

Comparison of Dental Caries and Malocclusion Prevalence Patterns Among the General Population of Erode and Namakkal Districts (Western Tamil Nadu) - An Analytical Cross- Sectional Study

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ABSTRACT

AIM: The aim of the study is to record the prevalence patterns of dental caries and malocclusion among the general population of western Tamilnadu (Erode and Namakkal districts).

MATERIALS & METHODS: A Cross-sectional study was carried out in the selected number of samples to find out the prevalence of Dental Caries and Malocclusion in the index age group of 5, 12, 15, 35-44, 65-74 years and 12 and 15 years, respectively using "WHO oral Health assessment form 1997". A total of 305 samples for Dental Caries and 544 samples for Malocclusion were collected in Western Tamil Nadu, India, using a Multistage random sampling technique. Samples were recruited from the randomly selected districts of Western Tamil Nadu i.e., Erode and Namakkal. Descriptive analysis was done using Microsoft Excel version 2016. The statistical test used was chi-square using SPSS Software Version 20.

RESULTS: The overall prevalence of Dental caries was higher in the Namakkal district (60%) than in the Erode district (51.4%), and the overall prevalence of Malocclusion was also higher in the Namakkal district (36.2%) than in the Erode district (30.7%). The prevalence of dental caries and Malocclusion were recorded as high among the rural population in the Erode and Namakkal districts.

CONCLUSION: The Western part of Tamilnadu (Erode and Namakkal district) records the high prevalence rates for Dental caries and Malocclusion, implicating the need for oral health awareness in that zone.

Keywords: Dental Caries, Malocclusion, Oral Health, Prevalence, Western Tamilnadu.

INTRODUCTION

Oral health is a fundamental aspect of overall well-being, influencing both physical and psychological dimensions of an individual's life. It encompasses the condition of the teeth, gums, oral mucosa, and surrounding structures, reflecting an individual's ability to speak, smile, eat, and

socialize comfortably. Dental caries and malocclusion stand as one of the significant challenges in the realm of oral health. [1]

Dental caries, commonly referred to as tooth decay or cavities, remains one of the most prevalent chronic diseases worldwide, affecting individuals across all age groups and socio-economic backgrounds. [2] It

results from a complex interplay of factors, including the presence of cariogenic bacteria such as *Streptococcus mutans*, frequent consumption of fermentable carbohydrates, inadequate oral hygiene practices, and socio-economic determinants. [3] Despite advancements in preventive measures and treatment modalities, dental caries continues to pose a considerable burden on public health systems, leading to pain, discomfort, tooth loss, and impaired quality of life for affected individuals. Similarly, malocclusion, characterized by misalignment or improper positioning of the teeth and jaws, represents another common oral health concern with significant implications for oral function, aesthetics, and overall well-being. [4] Malocclusion may manifest in various forms, including crowding, spacing, overbite, underbite, and crossbite, resulting from genetic predisposition, environmental factors, or a combination thereof. Beyond aesthetic considerations, malocclusion can interfere with proper mastication, speech articulation, and oral hygiene practices, potentially leading to complications such as temporomandibular joint disorders and psychosocial distress. [5] Quality of life can be defined as the general well-being of individuals within a society, which encompasses both positive and negative aspects. [6] Understanding the complex interactions underlying oral health, dental caries, and malocclusion is essential for developing effective preventive strategies and treatment interventions to promote oral health and enhance the quality of life for individuals worldwide. Thus, the ultimate goal of this study is to record the prevalence patterns of dental caries and malocclusion among the general population of western Tamilnadu (Erode and Namakkal districts).

