

Prosthetic Status and Prosthetic Needs of Patients Attending the Prosthodontic Department of a Dental Teaching Institution, India

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Abstract:

Background: There is a direct relationship of dental status and food intake. Impairment of oral health has an influence on quality of life. Baseline information related to prosthetic status and prosthetic needs will help us to undertake actions to promote the oral health. The present study was conducted to evaluate the prosthetic status and treatment needs among patients who reported to the Department of Prosthodontics in SJM Dental College and Hospital and to assess the influence of socio-demographic factors.

Materials and Methods: All the patients who reported to the Department of Prosthodontics in SJM Dental College and Hospital for a period of 3-month were included. Information related to socio-demographic factors and a clinical examination was carried out according to the World Health Organization method to assess prosthetic status and needs.

Results: There were a total of 314 subjects, of which 143 (45.54%) were males and 171 (55.44%) were females. 80.89% of patients had no prosthesis in upper arch 84.71% of subjects for lower arch. 67.51% of subjects required a prosthesis for the upper arch and 64.33% for the lower arch. Age has an influence with prosthetic status and needs. Gender and socio-economic status were statistically non-significant with prosthetic status and needs.

Conclusion: The prosthetic status of the studied population was low with 65.92% of the patients needing prostheses.

Key Words: Denture, edentulism, lower arch, prosthesis, upper arch

Introduction

Oral health affects people physically and psychologically and influences how they grow, enjoy life, look, speak, chew, taste food and socialize, as well as their feelings of social well-being.¹ Poor oral health and loss of teeth not only adversely affect the dietary intake, nutritional status, and phonetics but also compromise the general health. It denies them the pleasure of taking food of their choice.

Esthetics, speech, mastication, sense of taste, self-esteem, and self-image are dependent on a person's oral health. Masticatory efficiency is affected by the presence of teeth, the number of functional teeth and the use of prostheses, which influence the choice of food.^{2,3} Tooth loss in elderly people has been related to changes in food intake and nutritional deficiency.^{4,5}

Oral health is always an inseparable part of general health and socio-economic status plays a vital role in determining the oral health of an individual. Several studies in the past have revealed an association between socio-economic factors and oral health.⁶⁻¹⁰

Successful aging is related to maintaining quality of life, which in turn is dependent on how well individuals can fulfill the above. Normal functions such as mastication, speech, laughing, and esthetics can be impaired by inappropriately replaced teeth and loss of natural teeth. Replacement by dentures and prosthesis is associated with improvement in masticatory efficiency and being without natural/artificial teeth is related to being underweight.

Assessment of prosthetic treatment needs is essential to determine unmet oral health care needs in a systematic manner and to gather the information required to bring about change beneficial to the oral health of the population. Systematic assessment of treatment needs ensures that the oral health service uses its resources to improve the health of the population in the most efficient way.

The loss of teeth is an end product of oral disease and reflects the attitudes of the patients, the dentists in a society, the availability, and accessibility of dental care as well as the prevailing philosophies of care.¹¹

To promote the oral health, we need to know the prosthetic status and prosthetic need. Hence, it is necessary to collect

baseline information to formulate policy, to plan, to monitor, and to evaluate oral health services.

Objectives of the study

- To assess the prosthetic status and prosthetic needs of patients visiting the outpatient Department of Prosthodontics of SJM Dental College and Hospital, Chitradurga
- To evaluate the prosthetic status and prosthetic needs according to gender, age, and socio-economic status.

Materials and Methods

This was a descriptive cross-sectional study conducted in 2015 (June-August) to determine the prosthetic status and prosthetic need among the patients visiting the outpatient Department of Prosthodontics of SJM Dental College and Hospital, Chitradurga.

All patients visiting the outpatient Department of Prosthodontics, SJM Dental College and Hospital, Chitradurga over a period of 3-month were considered for the study. Institutional ethical clearance and informed consent was obtained from them prior to the study.

Inclusion criteria

Subjects above 18 years visiting the outpatient Department of Prosthodontics, SJM Dental College and Hospital were included for the study.

Exclusion criteria

Patients suffering from any acute illness and cognitive impairment at the time of study were excluded from the study.

All the subjects were explained about the need for the study. The consent form was obtained by the subjects who are ready to participate.

