

Evaluation of Oral Health Status in Edentulous Geriatric Patients with Psychiatric Diseases in North Indian Population

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ABSTRACT

Background: Few research on the oral health of edentulous geriatric psychiatric patients have been performed. Tooth loss, caries, poor oral hygiene, periodontal disease, the need for extractions, and increased prosthetic needs were all found to be more common in these studies. Oral signs may be the first or only sign of a psychiatric issue. This study investigated the oral health status of edentulous geriatric patients with psychiatric diseases in North Indian Population

Materials and methods: An oral examination documented the condition of oral tissues and current dentures, and a formal interview recorded socio demographic and dental data. A hospital practitioner reviewed the patients' medical history.

Results: A total of 111 patients, with an average age of 73, took part in the study. Nearly half of them were diagnosed with schizophrenia. Just 38.6% of those who were totally edentulous used dentures, despite the fact that 40% were completely edentulous. The dentate had an average of 12.9 teeth, with 50.7 percent having at least one decayed tooth, 44.8 percent requiring at least one extraction, and just 26.7 percent having teeth that had been filled. In 83.6 percent of the patients, dental hygiene was bad. More than 60% of the dentures is defective. Multiple regression studies revealed that the use of atypical antipsychotics was linked to fewer carious teeth, and that increasing age and dementia were linked to fewer remaining teeth.

Conclusion: The geriatric psychiatric patients' oral health was in bad shape. Dental treatment should be more accessible, and health-care workers should be qualified to recognise oral problems.

Keywords: Oral health, psychiatric patients, geriatric, edentulous.

INTRODUCTION

Few research on the oral health of edentulous geriatric psychiatric patients have been performed. Tooth loss, caries, poor oral hygiene, periodontal disease, the need for extractions, and increased prosthetic needs were all found to be more common in these studies. Oral signs may be the first or only sign of a psychiatric issue.¹

The duration of hospitalisation, the duration of disease, the educational level, the age of the patients, the intake of psychiatric medication with negative effects on oral health, gender, tooth-brushing habits, infrequent dental visits, and frequent snacking have all been investigated as factors that may affect the oral health of geriatric

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psychiatric in-patients. However, there have been very few studies of psychogeriatric populations.² Researchers also cite patients' unwillingness or inability to obtain more complex dental care due to mental illness, dentists' reluctance to offer more complex treatment, or the lack of dental treatment.

Another critical consideration is the health-care system's inadequate public dental coverage, which prevents the economically vulnerable from receiving oral care. Patients in previous studies received only emergency treatment (extractions, counselling) in the hospital, with very limited access to oral care until they returned home.³

After 1998, when psychiatric hospitals were required to provide dental care, and particularly when on-site dental treatment was provided, there was a significant improvement in the oral health of geriatric psychiatric patients in Israel. Furthermore, oral health was improved in a Canadian study when dental treatment was given in the hospital.⁴ Oral health care guidelines and recommendations for patients with mental disorders have been released. Both health care practitioners should be trained in oral evaluation, oral hygiene, and adequate dental referrals, as well as the inclusion of oral health needs assessments in general health assessments, and the training of the dental staff in the specific issues and treatment of mentally ill patients.⁵

Data on the oral health of edentulous mentally ill geriatric patients in India is limited. Oral disorder, as assessed by OHIPS and DMFT, was increased and directly linked to the severity of disease in a previous study in schizophrenic patients in India, conducted in 1996 in a younger age group with a mean age of 50.4 years.⁶

The aim of the present study was to assess the oral health of edentulous geriatric patients with psychiatric diseases in North Indian population.

MATERIALS AND METHODS

The study included 111 edentulous geriatric subjects with mental illness who were treated at a tertiary care hospital's psychogeriatric ward. The research included all patients who were hospitalised at the time of the review period. Those that were violent or uncooperative were marked by the ward psychiatrists and were removed from the

sample. A ward physician or nurse approached the patients and asked if they wanted to engage in a study on their teeth and gums. The researcher explained all procedures to them if they were interested in participating. Only those who gave their permission were included in the study.

