AN EVALUATION OF PROSTHETIC STATUS AND PROSTHETIC NEED AMONGST PEOPLE LIVING IN RURAL BANGALORE

Dayalan Malathi [1], Jagtani Mohnish [2], Bardia Lipi [3]

1.Head,Department of Prosthodontics, The Oxford Dental College and Hospital
2.Consultant Prosthodontist ,Sindhu Hospital, Kubernagar, Ahemdabad.
3.Post Graduate student, Department of Prosthodontics,The Oxford Dental College and Hospital.

ABSTRACT:

Introduction: Aging is a natural and normal inevitable biologic phenomenon. Oral health protection and promotion is very essential to improve the quality of life, both physically and mentally for the elderly.

Aims: The aim of this study is to determine the prevalence of Partial and Complete edentulism in the adult population of rural Bangalore and to assess its association with distinct variables such as age, gender, socioeconomic status, nutritional status, oral hygiene status and habits.

Methods and Material: A total number of 2033 patients participated in the study. Eight villages were selected by stratified sampling from four talukas (Devanahalli, Doddaballapur, Hosakote and Nelamangala) of Bangalore rural district. Demographic details, socio economic status, nutritional status and habits of the patients were collected using a specialised proforma.

Statistical analysis used: The statistical software namely R 3.2.2 was used for the analysis of the data. Descriptive statistical analysis has been carried out in the present study. Statistically significant differences were accepted when p value is less than 0.01, whereas differences were not considered to be significant where p value is more than 0.05.

Results: 1246 were male patients (61.29%) and 787 were female patients (38.71%). Highest prevalence of edentulism was seen in Socio-economic Class IV. Edentulism was also positively related to poor oral hygiene and age. 37.24% (757) patients were partially edentulous and 9.1% (185) patients were completely edentulism.

Conclusions: Within the limitations of this study, the following conclusions were drawn: Edentulism was significantly associated with age, gender, socio-economic status, deleterious habits and oral hygiene. Prevalence of partial edentulism was 37.3% and prevalence of complete edentulism was 9.1%. The Prosthesis need of the study population was considerably high.

The prosthetic status and prosthesis need also were significantly higher in the male population than the female population.

Key-words: Edentulism, Socio-economic status, Prosthetic status, Prosthetic need.

Key Messages: Prosthesis need shifts from single unit fixed prosthesis to removable complete denture prosthesis with increase in age and decrease in socio economic status. Edentulism is prevalent amongs male population, deleterious habits with poor oral hygiene and lower socio economic status.

INTRODUCTION

Man from time immemorial has tried to increase the life span and enhance his health using various scientific innovation. With changes in lifestyle, advances in medicine and prolonged life expectancy, the proportion of older people will continue to rise worldwide.[1] This rise in the aged population would create new problems and challenges, requiring changes in the organization of

our society, such that more and more elderly people will have to depend upon old age homes. For these people, oral health promotion and protection is very essential to improve the quality of life, both physically and mentally.[2] India has a geriatric population of 77 million, comprising 7.7% of its total population [3] and is expected to rise from 8.9% in 2016 to 21% by 2050.[1] It is predicted that the elderly population of India shall be the highest in the world by 2025

Edentulism is a debilitating and irreversible condition and is described as the "final marker of disease burden for oral health". According to the WHO, tooth loss can be disabling and handicapping since complete tooth loss limits two of the important functions for survival (ability to eat and speak) and for some other individuals, it restricts them from participating in social activities and thereby, compromising their overall quality of life.[4]

A lot of epidemiological surveys have been conducted and data has been obtained on the prevalence of dental caries and periodontal disease.[3] Edentulousness as a disease has not gained the same epidemiological interest, as caries and periodontitis and the data acquired is often more difficult to interpret due to its multifactorial nature. There is an abundant data on dental prosthetic needs of elderly institutionalized and non-institutionalized population, but most of these studies are from developed countries. Though, there are a few

studies that have assessed prosthetic status and treatment needs in rural Indian population, only genuine broad surveys can help us to draw a real portrait of prosthetic status and prosthetic needs of the Indian population.

Bangalore has a population of 9,621,551, rural Bangalore having a population of 871,607 ie. 9.06%. Despite the entire Bangalore having an average literacy rate of 87.67%, the dental prosthesis requirement of the population is not being met. It can either be due to decreased number of dental professionals or lack of awareness of the general population. Thus, an effort is being made to collect baseline information, which will help us to understand and compare the different factors associated with tooth loss. Hence, this study was undertaken to determine the prevalence of Partial and Complete edentulism in the adult population of rural Bangalore and to assess its association with distinct variables involved, such as age, gender, socioeconomic status, nutritional status, oral hygiene status and habits. This will further enable us to formulate a policy to evaluate, plan, motivate and monitor oral health services and render prosthodontic rehabilitation according to the need of the Bangalore rural population.

