Prevalence of Partial Edentulousness and Treatment needs in Rural Population of South India

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ABSTRACT

Introduction: Oral disease creates a major public health burden worldwide and receives inadequate attention in many low- and middle-income countries (WHO 2003).

Aim: The aim of this study was to estimate the prevalence of tooth loss and treatment needs of a rural adult population in South India.

Materials and methods: A descriptive point prevalence survey was conducted in three rural districts of Tamil Nadu, South India. A total of 3,000 subjects with a mean age of 36.2 (standard deviation 13.02) years participated in a clinical examination and interview. They were divided into three groups based on age: Group I – 18 to 30 years, group II – 31 to 50 years, and group III – 51 to 80 years.

Results: The overall prevalence of tooth loss was 48.7%. The most commonly occurring type of partial edentulousness was Kennedy's class III in maxilla comprising 23.3% followed by mandible 22.1%. Mandibular first molar was the most common missing tooth. The prevalence of tooth loss was more in males (58.2%) than females (41.8%). Group III subjects had the highest incidence of tooth loss.

Conclusion: The prevalence of tooth loss in South Indian rural population was 48.7%. The most common reason for tooth loss was dental caries which accounted for 50% followed by periodontal reasons 30% and others 10%. Fixed type of prosthesis was the preferred type of restoration for all the individuals with tooth loss, but affordability was the major factor that determined the treatment of the patients.

Keywords: Partial edentulousness, Prevalence, Survey, Tooth loss pattern, Treatment needs.

How to cite this article: Ashraf J, Jain AR, Ariga P, Nallaswamy D. Prevalence of Partial Edentulousness and Treatment needs in Rural Population of South India. World J Dent 2017;8(3):213-217.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

The presence (or) absence of teeth is a good indicator of oral health of an individual.¹ Several studies have con-

clusively established the fact that oral health and general health are interdependent.² Oral health is an important component of both overall health and quality of life. Oral disease creates a major public health burden worldwide and receives inadequate attention in many low- and middle-income countries [World Health Organization (WHO)].³ Systemic conditions have oral manifestations that increase the risk of oral disease, which in turn is a risk factor for various systemic diseases.

Tooth loss affects the overall health and quality of life of an individual, causing reduced efficiency and function of the masticatory system and the appearance of the individual. By reduced chewing ability in individuals with tooth loss, diet and nutritional intake could probably be reduced.²⁻⁵

The reasons for tooth loss may be due to dental caries, periodontal disease, traumatic accidents, impaction, orthodontics, supernumerary, preparation for radiotherapy, or even due to congenital and developmental disorders.⁶ The two most common causes of tooth loss in Asian population are dental caries and periodontal disease.⁷ Secondary reasons for tooth loss are restricted access to dental services, health systems, and lack of oral health care.⁸

Rural India accounts for 83.3% of the total population of India which accounts for majority of the population. The total population of Tamil Nadu is over seven million people and it contributes for 5.96% of the total population of India.

The aim of this study was to estimate the prevalence of tooth loss and treatment needs in the rural population of South India. Pattern of tooth loss was studied using Kennedy's classification which is the most widely accepted and universally followed classification of the partial edentulous state.⁹

It would also educate the people in the rural sector to be aware of their current oral health status and the various treatment options available for them based on their affordability and needs. This survey can also be helpful in planning various oral health care programs in rural areas by the private and public organizations to uplift the health and economy of the country.

MATERIALS AND METHODS

A descriptive point prevalence survey was conducted in rural population of Kancheepuram, Thiruvallur, and

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Graph 1: District-wise population distribution in the state of Tamil Nadu, South India

Vellore districts, Tamil Nadu, India. These districts were randomly chosen from the most populous districts in South India (Census 2011) (Graph 1). Men and women above 18 years of age and permanent residents of that district were included in the study. Subjects <18 years of age, completely edentulous patients, patients already been treated with functioning fixed prosthesis, uncooperative subjects, and individuals not native to those districts