A questionnaire was used to collect information regarding the demographic profile, such as age gender, and socio-economic status. Subjects were measured for prosthetic status by a calibrated examiner, subjects were made to sit comfortably on a dental chair, and intraoral examination was carried out to assess the prosthetic status and the type of prosthesis required by the patient. The World Health Organization oral health assessment proforma¹² was used to collect the information on prosthetic status and treatment needs.

Modified Kuppuswamy socio-economic scale¹³ was used to classify subjects according to socio-economic status.

Statistical analysis (Chi-square test) was done to evaluate the relationship between age, gender, socio-economic status, and prosthetic treatment needs.

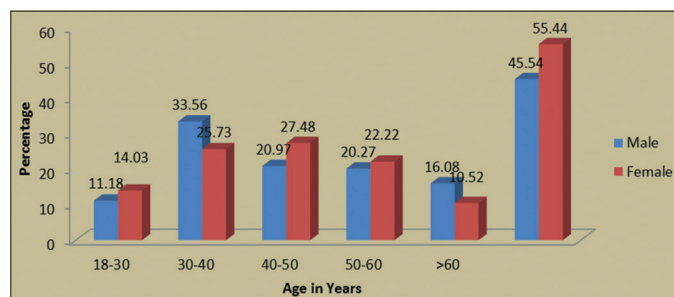
Results

Table 1 and Graph 1 represent the distribution of study subjects according to age and gender There were a total of 314 subjects

who visited the department during study period of which 143 (45.54%) were males and 171 (55.44%) were females. Table shows the distribution of subjects according to age group.

Table 2 shows prosthetic status of study subjects in upper and lower arch. The majority of the subjects had no prosthesis. That is 254 (80.89%) for upper arch and 266 (84.71%) for lower arch. Bridge was found in 23 (7.3%) subjects in upper arch and 18 (5.7%) in the lower arch. 11 (3.5%) were having partial denture in upper and lower arch. Full removable denture in upper and lower arch was seen in 11 (3.5%) and 9 (2.9%) subjects, respectively. No significant differences were found between the prosthetic status of the upper and lower arches ($\chi^2 = 2.087$; $P = 0.720$).

Table 3 shows prosthetic needs of study subjects in upper and lower arch. Out of 314 subjects, 212 (67.51%) required



Graph 1: Distribution of study subjects according to age and gender.

Table 1: Distribution of study subjects according to age and gender.

Age (years)	Male	Female	Total
18-30	16 (11.18)	24 (14.03)	40 (12.73)
31-40	48 (33.56)	44 (25.73)	92 (29.29)
41-50	30 (20.97)	47 (27.48)	77 (24.52)
51-60	29 (20.27)	38 (22.22)	67 (21.33)
>60	20 (16.08)	18 (10.52)	38 (12.10)
Total	143 (45.54)	171 (55.44)	314

Table 2: Prosthetic status of study subjects in upper and lower arch.

Variables	n (%)	
	Upper arch	Lower arch
No prosthesis	254 (80.89)	266 (84.71)
Bridge	23 (7.3)	18 (5.7)
More than one bridge	15 (4.8)	10 (3.2)
Partial denture	11 (3.5)	11 (3.5)
Full removable denture	11 (3.5)	9 (2.9)

$\chi^2=2.087, P=0.720$

Table 3: Prosthetic needs of study subjects in upper and lower arch.

Variables	n (%)	
	Upper arch	Lower arch
Need for one unit prosthesis	54 (17.19)	60 (19.10)
Need for multi-unit prosthesis	84 (26.75)	82 (26.11)
Need for combination of one-and/or multi-unit prosthesis	40 (12.73)	30 (9.55)
Need for full prosthesis	34 (10.82)	30 (9.55)

$\chi^2=2.486, P=0.647$

prosthesis for the upper arch and 202 (64.33%) for the lower arch. Need for multi-unit prosthesis for upper and lower arch was required most 84 (26.75%) and 82 (26.11%) for upper and lower arch, respectively, followed by need for one-unit prosthesis and combination of one-and/or multi-unit prosthesis. Full removable dentures were required by 34 (10.82%) subjects for upper arch and 30 (9.55%) for lower arch. No significant difference was found between the prosthetic needs of the upper and lower arches ($\chi^2 = 2.486$; $P = 0.647$).