The medical histories of the patients were reviewed with the help of a hospital physician (G.K.) to record age, medical and social history, primary psychiatric diagnosis based on the DSM-IV-TR manual¹⁹, accompanying general illness, drugs prescribed (type and number), duration of the mental disease, and length of the last hospitalisation. In the mornings, between 10.00 and 12.00, the patients were interviewed and clinically examined in the wards by the same professional gerodontologist (A.K.). Patients that were unable to move about were tested while lying in their beds. A formal interview was used to collect sociodemographic and dental data, which included both closed-ended and open-ended questions.

The questionnaires asked about occupation, education, marital status, involvement of carers, smoking habits, the date of the most recent dental appointment, the frequency of dental appointments, the frequency of dental hygiene, and the method of teeth cleaning. Patients were asked whether they wore dentures, how old they were, how much they used them, and how they cleaned them. Physicians, social workers, nursing staff, and patient carers, when present, offered more up-to-date information on the patient's medical, social, and dental background as needed. The oral and perioral tissues, as well as dentures, were examined using a dental mirror, light source and a tongue depressor after the interview.

There was no periodontal poking or other invasive techniques used, and no radiographs were taken. The number and position of natural teeth (including tooth remnants), the number of teeth with caries (no distinction between coronal and root caries), the number of teeth with filings, the number of teeth/roots requiring extraction (based on increased mobility or inability to be restored), and the presence of calculus, plaque, and food remnants were all considered during the oral examination (poor when covering at least one-third of the exposing tooth surface of at least one-third of the remaining teeth).

Oral pathology, angular cheilitis, and involuntary stomatognathic movement disorders (tardive dyskinesia, parkinsonian tremor, and so on) were also noted. Dentures were taken out and checked whether the patient wore them. Broken areas, tooth wear, denture hygiene (poor, when more than one-third of the denture base was covered by visible signs of plaque, debris, or calculus), retention (denture dislodging when pulling on the incisor teeth with the index finger), and occlusal vertical dimension (using the postural rest position measurement and accepting the 2–4 mm of freeway space) and occlusion (patients were asked to close and if their posterior teeth met in occlusion, it was considered acceptable²⁰).

Statistical analysis

Descriptive statistics were used to analyse the data. We measured the mean and median values, standard deviations, minimum and maximum values, and percentages. Chi-square tests, t-tests, Mann–Whitney tests, Kruskal–Wallis Analysis of Variance on Ranks tests (followed by Dunn's tests for multiple comparisons when a statistically significant difference was recorded) and ordered logistic regressions were used to identify statistically significant differences between variables. The significant associations revealed from bivariate analyses were then included in multiple ordinal logistic regression analyses to investigate the unconfounded effect of multiple independent parameters on the dependent variables. The level of statistical significance was set at $p \leq 0.05$.

RESULTS

Sociodemographic and medical characteristics of the Patients

The study included 111 patients, 41 men and 70 women, with a mean age of 73.0 years (range: 57–94) and a mean age of 73.0 years (range: 57–94). (Table 1). With the exception of one patient of Arabic ancestry, they were all Greek. Table 1 shows the sociodemographic features of the sample by primary psychiatric diagnosis. The majority of the patients suffered from schizophrenia and other psychiatric illnesses (50.5%), mood disorders (17.1%), dementia (24.3%), and numerous other mental disorders (8.1%).

Patients with different psychiatric illnesses, such as personality disorders (three patients, 2.7 percent), mental retardation (two patients, 1.8 percent), and anxiety disorders (four patients, 3.6 percent), were included in this last group since there were so few to be studied separately. The demented patients were slightly older than the other patients, and there were no statistically significant differences in the incidence of mental disorders between the sexes. Psychotic patients remained in the wards for longer periods of time. Fifty-eight percent of the patients had been in the hospital for less than three months, and 11 had been there for more than ten years.

In comparison to the other patient classes, more psychotic patients (42.9 percent) were in long-term hospitalisation (chi-square, $p = 0.001$), while the majority of patients with mood disorders had multiple hospitalizations accompanied by discharges (68.4 percent). The majority of psychotic patients (36.5%) were single, while the majority of demented patients (53.8%) and suicidal patients (47.4%) were widowed. The majority of the patients (58.6%) had an elementary education or had spent two or three years in elementary school. Seventy-eight percent were covered by social insurance, but ten percent were not.

