



**ASSESSMENT OF ORAL HYGIENE PRACTICES AND PERIODONTAL STATUS
AMONGST TUBERCULOSIS PATIENTS VISITING DOT CENTER,
NEW DELHI: A CROSS SECTIONAL STUDY**

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1. ABSTRACT

Background: There are evidence state that periodontitis may have contribution in onset and progression of tuberculosis disease. However, there are very limited data available till date. This study aims to asses oral hygiene practices and periodontal status amongst tuberculosis patients. Oral health problem of tuberculosis patients are lacking amongst patients and dentists. **Methods:** A cross-sectional comparative study was conducted. Total 337 participants were surveyed, in four DOT center facilitated by TB Alert India (New Delhi). Responses to the questionnaire using Google form was filled in the center itself using convenience sampling. Data on socio-demographic characters, Site of diseases and treatment regimen and Oral Hygiene practices was collected. **Results:** Number of subjects in age group 21-30 years are maximum with 38.90%. In view of educational background majority of participants are high school or less. Approximately 68.50% are unemployed. 97.60% participant's uses toothbrush and toothpaste as cleaning aids. Further 75.10% participants brushed once daily. Tongue cleaning is important for oral cavity and 55.80% participants clean their tongue. The association of age group and gender has been found with tongue cleaning (P-0.003). Surprisingly only 36.20% participants have visited dentist once in their life time. **Conclusion:** Medication side effects and poor oral hygiene habits create gingivitis, which further damages the tissues inside the socket and results in periodontitis. Age and education are important factors in preserving oral health. The findings indicated the need to raise knowledge about good oral hygiene and prevention. To promote individual and societal health, there is a need to disseminate information and implement applicable public health interventions. Integration of dental knowledge with other elements of health is crucial.

2. INTRODUCTION

Since the dawn of recorded history, people have been affected by tuberculosis (TB), which is linked to immune suppression, malnutrition, poverty, and crowded living conditions. Although more is known about the disease's pathophysiology and history since Koch first identified its infectious nature in 1882, the disease is still a major public health concern on a global scale. (Àngels O. et al.2011). The main cause of tuberculosis (TB), a chronic infectious granulomatous illness, is Mycobacterium tuberculosis. This is an acid-fast bacillus that is mostly transmitted through the respiratory route by inhalation of infected aerosol droplets containing the mycobacterium bacillus. (Anand Kumar Maurya et al)

TB is a systemic disease that affects people all over the world and is still a significant health issue in the majority of poor nations, with an especially high prevalence in Asian nations (Kumar PM. et al.2012). According to India TB report of 2021, India sees 19% hike in incidence cases when compared to previous year i.e. 2020. The infectious pool is maintained by occurrence of 19, 33,381 new and relapsed cases in 2021. A notable portion of the world's population is affected by tuberculosis, it's a serious global health problem. It continues to be the biggest reason of death all over world. In India, the low-income population becomes a target for disease, and oral health is frequently ignored, contributing to morbidity of the patients (Payal S. et

al.2015). Oral hygiene refers to the practice of maintaining a clean, healthy mouth, teeth, and gums. Although it is a necessity for our daily lives, oral hygiene is frequently taken for granted. An essential aspect of general health contains oral health. Lack of proper oral hygiene leads to numerous health complications. Because sustaining good oral health depends on a person's behavior and practices, the most prevalent oral diseases, dental caries, and periodontal disease, are regarded as behavioral diseases. (Indumathi M.et.al 2020). Enforcing proper oral hygiene habits is a crucial first step in keeping your mouth healthy. Understanding a population's oral hygiene habits is essential for the adoption of effective preventive interventions. Microbial plaque linked to periodontal disease, the chronic nature of these illnesses, and the aggressive local and systemic host responses to the microbial invasion all have an impact on the development of various systemic disorders and overall health.(Rastogi T. et.al. 2019). It is a public health concern that periodontal disease affects older people, adults, and adolescents so frequently. Periodontal disorders are linked to a number of risk factors, including smoking, poor dental hygiene, medication, age and stress. The term "periodontitis" is used to refer to an inflammatory conditions that affect the gingiva, the alveolar bone, and the supporting connective tissue that holds the teeth in place in the jaws. Miller proposed a wide- ranging role for the oral cavity and oral infections such periodontal disease in having an impact on the body as a whole. (Jan L.et al.2003). Periodontal disease and poor oral hygiene are connected, and inappropriate tooth brushing and other oral hygiene practices can promote bacterial deposition and dental plaque build-up on teeth and gums, which can lead to inflammatory changes in periodontal tissues This suggests a close link between an individual's periodontal health and overall health, as well as the potential influence of systemic disease on an individual's periodontal health. There is a tone of evidence to support the idea that untreated periodontitis can cause a variety of harmful systemic problems in a person. One of the key areas of research in periodontology nowadays is the correlation between systemic ailments and periodontal diseases, as well as their mutual cause-and-effect linkages. (Rastogi T. et al.2019). Therefore, maintaining good systemic health includes maintaining good oral health, and people with periodontitis are more likely to develop a variety of systemic conditions, including respiratory diseases like pulmonary tuberculosis (TB), chronic obstructive pulmonary disease, and cardiovascular diseases like myocardial infarction, atherosclerosis, and stroke. There are a few case reports and studies published on oral hygiene practices and periodontal status of TB patients in India and overseas. The purpose of the present cross sectional observational study was to assess the Oral hygiene practices and periodontal status amongst tuberculosis patients visiting DOT center facilitated by TB Alert India, New Delhi.

