



Epidemiological Survey on Edentulousness

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ABSTRACT

India has a large geriatric population of 77 millions, comprising 7.7% of its total population. One of the major handicaps in the elderly is loss of teeth, affecting their mastication, dietary intake and nutritional status.

Aims and objectives: The present study was planned to assess the level of edentulousness, cause of edentulousness, denture wearing and denture needs of the middle and elderly in the society and study was correlated between habits and socioeconomic variables, diet and body mass index (BMI).

Materials and methods: A total of 500 subjects (random sampling) from dental outpatient were studied. A prepared questionnaire was developed, explained, interviewed and questions were filled personally.

Results: The level of edentulousness was found to be high in the subjects with low socioeconomic status and in advancing age with no significant difference between male and females. Another finding was very low level of denture wearing of 62% needing complete denture and partial denture only 10.4% of subjects wearing dentures.

Mixed diet population had higher level of edentulousness compared with vegetarians. The BMI was correlated with level of edentulousness.

Conclusion: The study clearly showed that there is lack of dental awareness, so dental education and motivation in very important. The study concludes that the need for prosthodontics care will increase due to the increase in life span.

This study is clinically significant with regard to knowing the root cause of edentulism, either partial or complete. Out of 62% tooth loss, dental caries (37.4%) topped the cause for tooth loss followed by combination of dental caries and periodontal disease (12.2%).

Keywords: Edentulousness, Epidemiology, Body mass index, Denture wearing and diet.

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INTRODUCTION

Epidemiology is concerned with the course and outcome of diseases in individuals and groups in human population. The survey can be performed at small town level population or large national level population.

Last (1988) defined epidemiology as 'the study of the distribution and determinants of health-related status or events in specified populations and the application of the study to control health problems'.

Although a lot of epidemiological surveys have been conducted in dental caries and periodontal problems and data have been obtained, prosthetic sector has not gained any interest in epidemiology. One of the major handicaps in the elderly is loss of teeth, affecting their mastication, dietary intake and nutritional status.¹⁹

India has a large geriatric population of 77 million, comprising 7.7% of its total population.¹⁹ Of the many issues concerning the welfare of an adult, 'Health' is one of the major concerns.

Weintraub and Buet (1985) used the term edentulism to describe the complete absence of natural teeth, regardless of whether they had been replaced or not.¹⁸

There are a number of factors known to be associated with oral health of the adult population, such as socioeconomic status, literacy level, smoking or chewing tobacco and alcohol consumption. Other factors such as oral hygiene practices, social and cultural beliefs and attitudes, perceptions regarding oral health, function and philosophy of the dentists, can all influence oral health in the adult population.¹⁹

Epidemiological data on health and its related issues are very important in order to plan for future care.¹⁹ Nevertheless, the prosthetic sector has not gained the same epidemiological interest as caries and periodontitis and the data obtained, are often difficult to interpret.¹⁸

Prosthetic dentistry has a very dominant role in restorative dentistry. The prime objective of dental care is maintaining a natural functional dentition for life.

The percentage of edentulous people is expected to decrease in the coming decades as a result of improved oral health, where as the number of edentulous people will increase as a result of the strong increase in the aging population.¹³

Therefore, this study was planned to evaluate the level of edentulousness, denture wear habits and denture needs of adult population. It was planned to study the differences according to age and sex. As socioeconomic variables can influence the level of edentulousness, denture wearing and denture needs, these variables were also involved in the study.

MATERIALS AND METHODS

Selection of samples: The outpatient (OP) department in Sri Ramachandra Dental College, Porur, Chennai, was selected for the study. The cluster of villages close to this hospital made it logistically ideal to study the edentulous state of the population.

Target of the study population were 500 subjects (random sampling) from the dental OP.

The personal details and address of the subject were recorded. Educational status was listed as illiterate, school or college.

Socioeconomic status was graded as low, middle or high based on the income of the subject.

Socioeconomic status was recorded based on the guidelines set by Income Tax Department (Union of India). Dietary preferences (veg or mixed diet) are recorded to assess its relation to level of edentulousness and denture wearing habits.

The correlation of systemic diseases like diabetes, hypertension, etc. with edentulism was analyzed.

Height and weight of each subject was recorded to calculate body mass index (BMI) as an indicator of nutritional status.

$$\text{BMI} = \frac{\text{Weight in kilogram}}{\text{Height in (m}^2\text{)}}$$

The level, cause and duration of edentulousness were recorded.

The effect of loss of tooth on esthetics, mastication and phonetics as felt by the subject were evaluated. The subject past experience with prosthodontic treatment modality was analyzed. A prepared questionnaire which contains 19 questions was developed and for all the subjects the study purpose was explained, interviewed and questions were filled personally.

The examination was conducted using basic diagnostic tools. (Mouth mirror, straight probe, explorer No 21).

The operator examined the subjects by wearing mouth mask and disposable gloves.

Statistical software SPSS for windows (Version 11.5) was used for data analysis, Chi-square tests were performed and p-values were calculated for each parameter and the results were tabulated.

