakirkoy Research and Training Hospital for Psychiatry, Neurology and Neurosurgery in Istanbul. This hospital contains 67% of the overall chronic psychiatric patient beds in Turkey. Of the 491 patients examined, 82.2% had partial natural dentition and 18.8% were edentulous. A total of 330 dentate chronic

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psychiatric patients who had at least two functional teeth in one sextant in the mouth were included in the study.

Before the clinical examination, demographic (age, gender, length of hospitalization) and medical data (diagnosis of the mental disorders, psychiatric medications used and degree of helplessness) were retrieved from medical records. The presence of oral dryness was assessed during the clinical examination. The presence of dry lips, dryness of the buccal mucosa and lack of saliva upon palpation were accepted as determinants of oral dryness. In addition, the head nurses were consulted about the patients' smoking and daily tooth brushing habits. The brushing habits were obtained from charts recorded by the nurses. The brushing habits were recorded as "several times a week" for those who brush 3-7 times or more in a week whereas " seldom or never" for those who brush less than three times a week.

The periodontal status assessment criteria were those proposed in the World Health Organization oral health survey methods manual (WHO, 1987), employing the community periodontal index (CPI). The index teeth examined in each of the six sextants were 17, 16; 11; 26, 27; 36, 37; 31; 46; 47. Third molars were excluded from the study. A sextant was only examined if there were at least two teeth not indicated for extraction, otherwise that sextant would have been classified as an excluded sextant. If no index tooth was found in a sextant qualifying for examination, the remaining teeth in the sextant were examined and the highest score was recorded as the value for the sextant.

Each sextant was defined as follows: healthy, scored as CPI 0; bleeding observed on probing, CPI 1; calculus detected, CPI 2; pocket of 4-5 mm, CPI 3; or pocket of 6 mm or more, CPI 4; excluded sextant, CPI X. These six observations were then used to calculate a final CPI score. Meanwhile, CPI code for every individual patient was determined according to the sextant with the highest code. On this basis, the individual level of treatment needs (TN) was pointed out; patients with gingival bleeding needed oral hygiene instruction (TN1), those with score 2 and 3 needed also scaling (TN2). If there was at least one sextant with CPI score 4, the person was qualified for complex periodontal treatment (TN3).

The collected data was analyzed by using Chi-square test and Stepwise Logistic Regression Analysis. The relationship between the prevalence of CPI scores and associated explanatory variables were assessed by Chi- square test and the significant variables were further analyzed by logistic regression. Seven predictor variables were selected to predict the outcome variables. They were age, gender, diagnosis of psychiatric disorder, length of hospitalization, tooth brushing habits, degree of helplessness and smoking. The groups diagnosed with atypical psychosis and organic mental disorder was not included in these logistic models, since they did not meet the entry requirements for regression analysis. The precision was calculated for a 95% confidence level. A value of $p<0.05$ was considered statistically significant. The statistical analysis was performed using SPSS for Windows Statistical Software Package Version 13.0.

Results

For this study, a total of 330 patients (179 men and 151 women) aged 22-82 years (mean 49.2±11.7) were examined. The mean length of hospitalization was 16.0±10.9 years ranging between 1 and 44 years. The demographic and medical characteristics of the study population are shown in Table 1. Most of the patients (94.2%) were treated with psychotropic drugs with an average of two (mean: 2.43±1.28). Classic antipsychotics (66.7%), atypical antisychotics (39.1%), benzodiazepines (22.1%), anti-cholinergic drugs (63.9%), anticonvulsants (19.4%), and antidepressants (4.5%) were the psychotropic drugs used. 29.1% of the subjects received general medications including hematological drugs (3%), endocrinological drugs (10.3%), neurological drugs (10.6%), cardiovascular drugs (10.3%) and respiratory drugs (2.4%). 37.3 % of chronic psychiatric patients had oral dryness.

The percentage of subjects according to CPI scores were as follows: a healthy periodontium was found in 8.8% of the patients (CPI 0), while 14.2% exhibited gingival bleeding upon probing (CPI 1), 51.8% had dental calculus (CPI 2) and 33% had periodontal disease as evidenced by periodontal pocket formation greater than 3mm, 14.2% with at least one 4- to 5-mm pocket (CPI 3), and 18.8% with at least one 6-mm pocket (CPI 4).

Periodontal treatment needs as reflected by the CPITN were determined as follows; the great majority (91.2%) of the study population required oral hygiene instruction (TN1), and also 88.5% needed scaling and root planing (TN2), and 18.8% complex periodontal treatment (TN3).

Bivariate analysis between final CPI score and seven variables are shown at Table 2. The subjects were separated into two categories according to the CPI: less than 2, and 2 and more (A cut off point of 2 was chosen based on the mean CPI: 1.92±0.98). There were 92 subjects in the former category and 238 in the latter. Variables that were significant in the bivariate analysis were subjected to stepwise logistic regression analysis to adjust for the influence of confounding variables. Finally, gender and tooth brushing frequency were identified as significant explanatory variable for the final CPI score. The odds ratios with confidence intervals were calculated by the logistic regression model, and are shown in Table 3.

Variables that were significant in the bivariate analysis between the percentage of subjects in each highest CPI values and seven variables including age, gender, psychiatric diagnosis, length of hospitalization, degree of helplessness, tooth brushing habits, smoking were subjected to stepwise logistic regression analysis to adjust for the influence of confounding variables. Results are shown in Table 4. In the final model, tooth brushing habits remained as an explanatory variable in CPI 0 coded subjects; helplessness and psychiatric diagnosis (mental retardation) in CPI 2; tooth brushing habits and psychiatric diagnosis (schizophrenia) in CPI 3; and only helplessness in CPI 4 (Table 4).

The percentage of the coded sextants according to the highest CPI were determined as follows: Among the sextants, 10.4 % were determined as healthy (CPI 0), 4% as bleeding (CPI 1), 34% had calculus formation (CPI 2), 7% had shallow periodontal pockets (CPI 3), 5.3% had deep periodontal pockets (CPI 4) whereas 39.1% had excluded sextants (CPI X).

Table 1. Characteristics of the sample studied.

	n	*%*
Age groups		
22-34	35	10.6
35-44	74	22.4
45-54	123	37.3
55-64	62	18.8
> 65	36	10.9
Gender		
Male	179	52.5
Female	151	47.5
Diagnose		
Schizophrenia	204	61.8
Mental Retardation	101	30.6
Organic Mental Disorder	11	3.3
Atypical Psychosis	14	4.2
Hospitalization (years)		
1-9	115	34.8
10-19	91	27.6
20-29	85	25.8
30<	39	11.8
Tooth brushing habits		
Several times a week	124	37.6
Seldom or never	206	62.4
Helplessness		
Self sufficient	304	92.1
Partially/totally helpless	26	7.9
Smoking		
Smoker	191	57.9
Nonsmoker	139	42.1

Table 2. Number (%) of the chronic psychiatric patients for the CPI score (less than 2 and 2 and more) according to seven variables.

		CPI score		
	n	*n<2 (%)*	*n≥2 (%)*	*p value*
Age				0.1
Less than 50 years	171	57.6	49.6	
50 years or more	159	42.4	50.4	
Gender				0.007*
Male	179	42.4	58.8	
Female	151	57.6	41.2	
Psychiatric diagnosis				0.4
Mental Retardation	101	70.2	65.6	
Schizophrenia	204	29.8	34.4	
Length of hospitalization				0.7
16 years or less	179	55.4	53.8	
More than 16	151	44.6	46.2	
Helplessness				0.3
Self sufficient	304	94.6	91.2	
Partially-totally helpless	26	5.4	8.8	
Tooth brushing frequency				0.002*
Several times a week	206	48.9	67.6	
Seldom or never	124	51.1	32.4	
Smoking				0.4
Absent	139	47.8	39.9	
Present	191	52.2	60.1	

*Significant difference between two groups by Chi-square test.