Table 4 shows the prosthetic status of study subjects in upper and lower arch according to gender more than 80% of subjects in both genders were having no prosthesis in both upper and lower arches. There was no statistical significant difference with gender and prosthetic status of upper ($\chi^2 = 2.981$, $P = 0.561$) and lower arch ($\chi^2 = 1.044$, $P = 0.903$).

Table 5 prosthetic needs of study subjects in upper and lower arch according to gender. Need for multi-unit prosthesis was more both in upper and lower arch. That is 38 (26.6%) and 46 (26.9%) among males and females in upper arch, respectively. 37 (25.9%) and 45 (26.3%) among males and females in lower arch, respectively. There was no statistical significant difference with gender and prosthetic needs of upper ($\chi^2 = 5.177$, $P = 0.270$) and lower arch ($\chi^2 = 8.638$, $P = 0.071$).

Tables 6 and 7 represent the prosthetic status of study subjects in upper and lower arch according to age of the subjects. As the age advances, there is variation in the requirement of

the prosthesis. There was statistically significant difference prosthetic status according to age group both in upper ($\chi^2 = 315.42$, $P = 0.000$) and lower arch ($\chi^2 = 246.49$, $P = 0.000$).

Tables 8 and 9 represent the prosthetic needs of study subjects in upper and lower arch according to the age of the subjects. The majority of the subjects had no prosthesis. There was statistically significant difference prosthetic status according to age group both in upper ($\chi^2 = 63.564$, $P = 0.000$) and lower arch ($\chi^2 = 63.412$, $P = 0.000$).

Tables 10 and 11 represent the prosthetic status of study subjects in upper and lower arch according to socio-economic status. The majority of the subjects had no prosthesis both in upper and lower arch. Statistically, there was no difference for prosthetic status according to socio-economic status both in upper ($\chi^2 = 17.350$, $P = 0.137$) and lower arch ($\chi^2 = 15.492$, $P = 0.216$).

Tables 12 and 13 represent the prosthetic needs of study subjects in upper and lower arch according to socio-economic status. Requirement of prosthesis in upper and lower arch according to socio-economic status was statistically not significant upper ($\chi^2 = 11.201$, $P = 0.512$) and lower arch ($\chi^2 = 7.385$, $P = 0.831$).

Discussion

Studies related to assess the prosthetic status in dental teaching institutions are rarely conducted in India. No documented data was available for the prosthetic status and needs of patients attending SJM Dental College and Hospital. Therefore, an attempt was made to assess the prosthetic status and need of the patients attending Prosthodontic Department of SJM Dental College and Hospital.

In this study, the majority of the subjects had no prosthesis in upper arch 80.89% and 84.71% for lower arch. It is similar to the study done at Navi-Mumbai by Nadgere *et al.*,¹⁴ where 88% of the total population surveyed did not have any prosthesis.

Similar findings were reported by Shenoy and Hegde¹⁵ in Geriatric Homes in Mangalore where 88% had no prosthesis in upper and lower arch. Soh *et al.*,¹⁶ reported 78% subjects in long-term care facilities in Singapore were not having any denture which can be due to the fact that older people under use dental facilities due to lack of awareness, financial constraints, and reduced mobility.

The prosthetic need in this study for the upper and lower arches was 67.49% and 64.31%, respectively, which was in accordance with 59.7 for upper and 56.3 by Nadgere *et al.*,¹⁴ and 72% by Shah *et al.*,¹⁷ in India.

The level of prosthetic need was higher in females in upper arch (68.5%) and higher among males in lower arch (66.5%)

Table 4: Prosthetic status of study subjects in upper and lower arch according to gender.

Variables	n (%)			
	Upper arch		Lower arch	
	Male (143)	Female (171)	Male	Female
No prosthesis	116 (81.1)	138 (80.7)	122 (85.3)	144 (84.2)
Bridge	10 (7.0)	13 (7.6)	8 (5.6)	10 (5.8)
More than one bridge	7 (4.9)	8 (4.7)	4 (2.8)	6 (3.5)
Partial denture	7 (4.9)	4 (2.3)	6 (4.2)	5 (2.9)
Full removable denture	3 (2.1)	8 (4.7)	3 (2.1)	6 (3.5)
	$\chi^2=2.981, P=0.561$		$\chi^2=1.044, P=0.903$	

Table 5: Prosthetic need of study subjects in upper and lower arch according to gender.