RESULTS

In order to plan for future health care provisions, for the society, collecting epidemiological data on health and its related issues are very important. Data on oral health that to particularly relate to prosthodontics is scant. Therefore, this study was planned.

DISCUSSION

The preservation of dentition can be justified on the following grounds that, 'teeth' are useful for maintenance of arch length, esthetics, maintenance of healthy oral environment, mastication, phonetics, etc.

Tooth loss is the dental equivalent of mortality. It is the end product of oral disease and it also reflects the attitudes of patients, availability and accessibility of dental care and socioeconomic status.

One of the major handicaps in the elderly of our population is loss of teeth, affecting their mastication, dietary intake and nutritional status.

The importance of this study is to establish base line data on the prevalence of edentulism in adult population, seeking Care.

A cluster of villages close to Sri Ramachandra Dental College and Hospital, made it logistically ideal for this study.

Previous studies²⁰ have divided the subjects into 18 to 40 years (young adults), 41 to 60 years (middle adults) and >61 years (old adults), for the sake of convenience in classification. This present study also made use of this classification to segregate the sample size of 500 subjects (Fig. 1 and Table 1).

In this study, the number of male subjects were 232 (46.4%) and the number of female subjects were 268 (53.6%) (Fig. 2 and Table 2).

The younger age group (18-40 years) consisted of 315 subjects (63.0%), middle age group (41-60 years) consisted of 146 subjects (29.2%), old age group (>61 years) consisted of 39 subjects (7.8%).

Among these samples, 141 (28.2%) were illiterate, 276 (55.2%) were educated up to or below secondary school level and 83 samples (16.6%) were educated up to graduation (Fig. 3 and Table 3).

In this survey 257 subjects (51.4%) were of low-income group, 228 subjects (45.6%) were of middle-income group and there were mere 15 subjects (3.0%) who belonged to high-income group (Fig. 4 and Table 4).

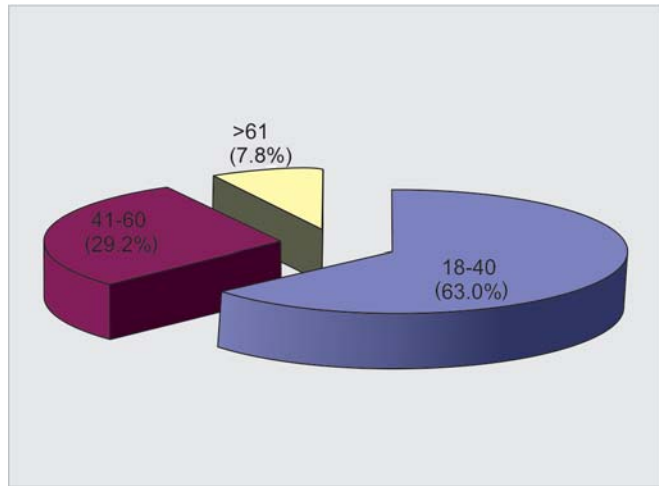


Fig. 1: Age in years

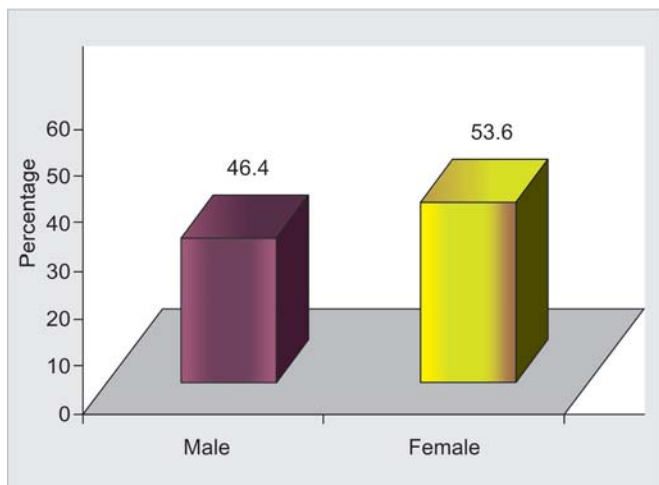


Fig. 2: Sex

A total of 70.6% of the total study population had desirable BMI. A total of 24.2% were under weight and 5.2% were found to be overweight (Fig. 5 and Table 5).

Studies by Georgia K Johnson,⁸ Jerome Hlaber et al¹¹ and Hanioka T et al,⁹ clearly mentioned the role of tobacco. Smoking is a risk factor for periodontitis. In this study, out of 500 subjects, 70 (14%) were smokers, 23 of them (4.6%) were tobacco chewers, 11 (2.2%) were pan chewers, 19 of them (3.8%) were both smokers and tobacco chewers and 377 samples (75.4%) did not have any habits. Statistical analysis, 'Chi-square' test showed significant p-values ($p < 0.05$) when the edentulousness and habits were compared. Smokers always had more cases in level of edentulousness than other habits (Fig. 6 and Table 6).