Using the stepwise logistic regression analysis between the excluded sextants (CPI X) and seven variables, Age, hospitalization and psychiatric diagnosis (schizophrenia) were identified as significant explanatory variables for the CPI X sextants (Table 5).

Discussion

The findings of this investigation, representing the first study that evaluates the periodontal health and the treatment needs of chronically hospitalized psychiatric patients in Istanbul, show a high prevalence of periodontal disease, and extensive unmet needs for treatment. Over half of the sample had large accumulations of calculus (51.8%) and one-third (32.9%) had periodontal disease, as evidenced by periodontal pocket formation. Besides, it was observed that the cumulative effect of past periodontal breakdown increased with age, based on a large number of excluded sextants noticed in the older age groups. These findings are in conformity with those of other studies that have noted extensive periodontal disease and a large number of excluded sextants in hospitalized psychiatric patients (Angelillo *et al.,* 1995; Velasco and Bullon 1999; Velasco *et al.,* 2005). In fact, the high number of excluded sextants in the present study may further aggravate the findings related to severe periodontitis since teeth recorded as absent or missing sextants may have been extracted for periodontal reasons. According to the stepwise logistic regression analysis, older age, longer hospitalization and psychiatric diagnosis (schizophrenia) remained as contributory factors to the observed differences for excluded sextants (CPI X). The expected significant increase in periodontal destruction with increasing age was not reflected in values for shallow or deep periodontal pocket in age cohorts, however significant differences were noted for the number of excluded CPI sextants, which expressed the rate of tooth loss. In addition, as the time of hospitalization proceeds, the periodontal status of our study population worsened, manifested by the increase of the number of sextants excluded. The association between poor periodontal health and longer period of hospitalization could be attributed to the accumulated

Table 3. Results of stepwise logistic regression analysis for CPI value. Odds ratios with 95% confidence intervals (C.I.)

Dependent variable: CPI value	*ß*	*SE*	*OR (95 % CI)*	*p value*
Independent variables				
Gender	0.53	0.26	0.58 (0.34-0.99)	0.04
Tooth brushing frequency	0.59	0.27	0.54 (0.32-0.93)	0.02
Constant	1.48	0.21	4.39	0.000

The variables were recorded as 0 or 1 for each category. Age (Less than 50 years= 0, 50 years or more=1),Gender (Male=0, Female=1), Psychiatric diagnosis (Mental retardation=0, Schizophrenia=1), Length of hospitalization (16 years or less=0, More than 16=1), Helplessness (Self sufficient=0, Partially-totally helpless=1), Tooth Brushing Frequency (Several times a week =0, Seldom or never =1), Smoking (Absent=0, Present=1).

Table 4. Results of stepwise logistic regression analysis for the distribution of subjects according to highest CPI scores. Odds ratios with 95% confidence intervals (C.I.)

Dependent variables	*Independent variables*	*ß*	*SE*	*OR (95 % CI)*	*p value*
CPI 0 Healthy	Tooth brushing frequency	2.241	0.51	9.42 (3.46 - 25.59)	0.000
	Constant	3.616	0.45	0.02	0.000
CPI 2 Calculus	Helplessness	1.262	0.48	0.28 (0.11 - 0.72)	0.009
	Psychiatric diagnosis	0.779	0.26	0.45 (0.27- 0.77)	0.004
	Constant	0.683	0.23	1.98	0.003
CPI 3 Shallow pocket	Tooth brushing frequency	1.134	0.40	0.32 (0.14 - 0.70)	0.005
	Psychiatric diagnosis	0.835	0.39	2.30 (1.06 - 4.97)	0.03
	Constant	2.03	0.33	0.13	0.000
CPI 4 Deep pocket	Helplessness	1.684	0.44	5.38 (2.27 - 12.76)	0.000
	Constant	1.684	0.16	0.18	0.000

The variables were recorded as 0 or 1 for each category. Age (Less than 50 years= 0, 50 years or more=1), Gender (Male=0, Female=1), Psychiatric diagnosis (Mental retardation=0, Schizophrenia=1), Length of hospitalization (16 years or less=0, More than 16=1), Helplessness (Self sufficient=0, Partially-totally helpless=1), Tooth Brushing Frequency (Several times a week =0, Seldom or never =1), Smoking (Absent=0, Present=1).