MATERIALS & METHODS

A Cross-sectional study was carried out in the selected number of samples to find out the prevalence of Dental Caries and Malocclusion in the index age group of 5, 12, 15, 35-44, 65-74 years and 12 and 15

years, respectively using “WHO oral Health assessment form 1997”. [7] The ethical permission was obtained from the Institutional Review Board of SRM Dental College and Hospital Ramapuram, Chennai and the ethical approval number is SRMDC/IRB/2021/MDS/NO.702. A total of 305 samples for Dental Caries and 544 samples for Malocclusion were collected in Western Tamil Nadu, India, using a Multistage random sampling technique. The following sample size was gathered according to the sample size estimation rule for cross-sectional studies. [8] Samples were recruited from the randomly selected districts of Western Tamil Nadu i.e., Erode and Namakkal. Finally, the samples were collected from urban and rural areas in the two districts of Tamil Nadu from the male and female participants. The sample size for recording dental caries and malocclusion in Erode district was 175 and 312, respectively. The sample size for recording dental caries and malocclusion in Namakkal district was 130 and 232, respectively. Participants aged 5, 12, and 15 years were examined from schools of that district in urban and rural areas of Tamil Nadu. Participants aged 35-44 years and 65- 74 years were examined by door- door survey of that district in urban and rural areas of Tamil Nadu. A single investigator carried out the examination to avoid inter- examiner variability. Informed consent was obtained from all the participants. People who refused dental examination, people under chemotherapy and radiotherapy and, terminally ill patients were excluded in the study.

STATISTICAL ANALYSIS

Descriptive analysis was done using Microsoft Excel version 2016. The statistical test used was chi-square using SPSS Software Version 20.

RESULT

TABLE 1: Gender distribution of the study participants for Prevalence of Dental caries in the West zone (Erode and Namakkal)

Zone	Gender		p-value
	Female n (%)	Male n (%)	
Erode	85(48.6)	90(51.4)	0.805
Namakkal	65(50)	65(50)	

Table 1 depict the gender distribution of the study participants for the prevalence of dental caries in the West zone. In Erode, female and male participants accounted for 48.6% and 51.4%, respectively, while in

Namakkal, the female and male participation rates were 50% each.

TABLE 2: Gender distribution of the study participants for the Prevalence of Malocclusion in the West zone (Erode and Namakkal)

Zone	Gender		p-value
	Female n (%)	Male n (%)	
Erode	156(50)	156(50)	1.00
Namakkal	116(50)	116(50)	

Table 2 depicts the gender distribution of the study participants for the prevalence of Malocclusion in the North zone. In Erode and Namakkal, female and male participants accounted for 50% each, respectively.

TABLE 3: Prevalence of Dental caries and Malocclusion among the genders in the Erode district

	Gender				p-value
	Female n (%)		Male n (%)		
	Present	Absent	Present	Absent	
Dental caries	42 (24)	43 (24.6)	48 (27.4)	42 (24)	0.604
Malocclusion	45 (14.4)	111 (35.6)	51(16.3)	105 (33.7)	0.462

Table 3 depicts the Prevalence of Dental caries and Malocclusion among the genders in the Erode district. The Prevalence of Dental Caries in the Erode district among the males and females were 27.4% and

24%, respectively. The Prevalence of Malocclusion in the Erode district among the males and females were 16.3% and 14.4%, respectively.