Another important finding seen in this study was that among the maxillary and mandibular arches, the edentulous state was more prevalent in mandibular arch (19.2%) as against the maxillary arch (12.2%). This was explained through previous studies. Cahen PM et al⁴ stated that the permanent mandibular first molar that erupted first into the

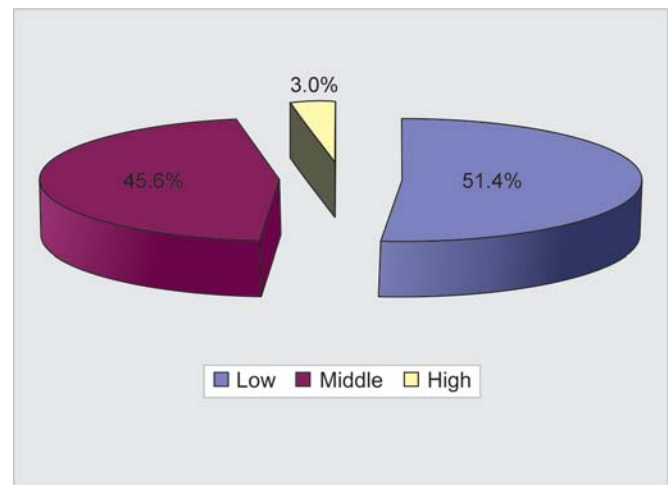


Fig. 4: Socioeconomic status

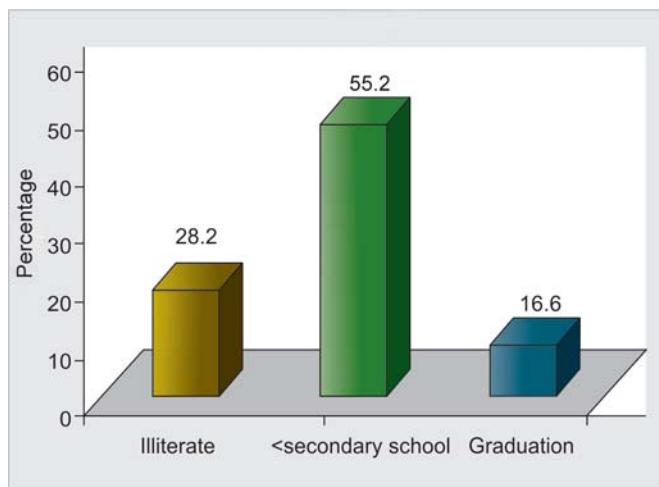


Fig. 3: Educational status of the subjects

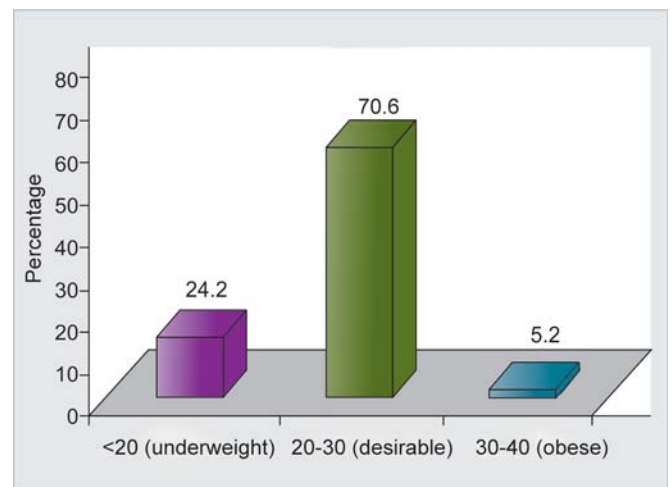


Fig. 5: Built (BMI)

oral cavity was more prone to caries and food lodgement due to deep pits and fissures (Fig. 7 and Table 7).

The survey showed that 40.2% of subjects had problems due to loss of teeth. Out of them, majority of the subjects had problems in mastication (26%), followed by esthetics and mastication (5.8%) which showed similar findings as by Annette Thomas-Weintraub,¹ who stated that masticatory difficulty was the most frequently voiced complaint (Fig. 8 and Table 8).

Another important finding was that out of 62% tooth loss, dental caries (37.4%) topped the cause for tooth loss, followed by combination of dental caries and periodontal disease (12.2%) which was in concurrence to the previous studies.⁴ Studies by Madlena M et al¹⁴ showed that decayed teeth were highest in age group of 45 to 64 years (Fig. 9 and Table 9).

Out of 62% of previous denture wearer, i.e. partially or totally edentulous, only 10.4% of the subjects were previous denture wearers, which indicate a high level of unawareness among the edentulous subjects of prosthodontic therapy. A

total of 51.6% of edentulous subjects were not wearing any previous dentures (Fig. 10 and Table 10).

Among the nondenture wearers, 49.4% were willing to accept prosthodontic treatment and 12.6% of the subjects who were not using dentures were still not interested in prosthodontic treatment. This shows that majority of the subjects were willing to accept prosthodontic treatment, if they are motivated which according to previous study by Henry A Collett¹⁰ said that motivation is an important factor in denture treatment (Fig. 11 and Table 11).