3. METHODOLOGY

Study setting

The study was conducted in DOT Cum DMC center situated at Mukundpur, Burari, Nathupura and Bawana. These areas are hugely populated localities in North Delhi, west of the Yamuna River, which is situated along the Outer Ring Road. The neighborhood has several unapproved colonies and small lanes, and the majority of the residential construction is made up of builder floors and independent houses. The nearest government hospital for tuberculosis treatment is Kingsway chest clinic and these DMC cum DOT center are facilitated by organization TB alert India.

Study Design and Sample size calculation

A cross-sectional, quantitative study was conducted. A sample size of 384 was calculated using Cochran Formula with 50 % or 0.5 prevalence estimate

$$n = z^2 p q d^2$$

$$n = 1.96^2 \times 0.5 \times (1 - 0.5) 0.05^2 n = 384.16$$

$$n \approx 384$$

Here, n = number of samples

z = 1.96 (95 % confidence level)

p = prevalence estimate, 50 % or 0.5 (as no study found).

q = 1 – p

d = precision limit or proportion of sampling error (0.05)

Sampling technique and procedures

A cross sectional survey was conducted to assess the oral hygiene practices and periodontal status among patients visiting DOT Centre, New Delhi, India. Using convenience sampling technique the study sample of 337 tuberculosis patients (184 male, 153 female) 18 and above years of age visiting the DOT centre, New Delhi, India were taken. This being a DMC Cum DOT Centre, a representative section of the society comprising of all the ethnic and cultural groups attended the same. Care was taken to include as many ethnic backgrounds as feasible and fairly close representation from both sexes.

Inclusion criteria

- Patients with at least 20 teeth present in the mouth and aged 18 and above.
- Informed written consent was obtained from all the participants in this study.
- Tuberculosis patients were categorized on the basis of history of previous tuberculosis treatment (patient registration group) according to WHO guidelines into groups A and B, and drug-resistant patients were included in group C as follows:
- **Group A:** New patients have never been treated for tuberculosis or have taken anti-tubercular drugs for less than 1 month.
- **Group B:** Previously treated patients have received 1 month or more of anti- tubercular drugs in the past including relapse patients, treatment after failure patients and treatment after loss to follow-up patients.
- **Group C:** All drug resistance tuberculosis patients.

- Exclusion Criteria
- History of periodontal treatment including prophylactic intervention for past 6months.
- Pregnant or lactating mothers
- Patients who will not sign consent.

Data collection Procedure and Quality assurance

A quantitative method of data collection was used. Signed informed consent (Appendix-II) was obtained from the participants. The purpose of this study was explained to all the eligible participants. The objectives, risks, and benefits of participating in the study were explained to the participants (Appendix-I). The survey team consisted of Tuberculosis Health Visitor of particular DMC cum DOT centre allotted to them by facilitating organization TB Alert India. They helped in contacting with tuberculosis patients. After explaining the study in detail to the participants, questionnaire using Google form was filled in the Centre itself. This was to minimize the burden & errors in data entry. The survey was conducted during the DMC cum DOT Centre working hours between 9 am to 4 pm & sometimes at extended hours as per the convenience of the participants. The survey was conducted from 3rd of May to the 4th of July 2022.

Pre-validated questionnaire was administered by the investigator and Clinical Examination was done using Community Periodontal Index of Treatment Needs (CPITN) which was developed by joint committee of the world health organization and Federation Dentaire Internationale.

Questionnaire

Survey Questionnaire for developing the questionnaire researcher reviewed relevant literature to get sensitizing concepts. The questionnaire was prepared in English. While asking the questions it was verbally translated to the local language understood by the participants (Hindi & English). All relevant information regarding the Socio

demographic information including age, gender, education. The site of disease (Pulmonary and Extra-Pulmonary) and Fixed dose combination and regimen (New treatment, previously treated and Drug Resistant) was also noted. Assessment about oral hygiene practises which includes frequency of tooth brushing (once, twice daily) oral hygiene aids used (Neem Stick/ Datun, Finger and tooth powder, Finger and toothpaste, Toothbrush and tooth powder, Toothbrush and toothpaste and Any other, please specify), Type of brush (soft, medium, hard, don't know). Awareness regarding brushing techniques, tongue cleaning, Use of interdental aids (Interdental brush, Interdental floss), Dental visits (Never, Only in problem, