

# Oral Health Status and Treatment Needs of Inpatients at a Medical College Hospital in Haryana

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## ABSTRACT

**Aim:** To assess the oral health status and felt needs of patients admitted to medical/surgical wards.

**Materials and methods:** The cross-sectional study included 346 patients who were recruited from medical/surgical wards. Dental parameters were recorded using the World Health Organization (WHO) Oral Health Assessment Form for Adults, 2013.

**Results:** Mean age of patients was 40.77 [standard deviation (SD)  $\pm$  14.4] years; 36.4% aged > 45 years and 32.9% educated beyond 10 years of education. 77.2% used toothbrush and 75.7% toothpaste for cleaning of teeth. 91% brushed their teeth at least once a day and 77.7% performed tongue cleaning. Greater number of decayed teeth ( $3.43 \pm 3.38$ ) were seen in those educated  $\leq$  10 years when compared with those educated beyond this level ( $2.43 \pm 2.55$ ). Participants with low education attainment and higher age group (>45 years) had significantly more teeth missing due to caries/other reasons, and with deeper periodontal disease. Conversely, higher educated and younger aged group (<45 years) participants had significantly greater mean number of sound teeth and teeth without gingival and periodontal abnormalities. There was no significant difference between smokers and nonsmokers, those who ever visited a dentist or not, practicing or not practicing oral hygiene, using tobacco or not, those with diabetes mellitus and/or hypertension or without these conditions. Nearly 80% of the patients felt no requirement for dental treatment.

**Conclusion:** Despite adherence to oral hygiene practices, the oral health status of patients admitted to medical/surgical wards was poor.

**Keywords:** Dental caries, Gingival diseases and periodontal pocket, Hospitalization, Oral hygiene.

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## INTRODUCTION

According to the WHO, oral health is considered as an integral part of general health.<sup>1</sup> Poor oral health can act

as a risk factor for various physical illnesses and it can also be a consequence of poor physical health. Periodontal diseases and loss of teeth have been shown to be independent risk factors for cardiovascular diseases, cardiac events, presence of hypertension, and peripheral vascular diseases.<sup>2-7</sup> There is bidirectional relationship between diabetes mellitus and periodontal diseases.<sup>8</sup> Subjects with diabetes mellitus are more likely to have periodontal diseases and these are now considered as the sixth complication of diabetes mellitus.<sup>9</sup> Presence of periodontal disease among patients with diabetes mellitus has also been linked to higher risk of end-stage renal disease.<sup>10</sup> Severe periodontal disease has been shown to increase blood glucose levels, poor long-term control of blood glucose levels, and higher number of cardiovascular complications.<sup>11</sup> Poor oral health has also been linked to hospital-acquired respiratory infections<sup>12</sup> and increased risk of death due to respiratory diseases.<sup>13</sup> Increased risk of stroke is seen in patients with periodontal diseases.<sup>14</sup> Loss of teeth due to any cause is associated with presence of Alzheimer's disease and dementia.<sup>15</sup> Periodontal disease and poor oral health are significantly associated with preterm birth,<sup>16,17</sup> preeclampsia,<sup>18</sup> aspiration pneumonia,<sup>19,20</sup> stomach ulcers,<sup>21</sup> cancers of head, neck, and esophagus,<sup>22</sup> and obesity.<sup>23</sup>

Awareness of medical doctors about oral health conditions was investigated in a study where more than four-fifths of the physicians were unaware of oral health problems in their patients and had inadequate knowledge to refer the patients for dental treatments.<sup>24</sup> There is credible evidence to suggest that physicians do not refer patients to seek dental care.<sup>25</sup>

Today, 68.4% of population is still living in rural areas,<sup>26</sup> who have high unmet general and oral health needs, which is attributed to scanty distribution of medical and dental workforce serving in rural areas. Thus, to meet the unmet systemic and oral health problems suffered by people in rural areas remains a challenge. Hence, there is a need to increase the awareness among clinicians with regard to the high prevalence of dental problems among people with various physical illnesses and association of poor oral health status with adverse physical health outcome. A preliminary step in this direction can be by carrying out a survey in easily assessable patients, such as in patients admitted to various medical/

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surgical wards in order to estimate the magnitude of their dental health problems. Moreover, there are limited data in terms of oral health among inpatients, admitted for diverse reasons.<sup>27,28</sup>

Review of some of the important studies that have addressed the oral health status of patients with physical illnesses (Table 1) reveals that such studies have been done in different patient settings, have used different study designs, and have not comprehensively addressed together the oral hygiene practices, dentition, and gingival and periodontal status.<sup>10,28-33</sup>

Thus, this study aimed to assess oral health status and treatment needs of hospitalized patients, who were treated for various systemic conditions.

## METHODOLOGY

This study was conducted among medically ill patients admitted in various medical–surgical wards of Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, India. This hospital mainly attends to patients drawn from rural areas. The study was approved by the Ethics Committee of the Institute and all the patients were assessed after obtaining written informed consent. Patients were recruited from the inpatient units of General Medicine, General Surgery, Orthopedics, Otolaryngology, Pulmonary Medicine, Oncology, Ophthalmology, and Gynecology and Obstetrics.

Conscious and cooperative patients were examined in the presence of their attendants at the bedside. Those admitted to various intensive care units were excluded from the study. A total of 346 patients were recruited. Patients who were found to have dental problems were advocated suitable dental treatment.

Demographic details and reason for hospital admission were obtained using a self-designed questionnaire. Assessment of dental parameters included collection of information on dentition, gingival disease, and periodontal pockets using WHO Format<sup>34</sup> and performing American Dental Association Type III examination.<sup>35</sup> Data collection was carried by one of the authors (AA), trained for clinical examination during several clinical sessions in the Department of Public Health Dentistry.

Data so obtained were assessed by using Statistical Package for the Social Sciences version 17.<sup>36</sup> Categorical variables were analyzed in the form of frequency and percentages. Continuous variables were assessed in the form of mean and standard deviation. Comparisons were done by t-test or Chi-squared test, wherever appropriate.

## RESULTS

The study included 346 subjects with mean age of 40.77 years (SD 14.4; 14–80), with two-thirds of the participants aged up to 45 years. Two-third (67.1%) of the

**Table 1:** Studies that report oral hygiene practices, dentition, periodontal and gingival status in patients with physical illnesses

Study	Study design, number of participants	Results
Shutlis et al <sup>10</sup>	Longitudinal cohort study in Gila River Indian Community of Arizona (USA), 529 participants	Age, duration of diabetes, hemoglobin A1c status, and hypertension at baseline associated with severity of periodontitis
Ziebolz et al <sup>28</sup>	Case–control study on 33 acute coronary syndrome subjects in University of Medical Centre Gottingen (Germany)	Mean DMFT 14.5 ± 6.8 in subjects < 44 years
Gautam et al <sup>29</sup>	Cross-sectional study on 206 chronic renal failure hospitalized patients in Andhra Pradesh with mean age 46.79 ± 12.78	92.7% Brushing teeth once a day, 45.1% visited a dentist. Lower educational level had high DMFT score. 44.2% with pocket depth of 4–5 mm
Carrinho Neto et al <sup>30</sup>	Cross-sectional study on 82 hospitalized patients in Londrina (Brazil) with mean age 45.7 ± 20.1	Mean sound teeth 21.6 ± 09.7, mean periodontal pockets 8.7 ± 12.3; 49.4% had felt need of oral prophylaxis. Advanced age led to poor oral hygiene, gingival inflammation was associated with physical illness and medication usage.
Rai et al <sup>31</sup>	Cross-sectional study involving 300 inpatients, of which 52 (17.3%) patients were in age range of 41–50 years at SDM College of Medical Sciences, Dharwad, Karnataka	Mean decayed teeth 1.91 ± 8.53 Mean missing teeth 5.12 ± 10.36 Mean filled teeth 0.16 ± 9.15 Mean DMFT in < 40 years and those > 40 years was statistically significant.
Commisso et al <sup>32</sup>	Cross-sectional study on 118 type II diabetic patients admitted in Diabetes Day Hospital, Italy with mean age 60.6 ± 14.2	48.8% Brushing teeth twice a day 16.5% Brushing teeth once a day 50% visited a dentist
Yunus and Itagi <sup>33</sup>	Cross-sectional study on 239 cerebrovascular accident survivors, of which 20.5% were in age range of 41–50 years in Maharashtra.	81.7% Brushing teeth once a day 16.3% in 41–50 years had >6 mm deep pocket Mean DMFT (41–50 years) was 6.10 ± 5.24. DMFT and Periodontal status significantly increased with increase in age of the subjects.

DMFT: Decayed, missing, or filled teeth

study participants were educated beyond matric. About one-third (33.2%) of patients had both diabetes mellitus and hypertension, 10.4% of patients were admitted for pregnancy-related issues, 6.4% had hypertension only, 6.6% had fractures, 5.2% had renal complaints, and the remaining one-third (38.2%) had other systemic conditions. About one-fourth (26.3%) of the study sample were either smokers (18.2%) or (8.1%) chewed tobacco. About two-thirds (64.2%) had consulted a dentist in their lifetime (Table 2).

The majority (77.2%) of the patients reported using toothbrush. However, a small proportion of patients either used finger for cleaning (16.2%) or tree stick (5.5%). Three-fourths (75.7%) relied on toothpaste, and this was followed by use of toothpowder (17.3%), and very few participants were using charcoal (0.3%). The majority (91%) of the participants were brushing their teeth at least once per day, and this was accompanied by cleaning of tongue in three-fourth (77.7%) of the participants (Table 3).

**Table 2:** Demographic status, deleterious habits, and self-expressed need of the study sample

Variables	Frequency (%)
<i>Age categories</i>	
<45 years	220 (63.6)
>45 years	126 (36.4)
<i>Education</i>	
Upto matric	232 (67.1)
Above matric	114 (32.9)
<i>Physical illnesses</i>	
Hypertension	22 (6.4)
Diabetes + hypertension	115 (33.2)
Renal diseases	18 (5.2)
Pregnancy	36 (10.4)
Fracture	23 (6.6)
Other systemic conditions*	132 (38.2)
<i>Tobacco use</i>	
Yes	91 (26.3)
No	255 (73.7)
<i>Type of tobacco use</i>	
Smoking	63 (18.2)
Chewing	28 (8.1)
<i>Earlier visit to dentist</i>	
Yes	222 (64.2)
No	124 (35.8)
<i>Dental care needs (self-expressed needs)</i>	
Extraction	25 (7.2)
Oral prophylaxis	12 (3.5)
Replacement	11 (3.2)
Restoration	24 (6.9)
No felt needs	274 (79.2)

\*Systemic conditions (132): respiratory diseases 35, cardiac diseases 29, diabetes mellitus 17, cholelithiasis 24, surgical cases 8, cancer cases 7, joint pain 6, ophthalmological conditions 3, hypertension + fracture 2, hypotension + fracture 1

**Table 3:** Oral hygiene practices of the study sample

Variables	Frequency (%)
<i>Preferred type of aid</i>	
Toothbrush only	267 (77.2)
Finger only	56 (16.2)
Tree stick only	19 (5.5)
No aid used	4 (1.2)
<i>Preferred type of material used</i>	
Toothpaste only	262 (75.7)
Tooth powder only	60 (17.3)
Charcoal only	1 (0.3)
No material used	23 (6.7)
<i>Preferred frequency of brushing teeth</i>	
At least once a day	315 (91)
Twice a daily	27 (7.8)
Do not brush	4 (1.2)
<i>Tongue cleaning</i>	
Present	269 (77.7)
Absent	77 (22.3)

## Dental Health Status

In the whole study sample, the mean number of sound teeth was 23.3 (SD 7.4). The mean number of unerupted teeth was 1.78 (SD 1.68) and the mean number of missing teeth due to caries was 3.1 (SD 3.17). Additionally, the mean number of missing teeth due to any other reason was 0.87 (SD 3.48). Very few patients had filled caries teeth, filled teeth with no caries, and fixed prosthesis (Table 4). The mean number of teeth with gingival bleeding for the whole study sample was 2.24 (SD 4.19). The mean number of patients without gingival abnormality in the study sample was 24.1 (SD 7.49). The comparison of dentition status with education is shown in Table 4, which clearly demonstrates that the less educated had significantly higher number of mean caries teeth, missing teeth due to caries, and significantly lower mean number of sound teeth. The less educated had significantly higher mean number of missing teeth and significantly lower mean number of teeth without gingival abnormality; significant onset of periodontal disease with pocket depth of 4 to 5 mm; greater number of missing teeth; and significantly lower number of teeth without periodontal abnormality.

When similar comparisons were done for patients aged <45 years and those > 45 years, participants > 45 years had significantly higher number of missing teeth due to caries, missing teeth due to reasons other than caries, and significantly lesser number of sound teeth (Table 5). Those aged > 45 years also had significantly higher number of missing teeth, lower number of teeth without gingival abnormality, higher number of teeth with periodontal pocket depth of 4 to 5 mm, and lower number of teeth without periodontal abnormality (Table 5).