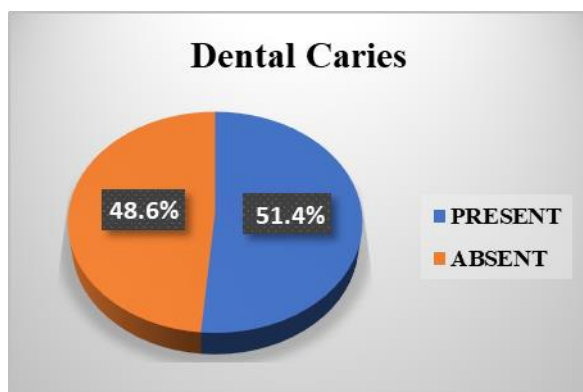


FIGURE 1: Overall Prevalence of Dental Caries in Erode District

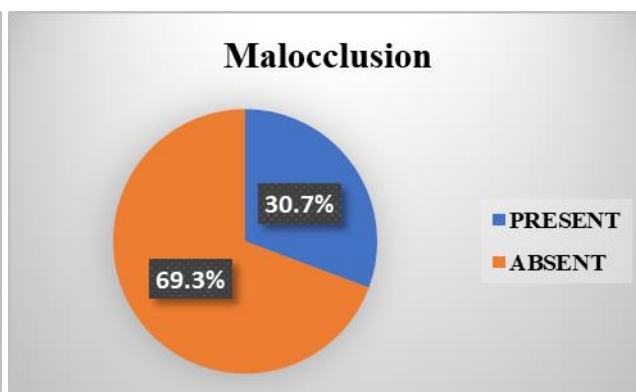


FIGURE 2: Overall Prevalence of Malocclusion in Erode District

Figures 1 and Figure 2 illustrates the Overall Prevalence of Dental caries and Malocclusion in the Erode district, which is 51.4% and 40%, respectively.

TABLE 4: Prevalence of Dental caries and Malocclusion among the index age groups in the Erode district

	Index age groups										p-value
	5 yrs n (%)		12 yrs n (%)		15 yrs n (%)		35-44 yrs n (%)		65-74 yrs n (%)		
	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	
Dental caries	14 (40)	21 (60)	17 (48.6)	18 (51.4)	19 (54.3)	16 (45.7)	21 (60)	14 (40)	19 (54.3)	16 (45.7)	0.525
Malocclusion	NA	NA	47 (30.1)	109 (69.9)	49 (31.4)	107 (68.6)	NA	NA	NA	NA	0.806

NA: Not Applicable

Table 4 depicts the Prevalence of Dental caries and Malocclusion among the index age groups (5 years, 12 years, 15 years, 35-44 years, 65-74 years) in the Erode district. The Prevalence of Dental caries among the index age groups (5 years, 12 years, 15 years, 35-44 years, 65-74 years) in the

Erode district, which is 40%, 48.6%, 54.3%, 60%, 54.3%, respectively. The Prevalence of Malocclusion among the index age groups (12 years and 15 years) in the Erode district, which is 30.1%, 31.4%, respectively.

FIGURE 3: Prevalence of Dental caries and Malocclusion among the urban and rural population in the Erode district

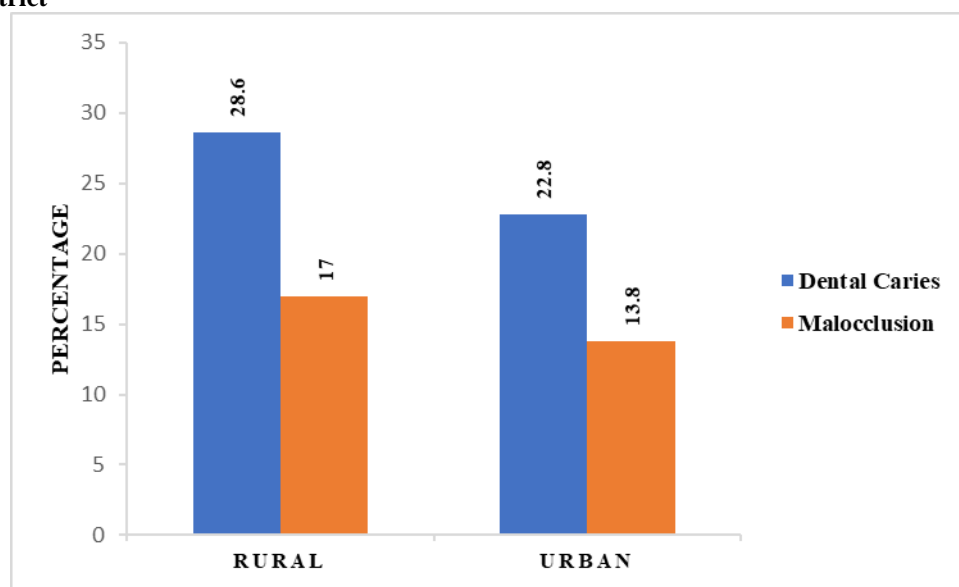


Figure 3 illustrates the Prevalence of Dental caries and Malocclusion among the urban and rural population in the Erode district. The Prevalence of Dental Caries in the Erode district among the urban and rural population were 22.8% and 28.6%,

respectively, and the p-value is statistically significant. The Prevalence of Malocclusion in the Erode district among the urban and rural population were 13.8% and 35.6%, respectively.