The reasons cited by the subjects for not wearing dentures was mainly due to lack of awareness (26.6%), cost factor by 7%. This showed that 'lack of dental awareness' as by Shah¹⁷ was primary cause of the edentulous state,

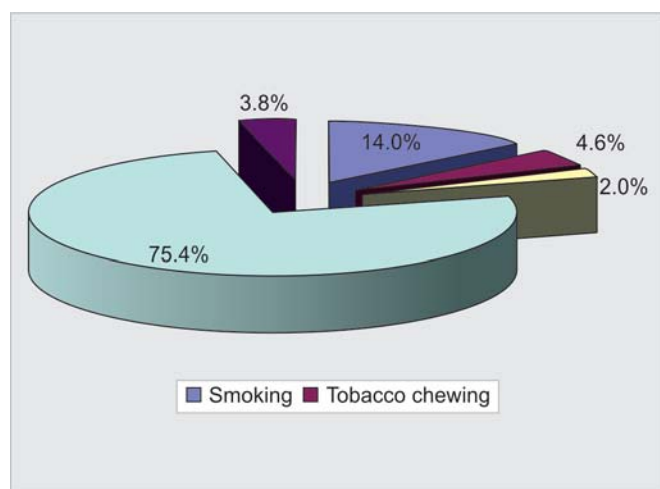


Fig. 6: Types of habits

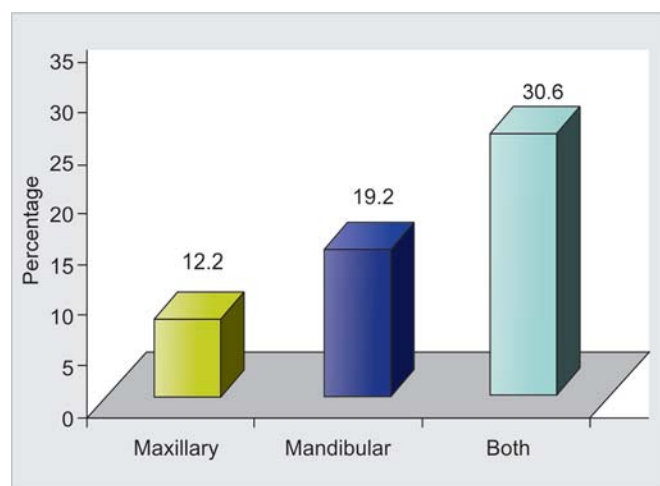


Fig. 7: Arch

Age (years)	No. of subjects	Percentage
18-40	315	63.0
41-60	146	29.2
>61	39	7.8
Total	500	100.0

Sex	No. of subjects	Percentage
Male	232	46.4
Female	268	53.6
Total	500	100.0

Educational status	No. of subjects	Percentage
Illiterate	141	28.2
<Secondary school	276	55.2
Graduation	83	16.6
Total	500	100.0

Socioeconomic status	No. of subjects	Percentage
Low	257	51.4
Middle	228	45.6
High	15	3.0
Total	500	100.0

Built (BMI)	No. of subjects	Percentage
<20 (under weight)	121	24.2
20-30 (desirable)	353	70.6
30-40 (obese)	26	5.2
Total	500	100.0

Table 6: The types of habits

Habits	No. of subjects	Percentage
Smoking	70	14.0
Tobacco chewing	23	4.6
Pan chewing	11	2.2
None	377	75.4
Smoking and tobacco Chewing	19	3.8
Total	500	100.0

Table 7: Level of edentulousness of arch

Arch	No. of subjects	Percentage
Maxillary	61	12.2
Mandibular	96	19.2
Both	153	30.6
Total	310	62.0

Table 8: The type of problem of subjects

Type of problem	No. of subjects	Percentage
Esthetics	15	3.0
Mastication	130	26.0
Phonetics	6	1.2
Esthetics and mastication	29	5.8
Mastication and phonetics	13	2.6
All	8	1.6
Total	201	40.2

Table 9: The cause of edentulousness

Cause of edentulousness	No. of subjects	Percentage
Dental caries	187	37.4
Periodontal disease	47	9.4
Trauma	14	2.8
Dental caries and Periodontal disease	61	12.2
Dental caries and trauma	1	0.2
Total	310	62.0

Table 10: About previous denture wearer

Are you a previous denture wearer	No. of subjects	Percentage
Yes	52	10.4
No	258	51.6
Total	310	62.0

Table 11: Willing for prosthodontic treatment

Prosthodontic treatment	No. of subjects	Percentage
Yes	247	49.4
No	63	12.6
Total	310	62.0

either partial or completely edentulous state (Fig. 12 and Table 12).

Shah N et al¹⁹ showed that tooth loss increased with advancing age and was higher among the elderly subjects.