Variables	n (%)			
	Upper arch		Lower arch	
	Male (143)	Female (171)	Male (143)	Female (171)
Need for one unit prosthesis	27 (18.9)	27 (15.8)	32 (22.4)	28 (16.4)
Need for multi-unit prosthesis	38 (26.6)	46 (26.9)	37 (25.9)	45 (26.3)
Need for combination of one-and /or multi-unit prosthesis	12 (8.4)	28 (16.4)	8 (5.6)	22 (12.9)
Need for full prosthesis	18 (12.6)	16 (9.4)	18 (12.6)	12 (7.0)
	$\chi^2=5.177, P=0.270$		$\chi^2=8.638, P=0.071$	

Table 6: Prosthetic status of study subjects in upper arch according to age.

Upper arch	Age group n (%)					$\chi^2=63.564$ $P=0.000^{**}$
	18-30	31-40	41-50	51-60	>60	
No prosthesis	36 (90.0)	75 (81.5)	62 (80.5)	53 (79.1)	28 (73.7)	
Bridge	4 (10.0)	8 (8.70)	6 (7.8)	5 (7.5)	0 (0)	
More than one bridge	0 (0)	6 (6.5)	5 (6.5)	3 (4.5)	1 (2.6)	
Partial denture	0 (0)	3 (3.3)	4 (5.20)	4 (6.0)	0 (0)	
Full removable denture	0 (0)	0 (0)	0 (0)	2 (3.0)	9 (23.7)	

P<0.05, **Highly significant

Table 7: Prosthetic status of study subjects in lower arch according to age.

Lower arch	Age group n (%)					$\chi^2=63.412$ $P=0.000^{**}$
	18-30	31-40	41-50	51-60	>60	
No prosthesis	35 (87.5)	81 (88.0)	63 (81.8)	59 (88.1)	28 (73.7)	
Bridge	4 (10.0)	6 (6.5)	5 (6.5)	3 (4.5)	0 (0)	
More than one bridge	1 (2.5)	4 (4.3)	3 (3.9)	1 (1.5)	1 (2.6)	
Partial denture	0 (0)	1 (1.1)	6 (7.8)	3 (4.5)	1 (2.6)	
Full removable denture	0 (0)	0 (0)	0 (0)	1 (1.5)	8 (21.1)	

P<0.05, **Highly significant

Table 8: Prosthetic need of study subjects in upper arch according to age.

Upper arch	Age group n (%)					$\chi^2=315.42$ $P=0.000^{**}$
	18-30	31-40	41-50	51-60	>60	
Need for one unit prosthesis	13 (32.5)	24 (26.1)	13 (16.9)	4 (6.0)	0 (0)	
Need for multi-unit prosthesis	12 (30.0)	30 (32.6)	29 (37.7)	12 (17.9)	1 (2.6)	
Need for combination of one-and/or multi-unit prosthesis	0 (0)	4 (4.3)	10 (13.0)	23 (34.3)	3 (7.9)	
Need for full prosthesis	0 (0)	0 (0)	1 (1.3)	0 (0)	33 (86.8)	

P<0.05, **Highly significant

Table 9: Prosthetic need of study subjects in lower arch according to age.

Lower arch	Age group					$\chi^2=246.49$ $P=0.000^{**}$
	18-30	31-40	41-50	51-60	>60	
Need for one unit prosthesis	11 (27.5)	30 (32.6)	12 (15.6)	7 (10.4)	0 (0)	
Need for multi-unit prosthesis	8 (20.0)	28 (30.4)	24 (31.2)	20 (29.9)	2 (5.3)	
Need for combination of one-and/or multi-unit prosthesis	1 (2.5)	0 (0)	11 (14.3)	14 (20.9)	4 (10.5)	
Need for full prosthesis	0 (0)	0 (4.3)	1 (1.3)	1 (1.5)	28 (73.7)	

P<0.05, **Highly significant

Table 10: Prosthetic status of study subjects in upper arch according to socio-economic status.