Table 5. Results of stepwise logistic regression analysis for CPI X (excluded sextants). Odds ratios with 95% confidence intervals (C.I.)

Dependent variable: Excluded sextants (CPI X)	*ß*	*SE*	*OR (95 % CI)*	*p value*
Independent variables				
Age	1.18	0.32	3.26 (1.69-6.27)	0.000
Length of hospitalization	1.51	0.33	4.56 (2.35-8.83)	0.000
Psychiatric diagnosis	0.91	0.31	2.50 (1.35-4.65)	0.004
Constant	0.45	0.26	1.58	0.09

The variables were recorded as 0 or 1 for each category. Age (Less than 50 years= 0, 50 years or more=1),Gender (Male=0,Female=1), Psychiatric diagnosis (Mental retardation=0, Schizophrenia=1), Length of hospitalization (16 years or less=0, More than 16=1), Helplessness (Self sufficient=0, Partially-totally helpless=1), Tooth Brushing Frequency (Several times a week =0, Seldom or never =1), Smoking (Absent=0, Present=1).

effects of periodontal problems, involving more teeth, leading to periodontitis and finally tooth loss as age advances. Similar observations have also been reported by other investigators (Angelillo *et al.,* 1995; Velasco and Bullon 1999; Kumar *et al.,* 2006). It could be therefore suggested that in the population examined the progress of periodontal destruction with increasing time might not be shown by an increase in pocket depth, but only by an increase in tooth loss.

The Community Periodontal Index (CPI) scores from the studies reviewed revealed different treatment needs for each one of the psychiatric populations investigated. The highest percentage of patients in our study population was recorded for the calculus (CPI 2) which was 51.8%, indicating an increasing need for preventive aspects in chronic psychiatric patients. This finding is consistent with the study of Velasco and Bullon (1999) who found that CPI 2 got the highest percentage (43.8%) among chronic psychiatric patients in Spain. Deep periodontal pockets (CPI 4) were found in 18.8% of our subjects (average age 49). Angelillo *et al.,* (1995) reported pockets of 6 mm or more and bleeding in 64% of the patients examined (average age 55). Velasco *et al.,* (1999) reported the same results for 8.9% of the population with the majority of the population studied having pockets of 4-5 mm (average age 58). Lewis *et al.,* (2001) reported 6 mm pockets in only 1% of the population studied, and reported the presence of hard deposits with no pockets in 42% of patients (average age 71). A study by Rekha *et al.,* (2002), in India, including 326 institutionalized patients, reported that 1.5% had periodontal health and 15.5% needed more complex periodontal therapy (average age 34). The difference in periodontal treatment needs of the institutionalized psychiatric patients can be attributed to difference in age and the number of teeth present.