General medical condition and drug intake

Hypertension (21.6 percent), diabetes (15.3 percent), cardiopathy (13.5 percent), and hypothyroidism were the most common general medical problems observed in the patients (13.5 percent). Atypical antipsychotics were the most widely prescribed drugs (80.2 percent). The patients were given an average of 4.6 2.8 medications a day (SD) (median: 4, range 0–12) and 2.9 1.5 psychiatric medications (SD) (median: 3, range 0–7). Just one patient was left without medicine.

Dental service utilisation

Only 12.6% reported that they had visited the dentist within the past 12 months. Almost 50% visited the dentist only in emergencies (pain, broken tooth, etc.).

Dental status of the patients

67 patients (60.4%) were dentate, while 44 patients (39.6%) were totally edentulous, according to the oral review (Table 1). It shows the occurrence of dental disease by psychiatric diagnosis. Patients with dementia had slightly more edentulousness, whereas patients with mood disorders needed less extractions. Just 26.7 percent of dentate patients had fillings (range: 1–11), 44.8 percent required at least one extraction (range: 1–14), and 50.7 percent had at least one decayed tooth (range: 1–10). The majority of the patients had poor oral hygiene.

The average and median numbers of teeth, caries, fillings, and teeth that should be removed as a result of a clinical diagnosis are seen. Just 17 (15.3%) of the patients had 20 or more natural teeth. There were no statistically significant variations in the number of teeth, decayed teeth, filled teeth, or teeth that required extraction due to mental illnesses. The statistically important relationships between oral health and sociomedical and dental practises are discussed. The number of natural teeth that remained decreased dramatically as people got older (mean: 11.8 in the 55–65 age group, 8.6 in the 66–75 age group, 5.3 in the 76–85 age group, and 2.5 in the 86–95 age group).

Edentulousness was found in 21.1 percent of those aged 55–65, 37.9% of those aged 66–75, 45.8% of those aged 76–85, and 70 percent of those aged >85. Widows and those with only a primary or secondary education had fewer teeth. The length of stay in the hospital was linked to a higher incidence of caries and the need for extractions. Patients who said they brushed their teeth at least once a day had more teeth than those who said they cleaned them less often. Furthermore, those who had seen their dentist during the previous year had fewer missing teeth.

When compared to those who did not take such drugs (3.4 3.0, median = 2.5), those who took atypical antipsychotics had less held teeth (1.8 2.5, median = 0). Antidepressants were associated with more filled teeth (1.6 2.3, median = 0.5) than those that did not (0.9 2.4, median = 0). The duration of the illness, the presence of carers, and smoking habits had no impact on any of the parameters tested. Diabetes, hypothyroidism, and hypertension, as well as the overall amount of medications taken each day, the number of psychiatric drugs taken each day, and the intake of traditional

antipsychotics and antihypertensives, were not linked to the number of remaining dentition, or carried teeth, filled teeth and the teeth that needed extractions (Mann–Whitney test, ordered logistic regression, $p > 0.05$). The only exception was the positive relation between hypothyroidism and number of filled teeth (Mann–Whitney, $p = 0.024$). (Table 1)

Dental hygiene habits

Fifteen dentate patients had never brushed their teeth before, and another 13 had not done so since being admitted to the hospital (Table 5). Some of the people who brushed their teeth said they didn't brush them as much as they did at home. The most popular form of brushing teeth was with a toothbrush and toothpaste (62.5 percent of respondents), while a significant percentage of patients simply rinsed with water (25 percent of the respondents). Many patients mentioned that they did not have access to a toothbrush or toothpaste while in the hospital and had to clean their teeth in other ways (with finger, with wet paper tissue, with finger and salt). The patients did not receive any help in daily oral hygiene. The daily cleaning of teeth was not significantly related to the primary psychiatric diagnosis (chi-square test, $p = 0.643$).