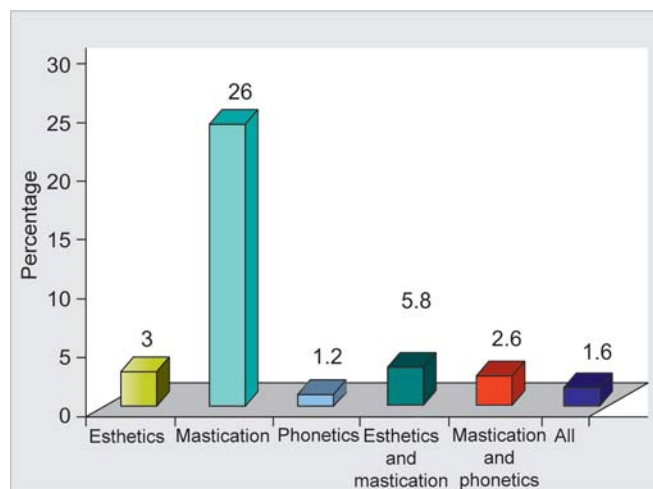


Fig. 8: Loss of tooth—type of problem

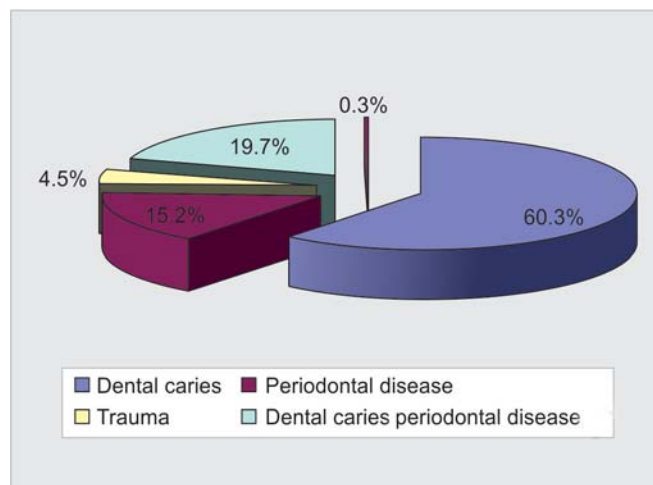


Fig. 9: Cause of edentulousness

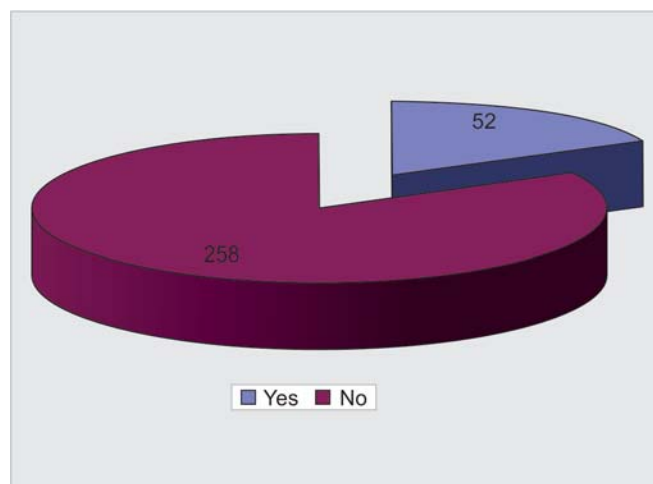


Fig. 10: Previous denture wearer

When the level of edentulousness and the sex of subject were compared, out of the 46.4% male subjects, 21.8% were fully dentate and 24.6% subjects were partially or completely edentulous. In female subjects, out of 53.6, 16.2% were fully dentate whereas 37.4% were either partially or completely edentulous. So, in this study female subjects were more prone to edentulousness, showing statistical significant p-value. Many studies^{2,12} have showed that a higher prevalence of edentulism existed among women than man (Fig. 13 and Table 13).

When the level of edentulousness and socioeconomic status were compared, the majority of the subjects were from low-income group (51.4%). Out of them, apart from 16.4% dentate subjects, the rest of the 35% were partially or totally edentulous. Out of 45.6% middle-income group, 24.6% were partially or completely edentulous. And of the 3% high income group, 2.4% of the subjects had missing teeth and 0.6% had no missing teeth. This showed that the level of edentulousness was seen more in low-income group and p-value was statistically significant and also studies by Al-Dwairi ZN³ suggest a significant relationship between sociodemographic variables and edentulism, with age, educational level and socioeconomic status playing vital roles in edentulism and denture demand (Fig. 14 and Table 14).

Anja Ainamo² stated that socioeconomic level was one of the reason associated with dental health. Workers and farmers were reported more often edentulous, than, senior salaried employees. Even studies by Dolan TA et al,⁵ Gordan W Thompson et al⁷ stated that subjects with least education and lowest income are most likely to be edentulous. And also Evren BA et al⁶ through his study of 269 subjects found that, 51% of the subjects had low income and majority of 66.6% were edentulous.