MATERIALS AND METHODS

The present study is a cross-sectional study to assess the prevalence of partial

and complete edentulism and the prosthetic need and prosthetic status amongst the people living in rural Bangalore.

A stratified sampling technique was adopted to select the villages. The first strata was obtained by dividing Bangalore into urban and rural district. The second strata was obtained by dividing Bangalore rural district into four talukas namely: Nelamangala, Hosakote, Doddaballapur, Devanahalli. The third strata was obtained by dividing all the zones of Bangalore rural district into north and south regions. The fourth strata was obtained by selecting a village in each north and south zone of each taluk. The villages were selected randomly. In each stratum, the age characteristics were divided into four age groups (18–34 years old, 35–54 years old, 55–74 years old and 75 years old or older) and gender characteristics into two groups (male and female). All the villagers in the selected villages had prior information of the date of survey and all the villagers present on the days of survey were included in the study. All the patients aged above 18 years of age were evaluated.

INCLUSION CRITERIA:

1) Subjects who were willing to participate and provide consent.

2) Patients aged above 18 were included in the study.

EXCLUSION CRITERIA:

1) Orthodontically extracted teeth.

2) Third molars and supernumerary teeth were not included in the study.

Demographic details, socio economic status, nutritional status and habits of the patients were collected using a specialized proforma. The calibrated examiner carried out the examinations for, Oral hygiene index simplified (John C Greene and Jack R Vermilion 1964), [5] DMFT index (Henry T.Klein, Carrole E.Palmer & Knutson J.W, 1938),[6] Prosthetic need and Prosthetic status (Oral health assessment form WHO 1997). To assess the socio-economic status of the study population, modified Kuppuswamy's Scale [7] was used.

The examination of the subjects were carried out in the school premises of the respective villages, under natural daylight conditions. The natural light was assisted by artificial battery light in cases where the proper illumination of the oral tissues could not be achieved with the natural light. The subjects were seated comfortably on the chair with the examiner standing at 9' O clock position. The clinical examination included recording of examinations for Oral hygiene index simplified, Decayed, missing, filled teeth index, Prosthetic need and Prosthetic index. Instruments and materials were arranged on a table within easy reach of the examiner. All the standard procedures and protocols were followed to ensure the infection control during the examination procedure.

Statistical Software: The statistical software namely R 3.2.2 was used for the analysis of the data.

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD and results on categorical measurements are presented in Number (%). The tests done in this study were:

1) Chi-square test.

2) Analysis of Variance (ANOVA).

3) Post hoc Tukey's test.

4) McNemar's test.

Statistically significant differences were accepted when p value is less than 0.01, whereas differences were not considered to be significant where p value is more than 0.05.

RESULTS:

2033 patients were enrolled in the study 1246 males (61.29%) and 787 females (38.71%). All the patients examined were divided according to their age in the following groups: Group 1 (18-34 years), Group 2 (35-54 years), Group 3 (55-74 years), Group 4 (≥75 years).

GROUPS	AGE DISTRIBUTION(in years)
I	18-34
II	35-54
III	55-74
IV	>75

Graph 1 shows the distribution of complete and partial edentulism as well as prosthetic status of the upper (maxilla) and lower (mandible) jaw in relation to different age groups. Among the 2033 patients 757 patients (37.24%) were partially edentulous and 185 patients (9.1%) were completely edentulous.

The mean age for Partially Edentulous Group was 43.10±12.75 years. The mean age for Completely Edentulous Group was 66.11±11.41 years. The results indicate that at the age of 30 years the patients have not lost any teeth. The partial edentulism is arising at the age of 43 years, while the patients have become completely edentulous at the age of 66 years.

Graph 2 shows the distribution of complete and partial edentulism as well as prosthetic status of the upper (maxilla) and lower (mandible) jaw in relation to Gender.

Graph 3 shows the distribution of complete and partial edentulism as well as prosthetic status of the upper (maxilla) and lower (mandible) jaw in relation to Socio-economic status.

Graph 4,5 and 6 show the comparison of edentulism and habits:

90 partially edentulous patients (11.89%) used to chew tobacco daily and 72 completely edentulous patients (38.92%) used to chew tobacco daily.