When the dentition, gingival, and periodontal status of subjects were compared with those who had ever

**Table 4:** Comparison of dentition, gingival and periodontal status with education status of study sample

Variable	Whole sample (n = 346) Mean (SD)	Up to matric (n = 232) Mean (SD)	Above matric (n = 114) Mean (SD)	t-value (p-value)
<i>Dentition status</i>				
Mean number of caries teeth/decayed teeth	3.10 (3.17)	3.43 (3.38)	2.43 (2.55)	-2.77 (p = 0.006)
Mean number of filled teeth with caries	0.002 (0.53)	0.00 (0.00)	0.008 (0.093)	1.42 (p = 0.154)
Mean number of restored teeth	0.213 (1.76)	0.13 (1.43)	0.37 (2.30)	1.13 (p = 0.255)
Mean number of fixed prosthesis	0.002 (0.053)	0.00 (0.00)	0.008 (0.093)	1.42 (p = 0.154)
Mean number of teeth missing due to caries	2.72 (5.10)	3.50 (5.71)	1.23 (3.17)	-3.87 (p < 0.001)
Mean number of teeth missing due to any other reason	0.878 (3.48)	1.19 (4.17)	0.27 (1.19)	-2.82 (p = 0.023)
Mean unerupted teeth	1.78 (1.69)	1.77 (1.68)	1.78 (1.72)	0.04 (p = 0.967)
Mean number of sound teeth	23.3 (7.40)	22.0 (7.91)	25.8 (5.50)	4.60 (p < 0.001)
<i>Gingival status</i>				
Mean number of teeth with gingival bleeding	2.24 (4.19)	2.40 (4.51)	1.91 (3.43)	-1.028 (p = 0.305)
Mean number of teeth for which gingival abnormality was not evaluated	5.29 (6.53)	0.41 (0.907)	0.25 (0.860)	-1.520 (p = 0.129)
Mean number of absent teeth	.358 (0.893)	6.32 (7.25)	3.20 (4.01)	-4.279 (p < 0.001)
Mean number of teeth without gingival abnormality	24.1 (7.49)	22.8 (8.07)	26.6 (5.35)	4.517 (p < 0.001)
<i>Periodontal condition</i>				
Mean number of teeth for which periodontal abnormality was not evaluated	0.349 (0.882)	0.41 (0.92)	0.219 (0.784)	-1.935 (p = 0.054)
Mean number of absent teeth	5.34 (6.49)	6.37 (7.19)	3.24 (4.00)	-4.328 (p < 0.001)
Mean number of teeth with pocket depth 4–5 mm	1.44 (2.31)	1.74 (2.59)	0.842 (1.46)	-3.443 (p < 0.001)
Mean number of teeth with pocket depth > 6 mm	0.06 (0.442)	0.09 (0.56)	0.008 (0.09)	-1.467 (p = 0.143)
Mean number of teeth without periodontal abnormality	24.7 (7.12)	23.3 (7.68)	27.6 (4.65)	5.500 (p < 0.001)

**Table 5:** Comparison of dentition, gingival and periodontal status of subjects in the age groups

Variable	Less ≤45 years (n = 220) Mean (SD)	Above > 45 years (n = 126) Mean (SD)	t-value (p-value)
<i>Dentition status</i>			
Mean number of decayed teeth	2.76 (2.85)	3.69 (3.58)	-2.649 (p = 0.008)
Mean number of filled teeth with caries	0.004 (0.067)	0.00 (0.00)	0.756 (p = 0.450)
Mean number of restored teeth	0.281 (2.17)	0.009 (0.56)	0.944 (p = 0.346)
Mean number of teeth with fixed prosthesis	0.004 (0.067)	0.00 (0.00)	0.756 (p = 0.762)
Mean number of teeth missing due to caries	1.27 (2.78)	5.25 (6.94)	-7.508 (p < 0.001)
Mean number of teeth missing due to any other reason	0.18 (1.07)	2.08 (5.40)	-5.05 (p < 0.001)
Mean number of unerupted teeth	1.67 (1.74)	1.97 (1.58)	-1.584 (p = 0.114)
Mean number of sound teeth	25.7 (5.34)	19.0 (8.52)	9.053 (p < 0.001)
<i>Gingival status</i>			
Mean number of teeth with gingival bleeding	2.28 (4.28)	2.17 (4.04)	0.229 (p = 0.818)
Mean number of teeth for which gingival abnormality was not evaluated	0.350 (0.911)	0.373 (0.864)	-0.230 (p = 0.818)
Mean number of absent teeth	3.00 (3.63)	9.28 (8.33)	9.683 (p < 0.001)
Mean number of teeth without gingival abnormality	26.3 (5.78)	20.1 (8.48)	8.045 (p < 0.001)
<i>Periodontal status</i>			
Mean number of teeth for which periodontal abnormality was not evaluated	0.354 (0.912)	0.34 (0.831)	0.706 (p = 0.893)
Mean number of absent teeth	3.06 (3.56)	9.32 (8.30)	-9.728 (p < 0.001)
Mean number of teeth with pocket depth 4–5 mm	1.18 (2.12)	1.90 (2.57)	-2.818 (p = 0.005)
Mean number of teeth with pocket depth > 6 mm	0.068 (0.531)	0.05 (0.306)	0.398 (p = 0.691)
Mean number of teeth without periodontal abnormality	27.3 (4.80)	20.3 (8.30)	9.867 (p < 0.001)