were excluded from the study. Ethical approval for the study was obtained from the Scientific Review Board and Institutional Human Ethical Committee of Saveetha University. The sample size was calculated based on the pilot study done in Saveetha University outpatient department for 1 month. The estimated sample size with power 80% was 4,000. After screening of 2,000 samples, *post hoc* power analysis test was done and sample size was recalculated as 3,000 with a power of 80%. The subjects are divided into three groups depending on their age: Group I – 18 to 30 years, group II – 31 to 50 years, and group III – 51 to 80 years. A nonprobability quota sampling method was used in the study. The survey was conducted from April to November 2011. About 150 to 300 individuals were screened in every visit during the day. The camp was set up in schools and panchayat office in the selected districts. Banners and pamphlets regarding our survey and free treatment were given to the people 1 week before our visit. A modified WHO questionnaire was used in this study to collect the desired data (Fig. 1). The WHO questionnaire format and guidelines on how to conduct an oral health survey is an important asset. It standardizes research methods and allows for comparison of results.¹⁰ The subjects were screened for missing teeth, tooth loss pattern, abutment evaluation, and treatment based on clinical examination and affordability was recorded.

SAVEETHA UNIVERSITY RURAL ORAL HEALTH SURVEY			
Identification no	<input type="text"/>		
Name	:	<i>Partial Edentulousness</i>	
Age	:	Recession	:
Sex	:	Mobility	:
Address	:	Oral hygiene status	:
Phone no	:	Oral mucosa	:
Occupation	:	Migration	:
Education	:	Plunger cusp	:
Income	:	Supra eruption	:
		Abutment evaluation	:
		Periodontal Status	:
		Dental Caries	:
<i>General Examination</i>		<i>Prosthetic Status</i>	
Diet	:	0 = No prosthesis	
Habits	:	1 = Bridge	
Smoking	:	2 = More than one bridge	
Tobacco Chewing	:	3 = Partial denture	
Alcoholism	:	4 = Both bridge(s) and partial denture(s)	
Oral Hygiene habits	:	5 = Full removable denture	
Type Brush/Past/Others	:	9 = Not recorded	
Frequency	:		
Direction	:		
Past medical history	:	Upper ☐ Lower ☐	
Past dental history	:	<i>Prosthetic Status:</i>	
Past surgical history	:	0 = No prosthesis needed	
Current medication	:	1 = Need for one-unit prosthesis	
Drug allergy	:	2 = Need for Multi Unit prosthesis	
Any nasal decongestant	:	3 = Need for Combination of one and/or	
for Allergy	:	multi unit prosthesis	
Blood pressure	:		

4 = Need for full prosthesis	
9 = Not recorded	
Upper ☐ Lower ☐	
History of RPD/FPD	:
Duration of RPD/FPD	:
Kennedy's classification	:

Class I	Class II
Class III	Class IV

Reason for not replacing :

Whether Treatment Desired :

Treatment Options :

M-Missing | D – Dental Caries | R – Recession | A – Attrition | C– Cervical Abrasion | F – Filling | P – Periodontal Pocket | O – Mobility

Fig. 1: Modified WHO questionnaire used in the data collection

Graph 2: Prevalence of age-group wise partial edentulousness in maxilla (U: Upper class)

Graph 3: Prevalence of age-group wise partial edentulousness in mandible (U: Upper class)

RESULTS

Out of 3,000 patients, 1,462 had tooth loss. The results showed that Kennedy's class III was the most commonly occurring type of tooth loss in all the three groups, maxilla (23.3%) (Graph 2) and mandible (22.1%) (Graph 3), followed by class II maxilla (3.7%) and mandible (7%), class I maxilla (1.3%) and mandible (1.4%), and class IV maxilla (0.9%) and mandible (0.3%). From the results, it was evident that tooth loss is more in men (58.2%) compared with women (41.8%) (Graph 4). Tooth loss was more in group III subjects compared with groups I and II. Most commonly occurring missing tooth was mandibular first molar.

Based on the clinical condition and tooth loss pattern, the subjects were given treatment options of fixed partial dentures (FPD), removable partial denture (RPD), complete dentures, and implant supported prosthesis. About 99.3% of the patients preferred fixed type of prostheses; however, due to socioeconomic reasons, 56.2% of the people opted for FPD, 28% for RPD, 14.1% for implants, and 1.7% for complete dentures.

Graph 4: Tooth loss and sex

DISCUSSION

The survey is a systematic method of collecting data from a population of interest. Point prevalence survey helps in identifying the occurrence of particular disease (or) condition in a particular period.¹¹ The total prevalence of tooth loss was 48.7%. The prevalence of partial edentulousness in Haryana was 47.4% in 2010¹² and Chennai suburban population is 45.5%.¹³ The results obtained are similar, but there can be an increase in the incidence of tooth loss if the study population was targeted to the older age group.