70 partially edentulous patients (9.25%) used to smoke daily and 55 Completely edentulous patients (29.73%) used to smoke cigarettes daily. 19 partially edentulous patients (2.51%) used to

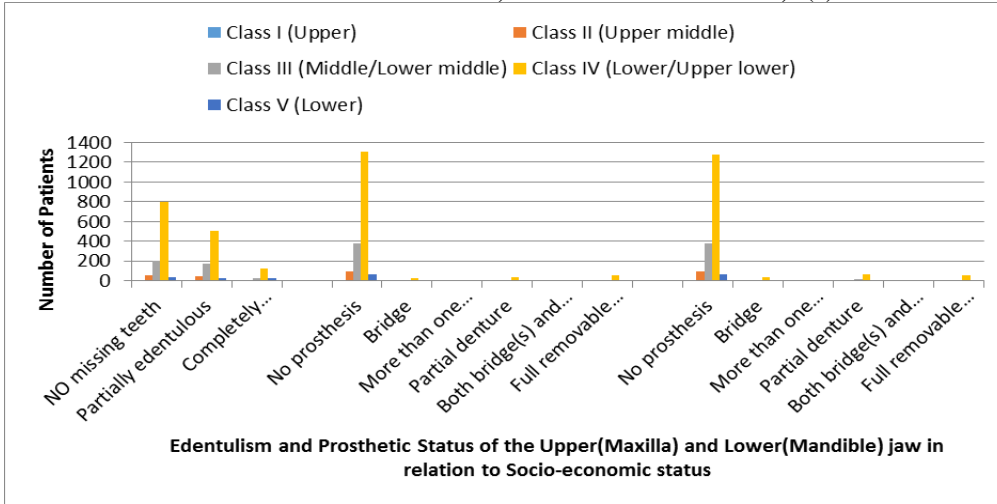consume alcohol daily and 22 Completely edentulous patients (11.89%) used to consume alcohol daily.