Use of dentures

The full and partial denture status is presented based on the interview. 37 (67.3 percent) of the 55 patients with dentures (49.5 percent of the overall population) said they used them, 15 (27.2 percent of denture patients) said they didn't need them, and three (5.5 percent) said they had lost them. Twenty-one patients (56.8% of denture users) said that they used their dentures on a daily basis. In comparison to the other patients (depressives: 47.4 percent, demented: 50 percent, other: 55.6 percent), few psychotic patients used their dentures (22 percent of psychotic denture patients), and all those who reported losing them were psychotics.

A large number of people who were truly edentulous had never made dentures before (31.8 percent). Pain (two patients), loose dentures (five patients), gagging (five patients), and difficulty adjusting to them were among the reasons given by a few patients for not wearing their dentures (two patients). The average age of complete and partial

dentures was 10.4 years, with a range of 1–40 years, and the average age of full dentures was 9.8 years. Thirty-two denture wearers, both full and partial, were studied. The five denture wearers who did not display their dentures for inspection did so either because they were left at home or because they declined to expose them.

Table 1: The proportion of the dentate patients (n = 67) with at least one filling, one decayed tooth, one tooth that needs extraction, and with presence of dental plaque or calculus. The last column presents the proportion of the edentulous (n = 44) by psychiatric diagnosis.

Mental disease	Fillings (dentate) n (%)	Decayed teeth (dentate) n (%)	Teeth needing extractions (dentate) n (%)	Dental plaque or calculus (dentate) n (%)	Edentulousness (all) n (%)
Mood disorders	5 (45.5)	5 (45.5)	1 (9.1)	10 (90.9)	8 (42.1)
Psychotic disorders	7 (17.5)	21 (52.5)	21 (52.5)	35 (87.5)	16 (28.6)
Dementia	3 (30.0)	4 (40.0)	4 (40.0)	8 (80.0)	17 (62.9)
Other	3 (50.0)	4 (66.7)	4 (66.7)	3 (50.0)	3 (33.3)
Total	18 (26.7)	34 (50.7)	30 (44.8)	56 (83.6)	44 (39.6)
p value	0.144	0.743	0.048	0.116	0.027

Table 2: Examination of dentures.

Upper and/or lower dentures' characteristics	Complete denture wearers (n = 13) n (%)	All denture wearers (n = 32) n (%)
Unsatisfactory retention	5 (38.5)	9 (28.1)
Broken denture	3 (23.1)	5 (15.6)
Tooth wear	3 (23.1)	5 (15.6)
Reduced occlusal vertical dimension	9 (69.2)	19 (59.4)
Unsatisfactory occlusion	8 (61.5)	15 (46.9)
Inadequate hygiene	8 (61.5)	21 (65.6)

Table 3: Examination of Oral Mucosal Lesions.

Oral Lesions	Mucosal	Of all subjects (n = 111) n (%)	Of denture wearers (n = 55) n (%)
Oral dyskinesia		7 (6.3)	2 (3.7)
Ulcer		4 (3.6)	2 (3.6)
Stomatitis		11 (9.9)	11 (20.0)
Angular cheilitis		1 (0.9)	1 (1.8)
Dry lips		9 (8.1)	3 (5.4)
Oral malodor		5 (4.5)	4 (7.3)
Denture irritation hyperplasia		2 (1.8)	2 (3.6)
Denture trauma		5 (4.5)	5 (9.1)
Leukoplakia		1 (0.9)	1 (0.9)

Many dentures needed to be fixed or replaced due to different flaws. The most common results were poor occlusion and a decreased occlusal vertical dimension. Denture hygiene was poor in the majority of denture wearers, particularly in psychotic and demented patients (85.7 percent and 66.7 percent, respectively), and less so in those with mood disorders (42.9 percent) (chi-square, p = 0.383).(Table 2)

Oral Mucosal Lesions

Denture wear was linked to the most common oral lesions, especially stomatitis (20 percent). Stomatitis was found to be significantly linked to psychiatric diagnoses, especially dementia (chi-square test, p = 0.013). Stomatitis was present in 26% of all dementia patients.(Table 3)

Multiple regression analyses

Multiple regression analyses were conducted based on the results of the bivariate analyses as follows: I Age (continuous dependent variable), marital status, period of hospitalisation (continuous dependent variable), level of education (elementary, >elementary), and primary psychiatric diagnosis were the predictors for total number of teeth (continuous dependent variable). (ii) Age, marital status, period of hospitalisation, primary psychiatric diagnosis, time since last dental visit (>1 year), and consumption of atypical antipsychotics were predictors for carious teeth (continuous dependent variable) (yes, no). (iii) The predictors for teeth that required extractions (continuous dependent variable) were age, marital status, length of stay in the hospital, and primary psychiatric diagnosis. The number of carious teeth in the dentate was

negatively related to the consumption of atypical antipsychotics, although the need for extractions was not significantly related to any of the independent variables examined ($p > 0.05$).