Upper arch	Socio-economic status n (%)				$\chi^2=17.350$ $P=0.137$
	Upper	Upper middle	Lower middle	Upper lower	
No prosthesis	6 (66.7)	127 (84.1)	113 (78.5)	8 (80.0)	
Bridge	1 (11.1)	8 (5.3)	14 (9.7)	0 (0)	
More than one bridge	2 (22.2)	9 (6.0)	3 (2.1)	1 (10.0)	
Partial denture	0 (0)	4 (2.6)	7 (4.9)	0 (0)	
Full removable denture	0 (0)	3 (2.0)	7 (4.9)	1 (10.0)	

Table 11: Prosthetic status of study subjects in lower arch according to socio-economic status.

Lower arch	Socio-economic status n (%)				$\chi^2=15.492$ $P=0.216$
	Upper	Upper middle	Lower middle	Upper lower	
No prosthesis	7 (77.8)	131 (86.8)	120 (83.3)	8 (80.0)	
Bridge	0 (0)	9 (6.0)	8 (5.6)	1 (10.0)	
More than one bridge	0 (0)	5 (3.3)	5 (3.5)	0 (0)	
Partial denture	2 (22.2)	4 (2.6)	5 (3.5)	0 (0)	
Full removable denture	0 (0)	2 (1.3)	6 (4.2)	1 (10.0)	

there was no statistical difference variation between the sexes regarding the status for maxillary and mandibular arches. This is in accordance with the findings of Mersel *et al.*,¹⁸ and Shroff.¹⁹

Requirement for one unit prosthesis was higher in age group of 18-30 years (32.5%), need for multi-unit prosthesis was more in age group of 41-50 year (37.7%), and full removable denture

Table 12: Prosthetic need of study subjects in upper arch according to socio-economic status.

Upper arch	Socio-economic status n (%)				$\chi^2=11.201$ P=0.512
	Upper	Upper middle	Lower middle	Upper lower	
Need for one unit prosthesis	3 (33.3)	23 (15.2)	27 (18.8)	1 (10.0)	
Need for multi-unit prosthesis	1 (11.1)	37 (24.5)	42 (29.2)	4 (40.0)	
Need for combination of one-and/or multi-unit prosthesis	1 (11.1)	23 (15.2)	15 (10.4)	1 (10.0)	
Need for full prosthesis	0 (0.0)	13 (8.6)	19 (13.2)	2 (20.0)	

Table 13: Prosthetic need of study subjects in lower arch according to socio-economic status.

Lower arch	Socio-economic status n (%)				$\chi^2=7.385$ P=0.831
	Upper	Upper middle	Lower middle	Upper lower	
Need for one unit prosthesis	3 (33.3)	27 (17.9)	29 (20.1)	1 (10.0)	
Need for multi-unit prosthesis	3 (33.3)	38 (25.2)	37 (25.7)	4 (40.0)	
Need for combination of one-and/or multi-unit prosthesis	0 (0.0)	19 (12.6)	10 (6.9)	1 (10.0)	
Need for full prosthesis	0 (0.0)	13 (8.6)	16 (11.1)	1 (10.0)	

was required by majority of people in the age group of above 60 years (86.8%). As age advances the requirement of more prosthesis with maximum partial edentulism was noted in this study which is similar to other studies by George *et al.*,²⁰ and Hamasha *et al.*,²¹ as age is a predisposing socio-demographic factor associated with tooth loss, in this study, an increase in age was associated with tooth loss.

Less percentage (55.5%) subjects in the upper socio-economic categories needed prosthesis of some kind, compared to those in the lower socio-economic categories. Certainly, the attitude and awareness toward dental care were better among the subjects in the upper socio-economic categories, and this was evident when the utilization of dental services was assessed, previous studies by Hanson *et al.*,²² Eklund *et al.*,²³ was also found the prosthetic status to be better among the subjects in the upper classes as was found in our study.

Conclusion

The findings of this study clearly demonstrate a high unmet need for prosthetic care among the population. There are 3 dental teaching institutions with a distance of 70 km which are providing facilities and treatment to the nearby villages, also treatment charges are negligible compared to private practice in spite of this, awareness among the patient for dental treatment was found to be significantly low having more percentage of patients having no prosthesis. This indicates patient education and counseling is needed along with oral health awareness campaigns.