In our study, the most common reason for tooth loss was periodontal disease, especially in group III subjects, but in group I subjects, the common reason was dental caries. This is in accordance with studies done by Al-Shammari et al¹⁵ where caries was the primary reason for tooth loss in patients with age <40 years, whereas in patients with more than 40 years of age, periodontal disease was the most common reason.

Partially edentulous state was again more prevalent in group III subjects compared with groups I and II. This shows that tooth loss increases with age. This is in accordance with studies done by Madléna et al⁴ who reported that tooth loss is directly proportional to age. This could be due to systemic disease, poor oral hygiene, lack of education and awareness, and due to low socioeconomic status.

Tooth loss was more common in men (58.2%) compared with women (41.8%). Similar results were seen in study done by Rihs et al¹⁶ but not in accordance with study done by Kudo et al.⁸ This may be due to the fact that tooth loss pattern varies with race, ethnicity, and gender.

In all the three groups, Kennedy's class III partially edentulous state was the most prevalent type of tooth loss irrespective of the arch. However, when partially edentulous state in maxilla and mandible was compared,

the prevalence was higher in maxilla (23.3%) than in mandible (22.1%). Similar results were seen in Iraqi population.¹⁶ The reason for this pattern of tooth loss is due to the development of oral health awareness among the population.

The most common missing tooth is the mandibular first molar. The reason for this is due to dental caries. Many studies have conclusively reported that the mandibular molars were the most severely affected teeth in the entire dentition due to dental caries since it is the first tooth to erupt. This could be the possible reason why mandibular molars are the most commonly missing tooth.¹⁷⁻¹⁹

In mandible and maxilla, most common missing teeth were the posteriors, and this was in accordance with the studies done by Locker et al.²⁰ The type of edentulousness affects the individual's food choice and masticatory ability which in turn may affect the nutritional status of the individual, especially in older adults.

There is strong evidence that a diet high in fruits and vegetables protects our body against obesity, diabetes, cardiovascular disease, and some cancers.²¹ The recommended intake of fruits and vegetables is 400 gm/day (WHO 2003). Thus, tooth loss will ultimately lead to poor dietary intake which in turn causes poor nutritional status. Masticatory performance and biting force are greater in dentate individuals followed by partially edentate and completely edentulous individuals.²² The subjects in all three study groups had missing posterior teeth, and in such partially edentulous subjects, biting force and masticatory ability is much lower compared with dentate individuals which was the prime concern in replacing the missing posterior teeth.

Enlargement of the tongue, reduction in the vertical dimension, and lower facial height of the individual are common sequelae of tooth loss, which are also confounding factors for obstructive sleep apnoea.²³ Tooth loss is recognized as an individual risk factor for a range of systemic conditions, such as hypertension, stroke, cardiovascular disease, diabetes, and coronary heart disease.²⁴⁻²⁶

These individuals with a high percentage of tooth loss need prosthetic restorations to restore the form, function, and esthetics. Based on their clinical condition, the patients were educated about the different treatment options and almost 100% of them preferred fixed type of prosthesis. However, their preference changed based on the cost of the treatment. About 56.2% opted for FPDs, 28% for RPDs, 14.1% for implants, and 1.7% for complete dentures.

Limitations of our study are nutritional assessment could have been done to assess the nutrition and dietary

intake of the people with tooth loss. Future studies could be done to study the sequelae of tooth loss and its correlation to systemic diseases.

CONCLUSION

Total prevalence of tooth loss is 48.7%, and Kennedy's class III was the most common type of tooth loss. Men had a higher incidence of tooth loss compared with women. The loss of teeth was directly proportional to age. The main reason for tooth loss was caries and the most common tooth lost was mandibular first molar. By bringing about awareness of tooth loss, its sequelae, and available treatment options in a rural population, the dental needs of the community could be met leading to an overall improvement in their quality of life.

ACKNOWLEDGMENTS

Authors would like to thank Saveetha Dental College Faculty and the management for the intense support and guidance throughout the study. The authors also acknowledge the subjects from the community for their active participation.

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