TABLE 6: Prevalence of Dental caries and Malocclusion among the genders in the Namakkal district

	Gender				p-value
	Female n (%)		Male n (%)		
	Present	Absent	Present	Absent	
Dental caries	38 (29.2)	27 (20.8)	40 (30.8)	25 (19.2)	0.720
Malocclusion	42 (18.1)	74 (31.9)	42 (18.1)	74 (31.9)	1.000

Table 6 depicts the Prevalence of Dental caries and Malocclusion among the genders in the Namakkal district. The Prevalence of Dental Caries in the Namakkal district

among the males and females were 30.8% and 29.2%, respectively. The Prevalence of Malocclusion in the Erode district among the males and females were both 18.1%.

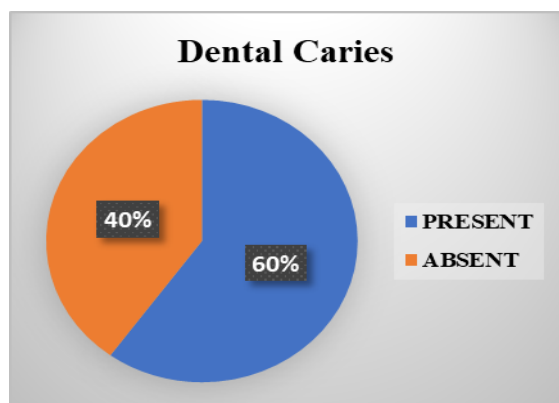


FIGURE 4: Overall Prevalence of Dental Caries in Namakkal District

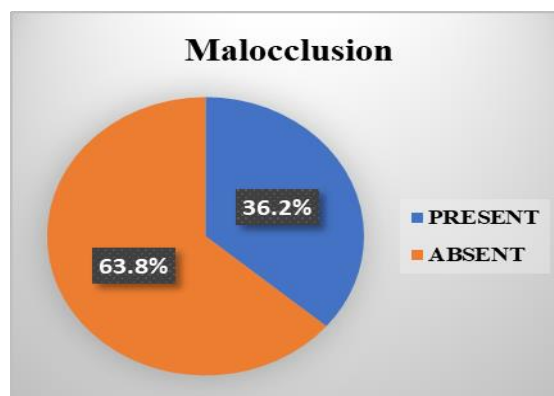


FIGURE 5: Overall Prevalence of Malocclusion in Namakkal District

Figures 4 and Figure 5 illustrates the Overall Prevalence of Dental caries and Malocclusion in the Namakkal district, which is 60% and 36.2%, respectively.

TABLE 7: Prevalence of Dental caries and Malocclusion among the index age groups in the Namakkal district

	Index age groups										p-value
	5 yrs n (%)		12 yrs n (%)		15 yrs n (%)		35-44 yrs n (%)		65-74 yrs n (%)		
	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	
Dental caries	17 (65.4)	9 (34.6)	16 (61.5)	10 (38.5)	13 (50)	13 (50)	16 (61.5)	10 (38.5)	16 (61.5)	10 (38.5)	0.831
Malocclusion	NA	NA	44 (37.9)	72 (62.1)	40 (34.5)	76 (65.5)	NA	NA	NA	NA	0.585

NA: Not Applicable

Table 7 depicts the Prevalence of Dental caries and Malocclusion among the index age groups (5 years, 12 years, 15 years, 35-44 years, 65-74 years) in the Namakkal district. The Prevalence of Dental caries among the index age groups (5 years, 12 years, 15 years, 35-44 years, 65-74 years) in

the Namakkal district, which is 65.4%, 61.5%, 50%, 61.5%, 61.5%, respectively. The Prevalence of Malocclusion among the index age groups (12 years and 15 years) in the Namakkal district, which is 37.9%, 34.5%, respectively.