The level of edentulousness and built of the patient (BMI) were compared and it was found that there was no role to be played by body mass index in leading to edentulous state. Studies by Mack F et al¹⁵ showed that the most significant risk factor for subjects with high BMI were hypertension and diabetes. Dental factors were not influenced by BMI but influenced by socioeconomic factor. In this study, 70.6% had desirable BMI. But out of the 70.6% subjects, 44.2% subjects still had missing teeth. This shows that apart from the BMI, more serious factors such as smoking, lack of awareness led to edentulousness. This was in concurrence with the previous studies by Shah N et al¹⁹ which shows that BMI does not correlate to level of edentulousness (Fig. 15 and Table 15).

When cause of edentulousness were examined and then compared with habits, smoking was the major cause

(16.1%), followed by tobacco chewing (5.2%) and pan chewing (3.2%). Hanioka T et al⁹ in his study stated that tooth loss in adults was very similar in both males and females. However, the smoking habits associated with males was responsible for the tooth loss. Even in this study

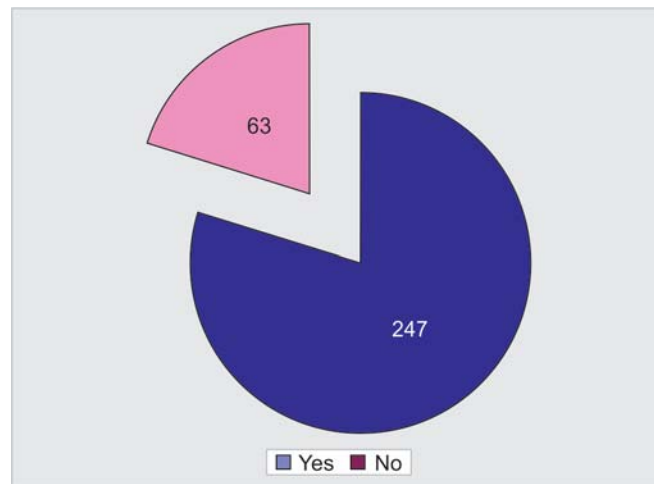


Fig. 11: Prosthodontic treatment

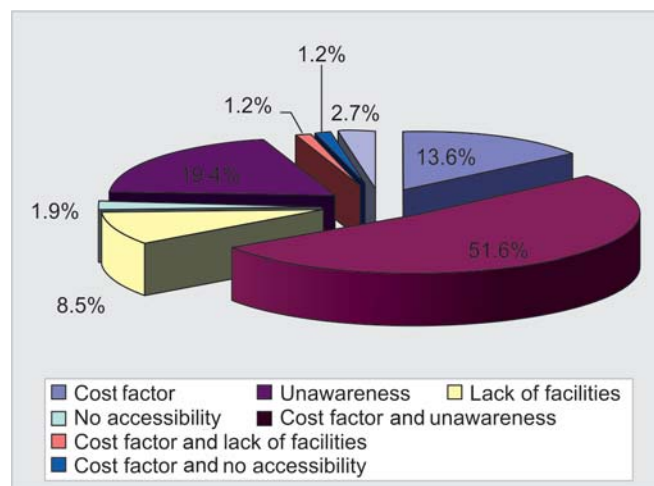


Fig. 12: Factors for not replacing the missing tooth

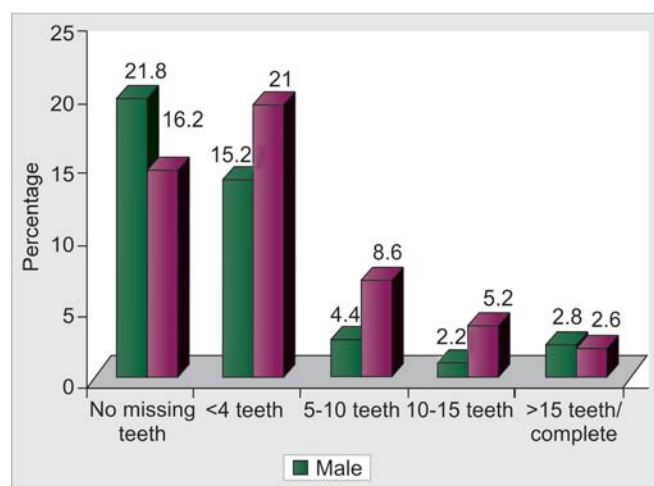


Fig. 13: Comparison of level of edentulousness and sex

smoking was the major causing edentulousness (Fig. 16 and Table 16).

The dental profession recognizes difficulties peculiar to prosthetic patients as well as the attention required by seemingly limitless details of treatment. Though the

prosthodontists honor the standards of treatment, general public are not interested in them. The public is interested in getting the necessary minimal treatment at the lowest possible cost. These are the demands that the general population is placing on the services which, the dental professionals must provide and that prosthodontists in particular must try to meet.