Graph 7 shows the comparison of edentulism and oral hygiene. Out of 757 patients, 144 patients (19.02%) had poor oral hygiene, 432 patients (57.07%) had fair oral hygiene and 181 patients (23.91%) had good oral hygiene.
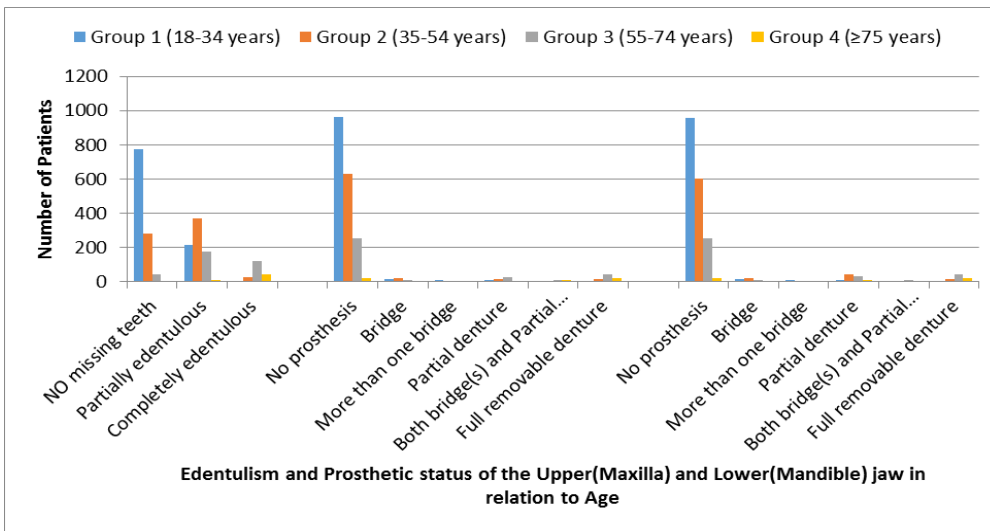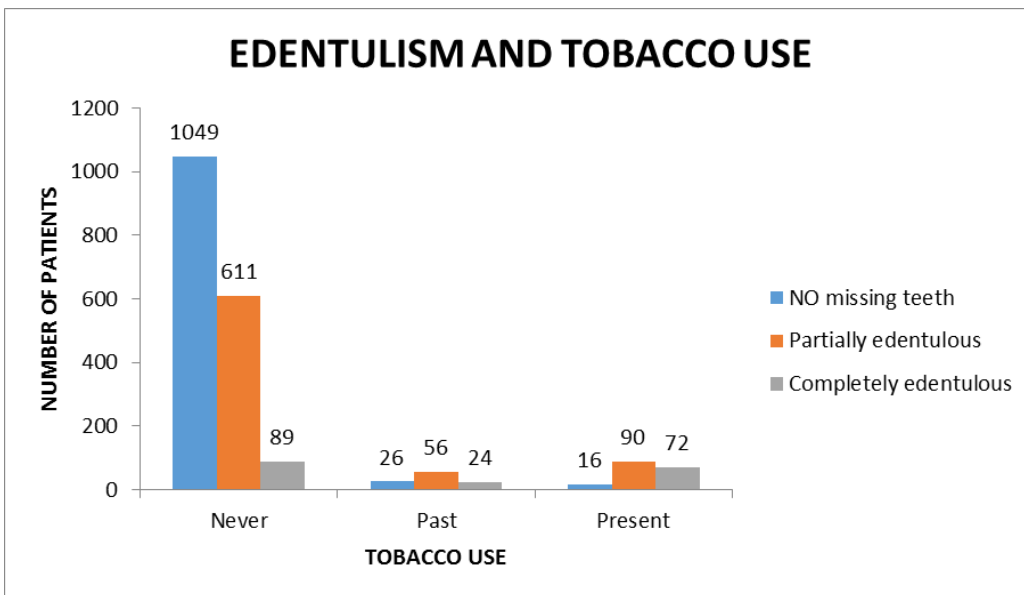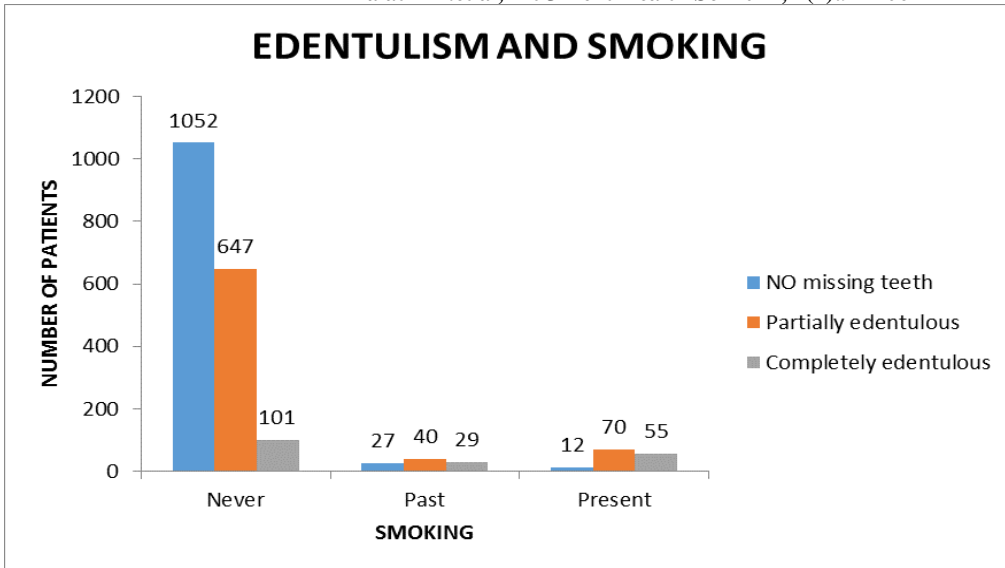