FIGURE 6: Prevalence of Dental caries and Malocclusion among the urban and rural population in the Namakkal district

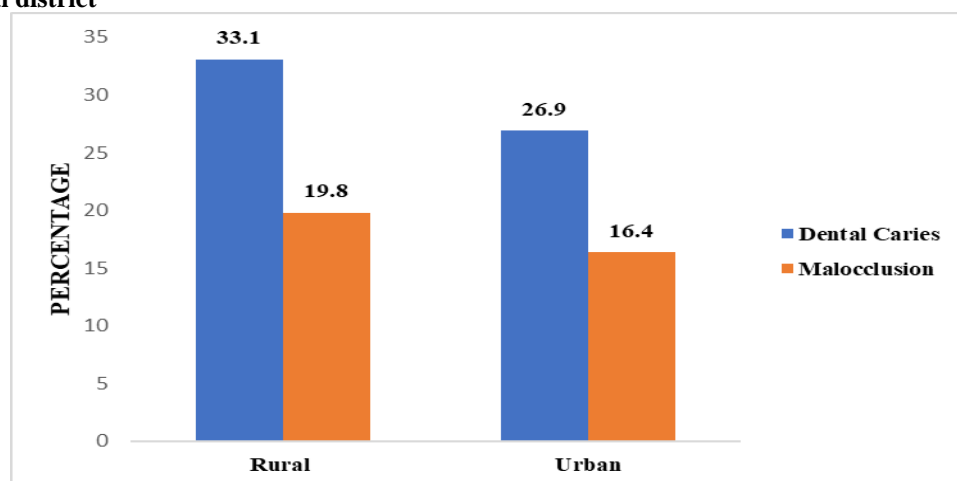


Figure 6 illustrates the Prevalence of Dental caries and Malocclusion among the urban and rural population in the Namakkal district. The Prevalence of Dental Caries in the Namakkal district among the urban and

rural population were 26.9% and 33.1%, respectively. The Prevalence of Malocclusion in the Namakkal district among the urban and rural population were 16.4% and 19.8%, respectively.

FIGURE 7: Comparison of Prevalence of Dental Caries and Malocclusion in Erode and Namakkal district