DISCUSSION

According to all previous research of psychiatric hospitalised patients, the oral health of this psychogeriatric population was very low. Almost half of the dentate had decayed or extracted teeth, and 83.6 percent had poor oral hygiene. Dentures were not worn by 50% of the edentulous (either a set or even one denture).⁷ The most common primary medical diagnosis in most surveys of psychiatric in-patients, including this one, was schizophrenia and other psychotic disorders. The study of Lewis et al. in Wales, where dementia was the most common illness, was an exception (46.9 percent). Multiple regression analysis found that the number of missing teeth was substantially higher in demented people, regardless of their age. As previously reported⁸, those patients also had higher rates of edentulousness. Patients with mood disorders had fewer carried and filled teeth than those who were psychotic or demented, according to research conducted in Israel.⁸

Many other dental disorders, with the exception of missing teeth, were more common in psychotic patients. As in Canada, psychotic patients had more remaining but less filled teeth, more caried teeth as in Israel and Spain, and more teeth that required extractions as previously mentioned. The later authors clarified this by citing high xerostomic drug dosages and a lack of dental care¹. Furthermore, few psychotic patients wore their dentures, and some said they had lost them. In this very old mentally ill population, however, neither general medical condition nor drug intake were found to be substantially associated with dental disease. Only mental problems were found to be substantially associated with dental status in a previous study in an older institutionalised population in North India. Only the use of atypical antipsychotics was linked to a lower risk of dental caries.⁹

In a 1996 study, Chu et al. found no connection between antipsychotic use and dental caries, although Thomas et al. discovered a marginally positive link between neuroleptic drug dosage and dental caries. Further research into the effects of

atypical antipsychotics on dental disease is required. Despite the fact that women had more natural teeth, fillings, and caries than men, the difference was not statistically important. This has also been recorded in other research.¹⁰ Multiple logistic tests found no important relationship between marital status and oral parameters, contrary to what other studies have found.¹¹

In our study's bivariate research, lower education was linked to fewer teeth and a higher plaque index in Serbia. The authors of that study stated that the less educated did not obtain adequate information on general and oral health. Even in this older psychiatric community, multiple regression analysis revealed that age was a major factor influencing the amount of remaining dentition. In several studies of psychiatric patients, age influenced the incidence of different parameters of dental disease: the number of missing teeth in the current and other studies, the DMFT, the frequency of periodontal disease, poor oral hygiene, and the increased need for extractions.¹²

In the age group 66–75, the rate of edentulousness was close to that of the general Greek population (40 percent). The mentally ill, on the other hand, had more caried teeth (1.9 per person compared to 1.4) and less fillings (0.9 compared to 2.48) than the general population. A 20-year-old study in a Greek institutionalised population found a higher need for extractions (4.2 teeth) and a higher rate of edentulousness (64.5 percent), but the participants were older (mean: 83.8 years) and cohort effects could not be ruled out. These results show that one of the reasons for the bad oral health of psychogeriatric patients in North India was the elderly patients' neglect of oral treatment.¹³

In a Geriatric Mental Health Department study in India, more than half of the older mentally ill patients (52.8 percent) used only oral rinsing. The hospital's health-care workers failed to provide adequate oral care, and patients were not given any assistance with oral hygiene. Many psychiatric patients are unable to practise oral hygiene on their own or lack the ability to do so. The nursing staff must assist and encourage them.^{14,15} A fascinating finding was that, while 48 percent of dentate psychiatric patients and 53 percent of denture wearers in Denmark received oral hygiene assistance, this assistance was unrelated to the level

of oral hygiene reported. The authors attributed this finding to the seriousness of the disease in those patients, their failure to accept aid, and the staff's inability to provide adequate oral hygiene assistance.^{16,17}

There were some flaws in this research. The majority of them included the removal of patients who were deemed to be disruptive or uncooperative by the ward staff, as well as those who refused to engage in the research. Those patients' oral health could be even worse. Another drawback of research of mentally ill populations is the precision of interview responses, which should be taken into account with caution due to the patients' mental state.