Graph 1
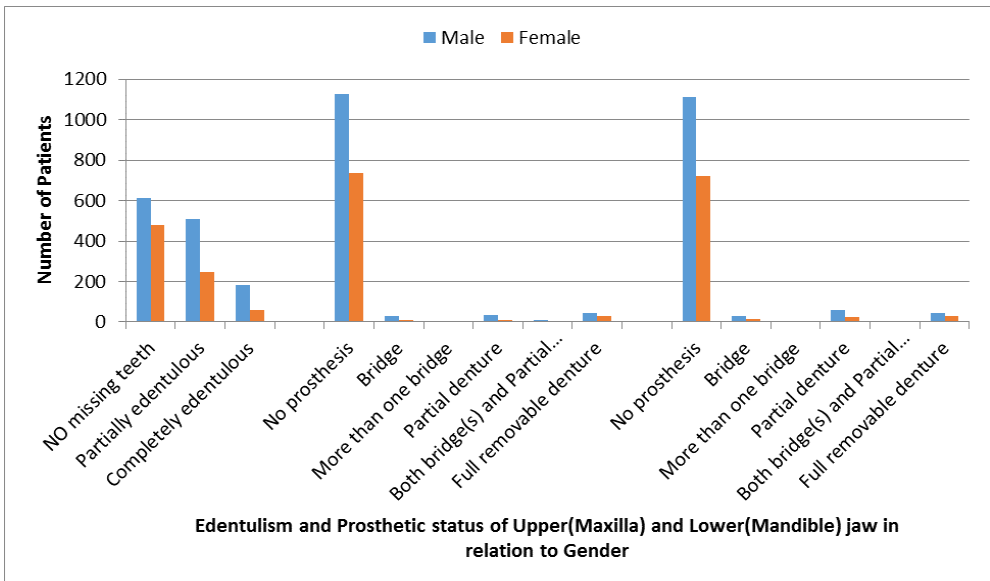
Graph 2

Graph 3

Graph 4

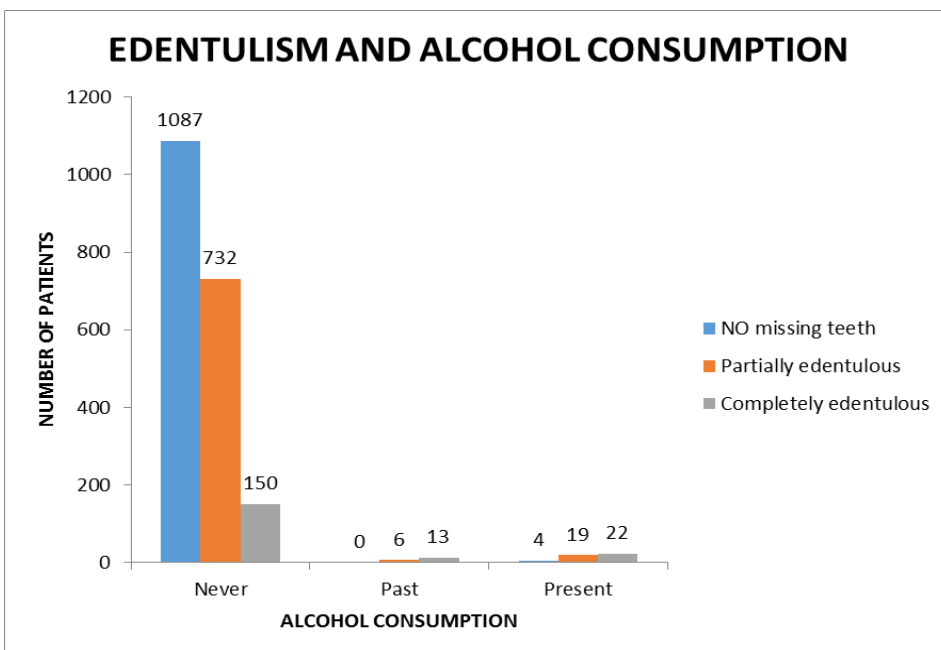**Comparison of Edentulism with Tobacco use**

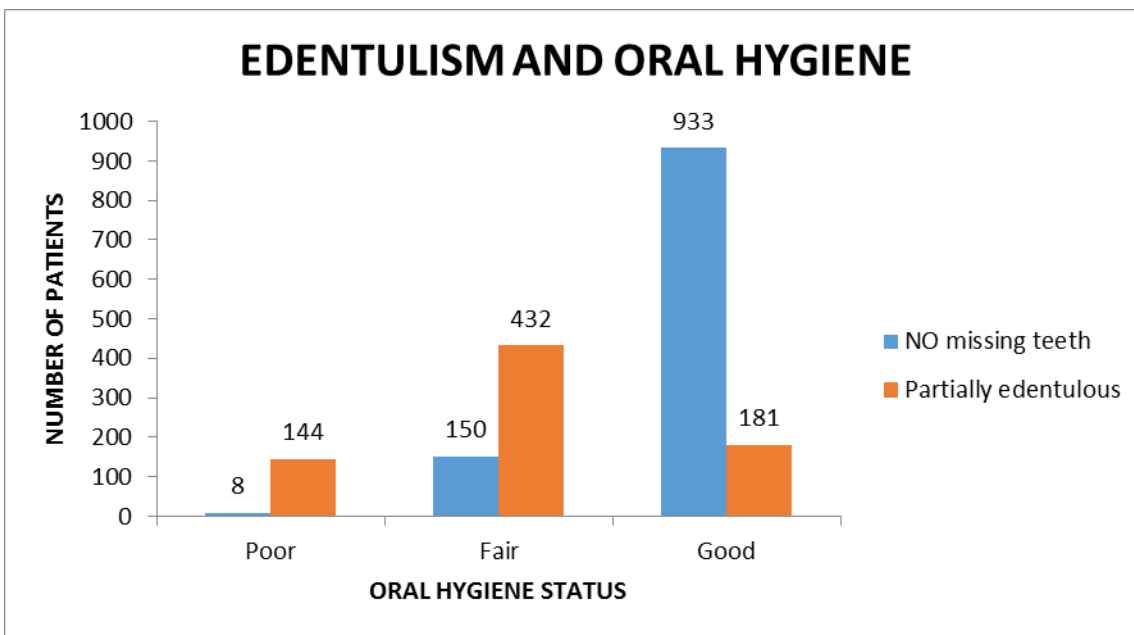| Tobacco	NO missing teeth	Partially edentulous	Completely edentulous	Total	Chi square test (Exact)
Never	1049 (96.15%)	611 (80.71%)	89 (48.11%)	1749 (86.03%)	χ^2 = 306.8
Past	26 (2.38%)	56 (7.4%)	24 (12.97%)	106 (5.21%)	p <0.0001
Present	16 (1.47%)	90 (11.89%)	72 (38.92%)	178 (8.76%)	
Total	1091 (100%)	757 (100%)	185 (100%)	2033 (100%)	