visited a dentist in their lifetime or never visited dentist; those practicing or not practicing sound oral hygiene like use of toothbrush and toothpaste for cleaning teeth, regular brushing of teeth, and practicing tongue cleaning; those with and without hypertension and/or diabetes

mellitus; those using or not using tobacco; no significant differences emerged, but for the fact that those who were using proper cleaning aids had significantly higher number of unerupted teeth [1.191 (SD 1.7) vs 1.34 (1.56); t-value 2.68 (p = 0.008)].



## DISCUSSION

The present cross-sectional study assessed the dentition, gingival disease, periodontal disease, dental hygiene, and felt needs of medically ill hospitalized patients. The sample size of the study was reasonably large when compared with some of the earlier studies.<sup>30-32</sup> The study was conducted in a medical college setup, which mainly caters to the rural population. The finding of lack of use of toothbrush by one-fourth of the study sample is comparable with previous studies.<sup>32,37</sup> Overall, the majority of the participants brushed their teeth only once, which is in consonance with previous studies in the Indian population.<sup>25,29,33</sup> This suggests that there is a need for large mass media campaigns to improve the awareness of rural population in sound oral hygiene practices.

In the present study, the mean numbers of sound teeth were only 23.3 (SD 7.4), indicating that the oral health status is poor among patients with various physical disorders. This finding is supported by the existing literature, which suggests the association of poor oral health status with various physical illnesses.<sup>9-14,31-33</sup> This finding reiterates the point that all patients with physical illness must receive proper oral health evaluation and education. However, in this study, no particular physical condition was found to have a specific association with oral health status.

In the present study, it was evident that lower education was associated with poor dental health. Previous studies also support the findings of the present study in terms of association of poor dental health and lower education level.<sup>29,38,39</sup>

The present study also revealed that compared with patients aged < 45 years, those aged > 45 years had significantly higher number of missing teeth due to caries, missing teeth due to reasons other than caries, and significantly lesser number of sound teeth. Those aged >45 years also had poorer gingival and periodontal health. These findings are similar to the previous studies and suggest that with increasing age, the oral health condition worsens, perhaps, especially, among those with various physical illnesses.<sup>7,14,15,31</sup> Although this study did not evaluate the cause-effect relationship, previous studies have shown association of poor oral health and development of myocardial infarction, infective myocarditis, chest infection, stroke, etc.<sup>7,12-14</sup> Accordingly, it can be said that oral health should be given due importance in evaluation of every patient with physical illness. All patients, especially those aged more than 45 years must be routinely screened for their dental status and they must be properly informed about the proper oral health hygiene and practices.

The present study has certain limitations. The study involved recruitment of inpatients by purposive sampling.

Hence, the findings cannot be directly generalized to the community samples. The study included a heterogeneous group of subjects in terms of type of physical comorbidity, did not evaluate the relationship of oral health status and physical condition, and did not evaluate the cause-effect relationship. The present study was cross-sectional in nature and it did not evaluate the longitudinal course of dental health status of the patients. The present study also did not evaluate the attitude and practices of physicians and surgeons in terms of their advice and referral to dentist. No association was explored for effect on oral health with medication usage; however, this association had been explored previously in certain studies.<sup>30,40</sup> Another shortcoming could be the nonevaluation of the association of length of time of stay in hospital with the oral health. The oral examination performed in hospital bed could have led to the underestimation of problems of oral cavity. Future studies must try to overcome these limitations.

To conclude, the present study reveals that patients with physical illnesses have poor dentition status, especially those with poor educational attainment and those >45 years or above. Further, oral health practices are poor in patients with various physical illnesses. Accordingly, there is a need for routine screening for dental problems in patients with various physical illnesses. There is a need to develop oral health protocols with the objective of providing preventive, curative, and rehabilitative services to hospitalized patients. Considering the fact that the referral rates from various medical wards are poor,<sup>24,41,42</sup> there is a need to increase the awareness of physicians regarding association of the poor dental health status and various physical illnesses.

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