References

- Locker D. Concepts of oral health, disease and the quality of life. In: Slade GD, (Editor). Measuring Oral Health and Quality of Life, Chapel Hill: University of North Carolina, Dental Ecology; 1997. p. 11-23.
- Marcenes W, Steele JG, Sheiham A, Walls AW. The relationship between dental status, food selection, nutrient intake, nutritional status, and body mass index in older people. *Cad Saude Publica* 2003;19(3):809-16.
- Sheiham A, Steele J. Does the condition of the mouth and teeth affect the ability to eat certain foods, nutrient and dietary intake and nutritional status amongst older people? *Public Health Nutr* 2001;4(3):797-803.
- Krall E, Hayes C, Garcia R. How dentition status and masticatory function affect nutrient intake. *J Am Dent Assoc* 1998;129(9):1261-9.
- Moynihan PJ. The relationship between diet, nutrition and dental health: An overview and update for the 90s. *Nutr Res Rev* 1995;8:193-224.
- Oliver RC, Brown LJ, Loe H. Variations in the prevalence and extent of periodontitis. *J Am Dent Assoc* 1991;122(6):43-8.
- Whittle JG, Whittle KW. Household income in relation to dental health and dental health behaviours: The use of super profiles. *Community Dent Health* 1998;15(3):150-4.
- Freire Mdo C, de Melo RB, Almeida e Silva S. Dental caries prevalence in relation to socioeconomic status of nursery school children in Goiânia-GO, Brazil. *Community Dent Oral Epidemiol* 1996;24(5):357-61.
- Al-Hosani E, Rugg-Gunn A. Combination of low parental educational attainment and high parental income related to high caries experience in pre-school children in Abu Dhabi. *Community Dent Oral Epidemiol* 1998;26(1):31-6.
- Jorgensen EB. Effect of socio-economic and general health status on periodontal conditions in old age. *J Clin Periodontol* 2000;27:83.
- Burt BA, Eklund SA. *Tooth Loss Dentistry, Dental Practice and the Community*, 5th ed. Philadelphia: W. B. Saunders Company; 2007. p. 203-11.
- World Health Organization. *Oral Health Surveys, Basic Methods*, 4th ed. Geneva: World Health Organization; 1997. p. 26-9.
- Kumar N, Shekhar C, Kumar P, Kundu AS. Kuppuswamy's socioeconomic status scale-updating for 2007. *Indian J Pediatr* 2007;74(12):1131-2.
- Nadgere J, Gala-Doshi A, Kishore S. An evaluation of prosthetic status and prosthetic need amongst people living in and around Panvel, Navi-Mumbai - A survey. *Int J Prosthet Dent* 2010;1(1):6-9.
- Shenoy RP, Hegde V. Dental prosthetic status and prosthetic need of the institutionalized elderly living in

- geriatric homes in mangalore: A pilot study. *ISRN Dent* 2011;2011:987126.
16. Soh G, Chong YH, Ong G. Dental prosthetic status and needs of an elderly population living in long-term care facilities in Singapore. *J Community Health* 1992;17(5):175-81.
 17. Shah N, Parkash H, Sunderam KR. Edentulousness, denture wear and denture needs of Indian elderly – A community-based study. *J Oral Rehabil* 2004;31(5):467-76.
 18. Mersel A, Anaise JZ, Shem-Tov A. Prosthetic needs and demands for services of a group of elderly people in Israel. *Community Dent Oral Epidemiol* 1984;12(5):315-8.
 19. Shroff BC. Edentulousness in India. National workshop on oral health goal. *Indian Dent Assoc* 1984;23:17-20.
 20. George B, John J, Saravanan S, Arumugham IM. Prevalence of permanent tooth loss among children and adults in a suburban area of Chennai. *Indian J Dent Res* 2011;22(2):364.
 21. Hamasha AA, Sasa I, Al-Qudah M. Risk indicators associated with tooth loss in Jordanian adults. *Community Dent Oral Epidemiol* 2000;28(1):67-72.
 22. Hanson BS, Liedberg B, Owall B. Social network, social support and dental status in elderly Swedish men. *Community Dent Oral Epidemiol* 1994;22:331-7.
 23. Eklund SA, Burt BA. Risk factors for total tooth loss in the United States; longitudinal analysis of national data. *J Public Health Dent* 1994;54(1):5-14.