Graph 5

Comparison of Edentulism with Smoking

Smoking	NO missing teeth	Partially edentulous	Completely edentulous	Total	Chi square test (Exact)
Never	1052 (96.43%)	647 (85.47%)	101 (54.59%)	1800 (88.54%)	χ^2 = 244.2
Past	27 (2.47%)	40 (5.28%)	29 (15.68%)	96 (4.72%)	
Present	12 (1.1%)	70 (9.25%)	55 (29.73%)	137 (6.74%)	p <0.0001
Total	1091 (100%)	757 (100%)	185 (100%)	2033 (100%)	

Graph 6

Comparison of Edentulism with Alcohol

Alcohol	NO missing teeth	Partially edentulous	Completely edentulous	Total	Chi square test (Exact)
Never	1087 (99.63%)	732 (96.7%)	150 (81.08%)	1969 (96.85%)	χ^2 = 118.38
Past	0 (0%)	6 (0.79%)	13 (7.03%)	19 (0.93%)	p <0.0001
Present	4 (0.37%)	19 (2.51%)	22 (11.89%)	45 (2.21%)	
Total	1091 (100%)	757 (100%)	185 (100%)	2033 (100%)	

Graph 7

Comparison of Edentulism with Oral Hygiene Index – Simplified (OHIS)

OHIS	NO missing teeth	Partially edentulous	Completely edentulous	Total	Chi square test (Exact)
Poor	8 (0.73%)	144 (19.02%)	0 (0%)	152 (8.21%)	χ^2 = 788.38
Fair	150 (13.75%)	432 (57.07%)	0 (0%)	585 (31.6%)	
Good	933 (85.52%)	181 (23.91%)	0 (0%)	1114 (60.18%)	p <0.0001
Total	1091 (100%)	757 (100%)	0 (0%)	1848 (100%)	

*185 cases OHIS not recorded

DISCUSSION

This study is a stepping stone with an objective of eradicating edentulism, similar to WHO's 2020 objectives.

The FDI, WHO and IADR, had prepared goals for the year 2020 based on current classification of diseases and established criteria for their diagnosis. One of their aim was also to promote sustainable, priority driven policies and programmes in oral health systems as well as to develop accessible cost effective oral health systems for the prevention and control of oral and craniofacial diseases and to integrate oral health care with other sectors that influence health. The objective was also to reduce disparities in oral health between different socio-economic groups within the country and inequalities in oral health across countries and to increase the number of health care providers who are trained in accurate epidemiological surveillance of oral diseases and disorders.[8]

Edentulism, partial as well as complete, is a condition which has been ignored for too long. Edentulism is defined as the loss of all permanent teeth and is the outcome of a multifactorial process involving biologic process (dental caries, periodontal disease, trauma and others) and non-biologic factors related to dental procedures (access to care, patient preferences).[9]

The population of the world continues to grow older, especially in high-income countries.[10] Aging, of a large portion, of the world's population, is leading to major readjustments in the social and health services. In most of the countries, this demographic transition will have an important implication on the health status and its need in the future.[10]

Tooth loss or edentulism is a significant but often overlooked health problem in the community. It has been associated with lower socioeconomic status, poor general health, and poses a significant risk of mortality. It is known to impair functions such as mastication, phonetics and aesthetics, often resulting in limited social and personal interaction and has a detrimental effect on the quality of life.[11]

Edentulism rates are often used as an indicator of the oral health of a population and as a reflection of the effectiveness of the preventive and treatment modalities implemented by the health-care delivery system.