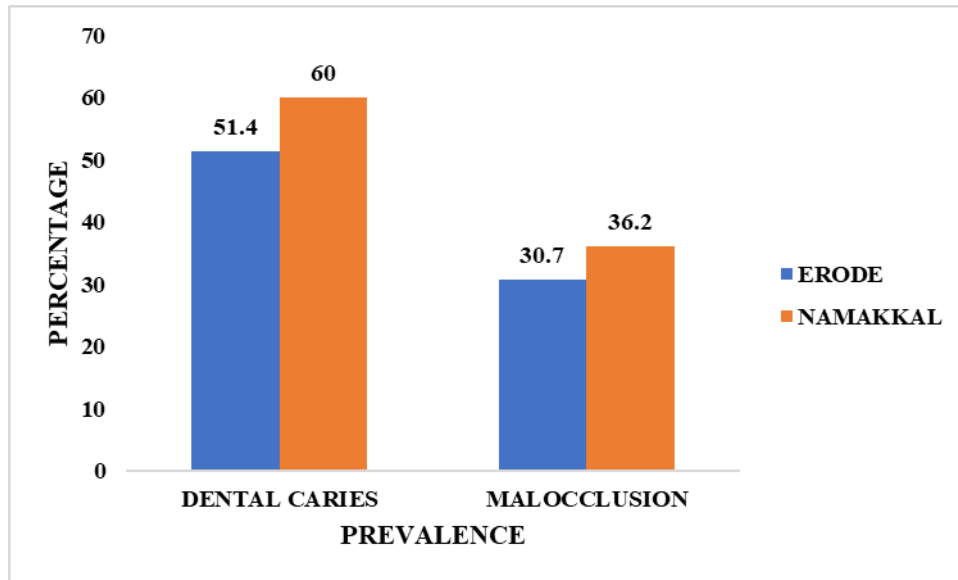


Figure 7 illustrates the Prevalence of Dental caries and Malocclusion among the general population of Erode and Namakkal district

FIGURE 8: Comparison of Prevalence of Dental Caries and Malocclusion among the urban and rural population in Erode and Namakkal district

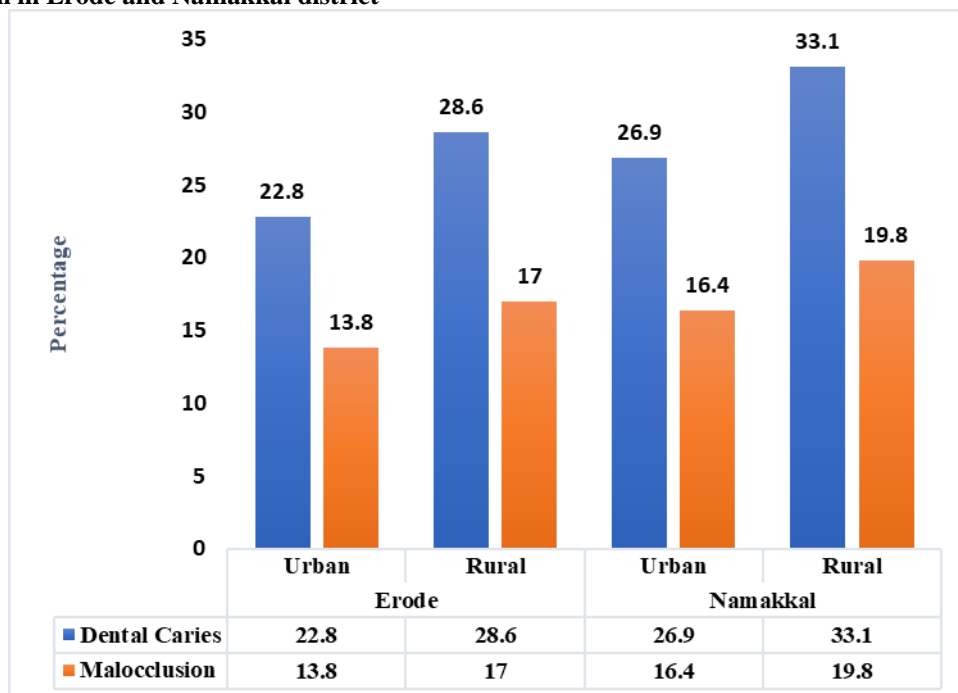


Figure 8 illustrates the Prevalence of Dental caries and Malocclusion among the urban and rural population of Erode and Namakkal district