Preventive dental care is almost nonexistent to the rural masses and vary in urban areas. There is no orientation of dental graduates toward the special needs to the older population. Therefore recommendation include, the establishment of continuing dental education programs on geriatric oral care; inclusion of a geriatric component in undergraduate and postgraduate curriculum; initiation of a diploma, certificate and degree courses in geriatric dentistry. Research on various aspects of ageing and age-related oral health problems; provision of preventive and curative treatment for various oral diseases to the elderly, etc. Studies by Musacchio E et al¹⁶ also suggested that the high prevalence of edentulous subjects without prostheses

Table 12: Not replacing the missing teeth			
S. no.	Why did not replace your missing tooth	No. of subjects	Percentage
1	Cost factor	35	7.0
2	Unawareness	133	26.6
3	Lack of facilities	22	4.4
4	No accessibility	5	1.0
5	Cost factor and unawareness	50	10.0
6	Cost factor and lack of facilities	3	0.6
7	Unawareness and lack of facilities, no accessibility	7	1.4
8	Lack of facilities and no accessibility	1	0.2
9	Cost factor, unawareness and lack of facilities	1	0.2
10	Cost factor, lack of facilities and no accessibility	1	0.2
Total		258	51.6

Table 13: Comparison of level of edentulousness and sex			
Level of edentulousness	Sex		Total
	Male	Female	
No. missing teeth	109	81	190
	21.8%	16.2%	38.0%
<4 teeth	76	105	181
	15.2%	21.0%	36.2%
5-10 teeth	22	43	65
	4.4%	8.6%	13.0%
10-15 teeth	44	26	37
	2.2%	5.2%	7.4%
>15 teeth/complete	14	13	27
	2.8%	2.6%	5.4%
Total	232	268	500
	46.4%	53.6%	100.0%

Table 14: Compares level of edentulousness and socioeconomic status				
Level of edentulousness	Socioeconomic status			Total
	Low	Middle	High	
No. missing teeth	82	105	3	190
	16.4%	21.0%	0.6%	38.0%
<4 teeth	94	78	9	181
	18.8%	15.6%	1.8%	36.2%
5-10 teeth	37	27	1	65
	7.4%	5.4%	0.2%	13.0%
10-15 teeth	28	9	—	37
	5.6%	1.8%	—	7.4%
>15 teeth/complete	16	9	2	27
	3.2%	1.8%	0.4%	5.4%
Total	257	228	15	500
	51.4%	45.6%	3.0%	100.0%

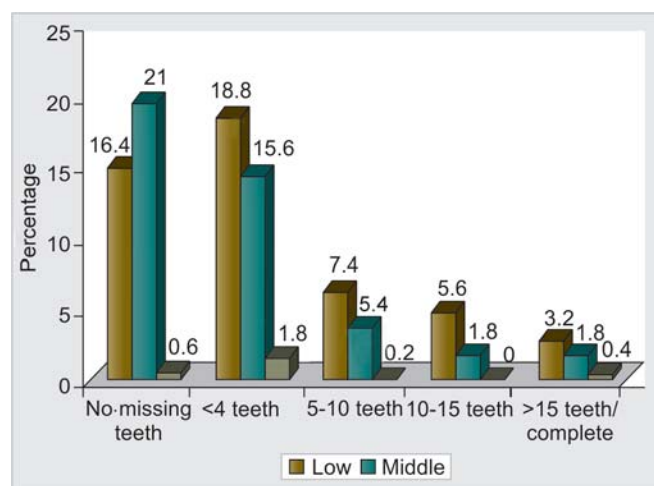


Fig. 14: Comparison of level of edentulousness and socioeconomic status

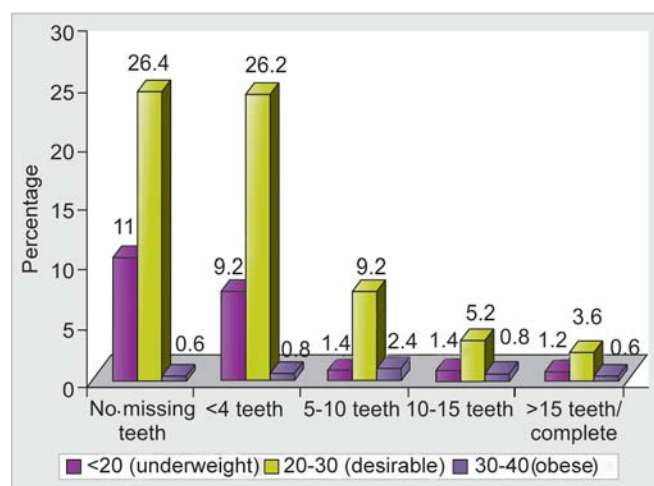


Fig. 15: Comparison of level of edentulousness and built (BMI)

suggests a need for educational and social measures to improve patients attitudes to dental care and to encourage the use of prostheses among the elderly.

Oral health awareness and education programs should be conducted at the community level for every individual.

The role and proper method of oral hygiene practice, the negative efforts of various oral habits, especially tobacco habits, the need to replace missing teeth, care of artificial dentures and self examination of the oral cavity for early detection of oral precancers and cancers should be explained.

The future of prosthodontics, require some revamping of the concepts of delivery of prosthodontic services taking place. Present and future demands will not be met by dentists taught by dental faculties as they function today.

So, prosthodontists with extensive training and advanced clinical experience can meet the challenges of partial or complete edentulous state of the patients.