The stepwise logistic regression analysis showed that male gender was a significant contributor to having a final CPI score of 2 or more. In line with the present findings for the men, who had higher CPI score than women, other epidemiological studies have consistently confirmed that periodontal diseases are more prevalent in men (Albandar, 2002 ; Krustrup and Petersen., 2006). It has been suggested that the reason for gender related differences in the clinical signs of periodontal destruction was often related to better oral hygiene practices among females (Corbet *et al.,* 1990). The logistic regression analysis also revealed that irregular tooth brushbrushing habits were significantly associated with a final CPI score of 2 or more. Dental plaque removal at least once per day is sufficient for the prevention of most infection and inflammation related oral disorders (Wilkins, 2005). The lack of proper oral hygiene undoubtly contributes to the increased prevalence of periodontal disease. This problem especially prominent in the partly and totally helpless group due to physical limitations as in case of this study. This result is consistent with previous findings (Kumar *et al.,* 2006). Patients who were partially or totally helpless had increased CPI 2 and CPI 4 scores and this was expected as the degree of helplessness worsened and the ability to perform their daily activities reduces. This result also draws attention to the importance of chronic psychiatric ward nurses in the provision of oral health of patients partially or totally confined to bed. Nurses interact with patients on a daily basis, and they are psychiatric care-givers of choice to ensure that their patients maintain an acceptable level of oral hygiene. Still further research should, first and foremost, be focused on the difficulties for nurses in approaching their psychiatric patients in order to perform oral care.

The logistic regression analysis revealed that the patients with mental retardation were more likely to have a CPI 2 score whereas schizophrenia patients were more likely to have a CPI 3 score. In addition, the rate of tooth loss, defined as excluded sextants was higher in schizophrenic patients compared to the subjects with mental retardation. The difference in periodontal health of psychiatric patients may be significant in planning interventions in patients with periodontal disease. Mental retardation is a developmental disability that is marked by lower-than-normal intelligence and limited daily living skills, and oral hygiene seems to be affected more adversely in this group of patients compared to other mental diseases. The high prevalence of calculus among the patients with mental retardation results from their poor oral hygiene practices. On the other hand, Hede (1995) reported that negative symptoms in schizophrenia and personality disorders are possibly responsible for poor toothbrushing habits. Despite this, it has been suggested that patients with schizophrenia could maintain a good toothbrushing habit (Friedlander and Marder, 2002). Many patients suffering from long-term psychiatric illness are on medication for long periods. It seems that the effect of psychotropic medication on the periodontium was due to a high rate of calculus deposits, resulting from oral hygiene neglect, xerostomia and alteration of microbial profile (Friedlander *et al.,* 2002). In this study, patients ingested different doses, types and combinations of psychiatric and general medications. For this reason, we can't conclude with accuracy the real effects of these medications. Medications were not included in this analysis due to the complex pattern of medications prescribed to the participants, and because almost all of the patients had received or were receiving potentially xerostomic medications. Moreover, oral dryness was included as a measure of xerostomia, since the actual presence of this side effect was considered of more relevant to the analysis than the medication itself. The objective identification of oral dryness was noted in 37.3% of our study population. This frequency is supported by other similar reports in the literature (Vigild *et al.,* 1993 ; Rekha *et al.,* 2002).

This is the first study performed in Turkey which evaluates the treatment needs and risk factors associated with periodontal status among chronic psychiatric patients. The results of the present investigation may serve to reorganize duties of psychiatric nurses and assisting personel. The data from this study also provides the means to assess the demand for dental care and to formulate appropriate policies. Limitations of this study include heterogeneity in psychiatric diagnosis, and the lack of a matched control group. In addition, although the study population represents approximately 70% of the overall recorded chronic psychiatry patients in Turkey, there is no available information regarding unrecorded patients. Another limitation of the study is the lack of information regarding the psychotropic drugs used by the patients as well as the effect of systemic medications on periodontal health.

In conclusion, this study provided the opportunity for evaluating the periodontal health status of a group of hospitalized chronic psychiatric patients and for referrals to be made for further treatments for those in need. The high figures for calculus and deepened periodontal pockets in this population reflect the inadequacy of both preventive programmes and specialised professional services. Future research should focus on continually monitoring the periodontal health status of chronic psychiatric patients and seeking ways to adjust the resources available to best meet the needs of these patients. Also educational programmes on oral health and hygiene for health care professionals, especially nurses, should be regarded as important.

References

Aida, J., Ando, Y., Akhter, R., Aoyama, H., Masui M., Morita M. (2006): Reasons for permanent tooth extractions in Japan *J Epidemiology* **16**,214-219.