DISCUSSION

Only limited oral epidemiological data on Western Tamilnadu is available. Epidemiological data update recent disease trends and treatment needs, and localized prevalence data provide a crucial contribution to better understanding the disease, as well as assisting with prevention and treatment planning. The current Cross-sectional study recorded the prevalence of dental caries and Malocclusion in Western Tamilnadu (Erode and Namakkal district). The two districts are typically located on either side of the banks of river Cauvery. The low prevalence of dental caries in Erode district may be due to high fluoride concentration in the drinking water. [9,10] The overall prevalence of Dental caries was higher in the Namakkal district (60%) than in the Erode district (51.4%), and the overall prevalence of Malocclusion was also higher in the Namakkal district (36.2%) than in the Erode district (30.7%). Several factors contribute to the increase in oral diseases like dental caries and malocclusion, including not being aware of dental hygiene, not brushing properly, and eating incorrectly (increased carbohydrate and sugar consumption). [11,12] Notably, the Erode and Namakkal districts record one of the lowest literacy rates, 72.58% and 74.63%, respectively. [13] The prevalence of dental caries was higher among the males than the females in Erode and Namakkal districts. This finding is in accordance with the study conducted by Ambati Sai Naga Madhuri et. al., in 2023. [14] Females are more susceptible to caries because of their variation in tooth eruption. In females, teeth tend to appear earlier, resulting in an extended exposure to acidic substances. In addition, changes in hormone levels due to puberty, menstruation, or pregnancy may also impact saliva content and flow rate, making female adolescents more likely to develop dental caries. [15] The prevalence of malocclusion was higher in the Namakkal district and was equal among the males and females in the current study. The prevalence of Malocclusion was found to be higher in

Namakkal district. Evidently, the malocclusion prevalence was high among 12-year-old school-going children. According to the study conducted in Chennai, 37.5% of the study population had malocclusion occurrence.[16] The results are comparable with the current study. In the Erode district, the 15-year and 65- 74-year-old age group records higher dental caries prevalence, whereas in the Namakkal district, dental caries occurrence was higher in all the index age groups. Dental caries seems to be more prevalent due to the continuous and cumulative nature of the disease; additionally, the number of teeth increases as the patient ages. The prevalence of dental caries and Malocclusion were recorded as high among the rural population in the Erode and Namakkal districts. Considering differences in social class, population density, and access to oral health services in rural and urban areas, dental caries was expected to be more prevalent and severe. In order to influence policymaking and its plan, it is necessary to compare these differences. There has already been research in India that indicates rural populations have a higher incidence of dental caries. [17,18]. As a preliminary data source, this study can be used to identify and confirm various dental diseases and risk factors in that region. Further large-scale epidemiological studies can be conducted in order to confirm these findings. Dental health programs at schools and oral health awareness programs for the general population should be conducted regularly. Dental manpower and Government dental facilities should be enhanced to meet the necessary treatment needs of the people which considerably reduces the high out-of-pocket expenditure at private clinics. These private clinics can only benefit the wealthy population, whereas the needy people can't afford the treatment. One important limitation of this study is that the severity status of dental caries and malocclusion has not been recorded. Only the prevalence rates of dental caries and malocclusion were considered. Central government should

formulate a strong oral health policy and it should be executed by the state governments. The oral health policy should be expanded with the involvement of more community dentists (public health dentists) in the public health department of state and central government.

CONCLUSION

The overall prevalence of Dental caries was higher in the Namakkal district (60%) than in the Erode district (51.4%), and the overall prevalence of Malocclusion was also higher in the Namakkal district (36.2%) than in the Erode district (30.7%). Ironically, the Western part of Tamilnadu (Erode and Namakkal district) records the high prevalence rates for Dental caries and Malocclusion, implicating the need for oral health awareness in that zone. Negligence is the most common factor for complications of dental diseases. Oral health can be alleviated by creating awareness of oral health among parents, teachers, and the general public, and emphasis should be laid on oral hygienic practices and diet counseling. The epidemiology of dental diseases, such as dental caries and malocclusion, is essential for the development of preventive and therapeutic measures. Public health departments and community health centers should appoint an oral epidemiologist who is a public health dentist (the same should be done in the state and central government as well). Besides organizing periodic dental treatment schedules, a public health dentist also supervises a team of dentists to render prompt preventive treatments and also keeps records of epidemiological data. However, the government, due to financial constraints, is not appointing oral epidemiologists in the central and state public health departments. The state and Central government should also focus on increasing the number of government dental health facilities so that people receive early diagnosis and prompt treatment. This study provides insights regarding dental caries and Malocclusion prevalence status for the western part of

Tamilnadu, India, for formulating futuristic preventive strategies.

Declaration by Authors

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