India occupies 2.4% of the world's land area but supports over 17.5% of the world's population. According to the 2001 census, 72.2% of the population lived in about 638,000 villages and the remaining 27.8% lived in more than 5,100 towns and over 380 urban agglomerations. As of 1st of January 2015, the population of India was estimated to be 1,286,956,392 people. This is an increase of 1.34 % (16,979,590 people) compared to population of 1,269,976,802 the year before. During 2015, India's population is projected to have increased by 17,206,607 people

and reach 1,304,162,999 in the beginning of 2016.[12]

India has a large geriartric population of 77 million, comprising 7.7% of its population. Despite a steady decline in the rates of complete tooth loss over the past several decades, more than one-third (33.1 %) of those aged 65 years and above are edentulous. The percentage of edentulous people is expected to decrease in the coming decades as a result of improved oral health; whereas, the number of edentulous people will increase as a result of the strong increase in the aging population.[13]

A total of 985 patient out of 2033 patients belonged to Group 1 (18-34 years) of age, whereas least number of patients (42) belonged to Group 4 (≥75 years). 1091 patients had no missing teeth (53.66%), 757 patients were partially edentulous (37.24%) and 185 patients were completely edentulous (9.1%). Edentulousness also progressed as age of the patients increased ie. age α edentulousness. The mean age for patients, who had not lost any teeth was 30.65±10.45 years, for partially edentulous patients was 43.10±12.75 years and for completely edentulous patients was 66.11±11.41 years.

Since all the examinations were informed and conducted on holidays and Sundays, there were more male patients (61.29%) as compared to female patients (38.7%). In earlier studies female patients were higher than male patients. However, 125 of the male patients

(10.03%) were edentulous and 509 were partially edentulous out of 1246 male patients examined. The prevalence of edentulism in the male patients was considerably higher when compared to female patients. 60 female patients (7.62%) were completely edentulous and 248 female patients (31.51%) were partially edentulous out of 787 female patients examined. This higher incidence of edentulousness in the male patients could be because most of the male patients examined had a history of tobacco chewing, cigarette smoking and alcohol consumption in the past or in the present.

70.44% patients belonged to Class IV (Upper Lower Class) while only 0.59% patients were seen in Class I (Upper Class). Highest prevalence of edentulism was observed in Class IV (Upper Lower Class) with 507 of the partially edentulous patients (66.97%) and 125 of the completely edentulous patients (67.57%).

The patients who had a history of tobacco chewing, tobacco smoking and alcohol consumption had higher prevalence of partial and complete edentulism as compared to those who had never chewed and smoked tobacco nor consumed alcohol. It was also seen that partial and complete edentulism were more prevalent in the patients who smoked cigarettes daily and chewed tobacco as well as consumed alcohol daily. Similarly prevalence of partial edentulism increased with the decline in oral hygiene. 19.02% of the patients had

poor oral hygiene, whereas only 23.91% had good oral hygiene out of 144 of partially edentulous patients.

The prevalence of prosthesis in the male population was found to be more than the female population for both the maxilla (upper) as well as the mandible (lower jaw). The prosthetic status and prosthetic need were assessed separately for the upper jaw (maxilla) and lower jaw (mandible). It was observed that with increasing age the prosthetic status shifted from maximum number of patients having a bridge to maximum number having a partial denture to complete denture. In this study, it was found that, 1129 male patients (90.61%) and 736 female (93.52%) had no prosthesis in the upper jaw (maxilla), while 1112 (89.25%) male and 720 (91.49%) of the females had no prosthesis in the mandible (lower jaw).

In the present study, none of the patients in Class I (Upper Class) had any prosthesis in the upper (maxilla) and lower (mandible) jaws. In Class IV (Upper Lower Class), 8.8% of the patients had prosthesis in the upper (maxilla) jaw, out of which, maximum number of the patients (3.84%) were having a full removable denture (complete denture). Correspondingly for the lower jaw (mandible) it was observed that, in Class IV (Upper Lower Class), 10.68% of the patients had prosthesis out of which, maximum number of patients (3.84%) were having a full removable denture (complete denture). Maximum prosthesis requirement (38.37%) was in

Age group 2 (35-54 years). These findings indicate that the prosthetic need is increasing with increasing age, as well as the requirement is shifting from one-unit fixed prosthesis to multi-unit fixed prosthesis and gradually to partial and complete denture. 8.27% of the males and 4.83% of the females required full prosthesis in both the upper jaw (maxilla) and lower jaw (mandible). The requirement of the prosthesis for the male population is significantly higher than the female population. The probable reason could be less exposure of the female population to habits like alcohol consumption, tobacco chewing and smoking, which are significantly related to increased prevalence of edentulism.