Albandar, J.M. (2002): Global risk factors and risk indicators for periodontal diseases. *Periodontology 2000* **29**,177-206.

Angelillo, I.F., Nobile, G.C.A., Pavia, M., De Fazio, P., Puca, M., Amati, A.(1995): Dental health and treatment needs in institutionalized psychiatric patients in Italy. *Community Dentistry and Oral Epidemiology* **23**, 360-364.

Armitage, GC. (1999): Development of a classification system for periodontal diseases and conditions. *Annual Periodontology* **4**, 1-6.

Brown, S., Birtwistle, J., Roe, L., Thompson, C. (1999): The unhealthy lifestyle of people with schizophrenia. *Psychological Medicine* **29**, 697-701.

Corbet, E.F.,, Holmgren, C.J., Lim, L.P., Davies, W.R. (1990): Sex differences in the periodontal status of Hong Kong adults aged 35-44 years. *Community Dental Health* **6**, 23-30.

Friedlander, H.A., Marder, R.S. (2002): Psychopathology, medical management and dental implications of schizophrenia. *Journal of American Dental Association* **133**, 603-610.

Friedlander AH, Friedlander IK, Marder SR. Bipolar I disorder. (2002): Psychopathology, medical management and dental implications. *Journal of American Dental Association* **133**: 1209-1217.

Hede B. (1995): Dental health behavior and self-reported dental health problems among hospitalized psychiatric patients in Denmark. *Acta Odontologica Scandinavia* **53**:35-40.

Hugoson, A, Ljunguist B, Breivik T. (2002): The relationship of some negative life events and psychological factors to periodontal disease in an adult Swedish population 50-80 age. *Journal of Clinical Periodontology* **29**, 247-253.

Krustrup,U., Petersen, E. (**2006):** Periodontal conditions in 35-44 and 65-74-year-old adults in Denmark *Acta Odontologica Scandinavica* **64**, 65-73.

Kumar, M., Chandu, G.N., Shafiulla, M.D.(2006): Oral health status and treatment needs in institutionalized psychiatric patients:one year descriptive cross sectional study. *Indian Journal of Dental Research* **17**, 171-177.

Lewis, S., Jagger, R.G., Treasure, E. (2001): The oral health of psychiatric in-patients in South wales. *Special Care Dentistry* **21**:182-186.

Rekha, R., Hiremath, S.S., Bharath, S.(2002): Oral health status and treatment requirements of hospitalized psychiatric patients in Bangalore City: A comparative study *Journal of Indian Society Pedodontics and Preventive Dentisry* **20**, 63-67.

Teng, H.C., Lee, C.H., Hung, H.C., Tsai, C.C., Chang, Y.Y., Yang, Y.H., Lu, C.T., Yen, Y.Y., Wu, Y.M.(2003): Lifestyle and psychosocial factors associated with chronic periodontitis in Taiwanese adults. *Journal Periodontology* **74**, 1169-1175.

World Health Organization.(1987): *Oral health surveys.* Basic methods. 3rd edition. Geneva.

Velasco, E., Bullon, P. (1999): Periodontal status and treatment needs among Spanish hospitalized psychiatric patients. *Special Care Dent*istry **19**, 254-258.

Velasco Ortega, E., Monsalve Guil, L., Casas Barquero, N., Velasco Ponferrada, C., Medel Soteras, R. (2005): Periodontal diseases in schizophrenic patients: A case-control study (Spanish). *Avances en Periodoncia e Implantologia Oral* **17**,235-243.

Vigild, M., Brinck, J.J., Christensen, J.(1993): Oral health and treatment needs among patients in psychiatric institutions for the elderly. *Community Dentistry and Oral Epidemiology* **21**,169-171.

Wilkins, EM. (2005): Clinical practice of the dental hygienist. 9th ed. Philadelphia: Lippincott Williams & Wilkins.