Furthermore, several patients did not respond to any of the questions, either because they did not know the answer or because they did not want to. Since the reasons for extractions in older adults are not always apparent, the DMFT index was not used in this review. This raises questions about its application. In terms of oral examination, all of the patients were tested by the same skilled examiner, removing the possibility of inter-examiner inconsistency.

CONCLUSION

The oral health of the edentulous geriatric psychiatric patients was very poor. Access to dental care should improve, and the health care staff should be trained to identify oral problems.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Barnes GP, Allen EH, Warren PA et al. Dental treatment needs among hospitalized adult mental patients. *Spec Care Dent* 1988; 8: 173–177.
2. Vigild M, Brinck JCJ. Oral health and treatment needs among patients in psychiatric institutions for the elderly. *Community Dent Oral Epidemiol* 1993; 21: 169–171.
3. Angelillo IF, Nobile CGA, Pavis M et al. Dental health and treatment needs in institutionalized psychiatric patients in Italy. *Community Dent Oral Epidemiol* 1995; 23: 360–364.
4. Hede B. Oral health in Danish hospitalized psychiatric patients. *Community Dent Oral Epidemiol* 1995; 23: 44–48.
5. Thomas A, Lavrentzou E, Karouzos C et al. Factors which influence the oral condition of chronic schizophrenia patients. *Spec Care Dent* 1996; 16: 84–86.
6. Velasco E, Machuca G, Martinez-Sahuquillo A et al. Dental health among institutionalized psychiatric patients in Spain. *Spec Care Dent* 1997; 17: 203–206.
7. Sjogren R, Nordstrom G. Oral health status of psychiatric patients. *J Clin Nurs* 2000; 9: 632–638.
8. Lewis S, Jagger RG, Treasure E. The oral health of psychiatric in-patients in South Wales. *Spec Care Dent* 2001; 21: 182–186.
9. Rekha R, Hiremath SS, Bharath S. Oral health status and treatment requirements of hospitalized psychiatric patients in Bangalore city: a comparative study. *J Indian Soc Pedod Prev Dent* 2002; 20: 63–67.
10. Ramon T, Grinshpoon A, Zusman SP et al. Oral health and treatment needs of institutionalized chronic psychiatric patients in Israel. *Eur Psychiatr* 2003; 18: 101–105.
11. Tang WK, Sun FCS, Ungvari GS et al. Oral health in psychiatric in-patients in Hong-Kong. *Int J Soc Psychiatr* 2004; 50: 186–191.
12. Kumar M, Chandu GN, Shafiulla MD. Oral health status and treatment needs in institutionalized psychiatric patients: one year descriptive cross sectional study. *Indian J Dent Res* 2006; 17: 171–177.
13. Bhansali S, Tripathi A, Tiwari SC et al. A study of the prosthodontic and oral health needs of an ageing psychiatric population. *Gerodontology* 2008; 25: 113–117.
14. Farrahi-Aval N. Oral Health Status and Treatment Needs of the Institutionalized Chronic Psychiatric Patients in Two Ontario Psychiatric Care

Centres. University of Toronto, 2008: 122 pp. MSc Thesis.

15. Chu K-Y, Yang N-P, Chou P et al. Factors associated with dental caries among institutionalized residents with schizophrenia in Taiwan: a cross-sectional study. BMC Public Health 2010; 10: 482–488.

16. Jankovic' S, Milovanovic' SD, Gajic' I et al. Oral health status of psychiatric in-patients in Serbia and implications for their dental care. Croat Med J 2010; 51: 443–450.

17. Zusman SP, Ponizovsky AM, Masarwa A et al. An assessment of the dental health of chronic institutionalized patients with psychiatric disease in Israel. Spec Care Dent 2010; 30: 18–22.