Hence, with decreasing socio-economic class the prosthetic status is increasing, furthermore the prosthetic status is shifting more towards the partial denture and complete denture than fixed prosthodontic treatment. This may be due to an increase in edentulism rate as the socio-economic class decreases. The education level, occupation and income are decreasing simultaneously with decreasing socio-economic class hence the prosthetic status has shifted from fixed prosthesis to a removable one.

CONCLUSION:

Within the limitations of this study, the following conclusions were drawn:Edentulism was significantly associated with age, gender, socio-

economic status, deleterious habits and oral hygiene. With increasing age, more number of partially edentulous and completely edentulous patients were observed.There was higher prevalence of partial and complete edentulism in the male population than the female population. Prevalence of partial edentulism was 37.3% and prevalence of complete edentulism was 9.1%, in a population of 871,607. The Prosthesis need of the study population was considerably high. 27.45% of the patients required prosthesis in the upper jaw (maxilla) and 31.19% of the patients required prosthesis in the lower jaw (mandible). The Prosthetic status in the study population was very low. 8.26% of the patients had prosthesis in the upper jaw (maxilla) and 9.89% of the patients had prosthesis in the lower jaw (mandible). Prosthetic status and Prosthesis need is significantly associated with age, gender and socio-economic status. The prosthetic status changed as the age increased because of a significant increase in the prevalence of edentulism. Similarly, with increasing age, xi higher numbers of partial and complete dentures were required in the elderly population. The prosthetic status and prosthesis need were significantly higher in the male population than the female population. Prosthetic status changed from a bridge, to a removable partial denture and eventually to a complele denture with increasing age and decreasing socioeconomic status. Prosthesis need shifts from requirement of one-unit prosthesis, to multi-unit prosthesis and to a complete denture with increasing age and decreasing socioeconomic status. There was no significant relation between partial and complete edentulism and Body Mass Index.

REFERENCES:

1. Chaware S, Ghodpage SL, Sinha M, Chauhan V, Thakare V. Prosthetic status and prosthetic needs among institutionalized geriatric individuals in Nashik City, Maharashtra: a descriptive study. J Contemp Dent Pract. 2011 May 1;12(3):192-5.

2. Eachempati P, Shenoy VK, Jain N, Singh S. Prosthodontic status and needs of elderly institutionalized residents in Mangalore: a prospective study. Indian J Dent Res 2013 May-Jun;24(3):284-88.

3. Reddy NS, Reddy NA, Narendra R, Reddy SD. Epidemiological Survey on Edentulousness. J Contemp Dent Pract. 2012 Jul 1;13(4):562-70.

4. Samara SA, Haidar ZS. Re-visiting edentulism: Complete removable dentures vs Implant over dentures. J Oral Health Comm Dent 2011; 5(3): 107-09.

5. Greene JC, vermillion JR. The simplified oral hygiene index. J am dent assoc.1964 Jan;68:7-13

6. Klein H, Palmer CE, Knutson JW. Studies on dental caries. I. Dental status and dental needs of elementary school children. Public Health Rep.1938;53:751.

7. Gururaj, Maheshwaran. Kuppuswamy's Socio-Economic Status Scale – A Revision of Income Parameter For 2014. International Journal of Recent Trends in Science And Technology 2014;11(1):01-02.

8. Hobdell M, Petersen PE, Clarkson J, Johnson N. Global goals for oral health 2020. Int Dent J. 2003 Oct;53(5):285-288.

9. Kaira LS, Dabral E. Prevalence of complete edentulism among Udaipur population of India. The Saudi Journal for Dental Research (2014) 5, 139–145.

10. Medina-soli´s CE, Pe´rez-nu´n˜ez R, Maupome´ G, Avila-burgos L, Pontigoloyola AP, Patin˜o-mari´n N, Villalobos-rodelo JJ. National survey on edentulism and its geographic distribution, among Mexicans 18 years of age and older (with emphasis in WHO age groups). J Oral Rehabil. 2008;35:237– 244.

11. Hewlett SA, Calys-Tagoe BN, Yawson AE, Dako-Gyeke P, Nakua E, Folson G, Baddo AN, Mensah G, Minicuci N, Kowal P, Biritwum RB. Prevalence and geographic distribution of edentulism among older Ghanaians. J Public Health Dent. 2015 ;75(1):74-83.

12. Censusindia.gov.in. Rural Urban distribution of population. India. GI. Available from http://censusindia.gov.in/2011-provresults/paper2/data_files/india/Rural_Urban_2011.pdf (accessed 16 October 2015).

13. Nagaraj E, Mankani N, Madalli P, Astekar D. Socioeconomic factors and complete edentulism in north karnataka population. J Indian Prosthodont Soc.2014 Mar;14(1):24-8.