Periodical surveys in different parts of the country should be consistently undertaken, to evaluate the status of edentulism and the progress in attempts to curb it.

Table 15: Comparison of level of edentulousness and Built (BMI)

Level of edentulousness	Built (BMI)			Total
	<20 (under wt)	20-30 (desirable)	30-40 (obese)	
No. missing teeth	55	132	3	190
<4 teeth	11.0%	26.4%	0.6%	38.0%
5-10 teeth	46	131	4	181
10-15 teeth	9.2%	26.2%	0.8%	36.2%
>15 teeth/complete	7	46	12	65
	1.4%	9.2%	2.4%	13.0%
	7	26	4	37
	1.4%	5.2%	0.8%	7.4%
	6	18	3	27
	1.2%	3.6%	0.6%	5.4%
Total	121	353	26	500
	24.2%	70.6%	5.2%	100.0%

SUMMARY AND CONCLUSION

This study presents the results of an epidemiological survey. The data of the systemic disease, habits, problems due to edentulousness, prosthodontic treatment needs of the

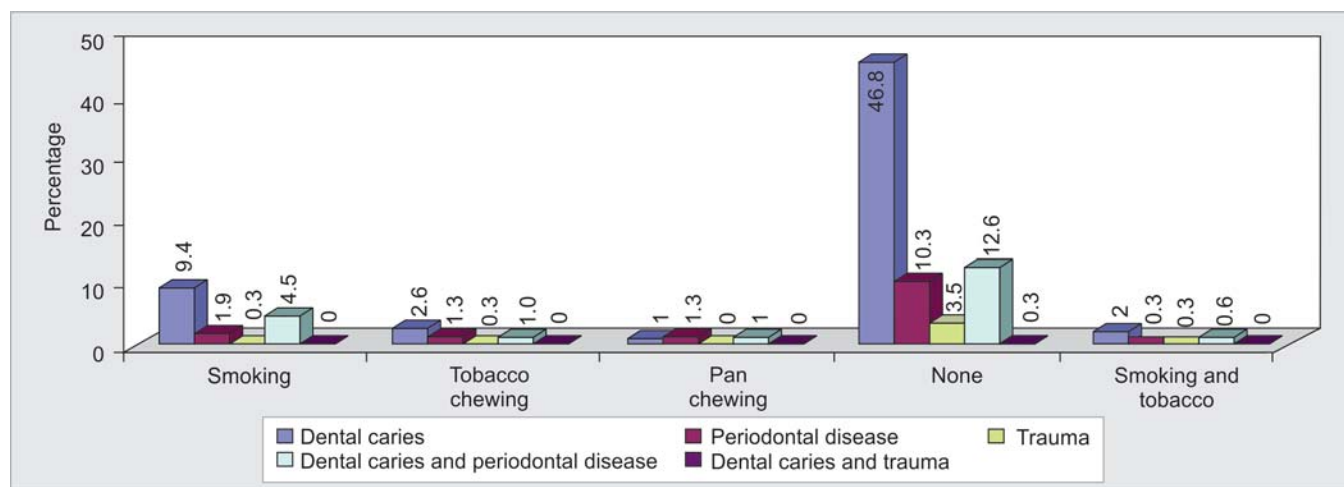


Fig. 16: Comparison of cause of edentulousness and habits

Table 16: Comparison of cause of edentulousness and habits

Cause of edentulousness	Habits					Total
	Smoking	Tobacco chewing	Pan chewing	None	Smoking and tobacco chewing	
Dental caries	29	8	3	145	2	187
	9.4%	2.6%	1.0%	46.8%	0.6%	60.3%
Periodontal disease	6	4	4	32	1	47
	1.9%	1.3%	1.3%	10.3%	0.3%	15.2%
Trauma	1	0.3		11	1	14
	0.3%	1		3.5%	0.3%	4.5%
Dental caries and periodontal disease	14	3	3	39	2	61
	4.5%	1.0%	1.0%	12.6%	0.6%	19.7%
Dental caries and trauma				1		1
				0.3%		0.3%
Total	50	16	10	228	6	310
	16.1%	5.2%	3.2%	73.5%	1.9%	100.0%

subjects, in this study have provided the basic information that may help to throw light on some of the problems facing practice of prosthodontics.

In this study, it was observed that the subjects who were illiterate or the most educated up to or below secondary school level exhibited more amount of tooth loss or edentulousness when compared with subjects who were educated up to graduation.

Through this study it was found that loss of teeth and level of edentulousness were more prevalent among low-income group subjects, followed by middle-income group and high-income group.

The results of the survey clearly stated that there is lack of dental awareness among the people. So, 'dental education and motivation' is the most important aspect of prosthodontic treatment.

To conclude, it can be stated that the need for prosthodontic care will increase due to this increase in life span.

Conducting surveys, dental education and motivation are important tools in the rural elderly to enlighten the availability of prosthetic services and to thoroughly eradicate the misconception that 'Tooth loss' is an unavoidable and inevitable part of the ageing process.

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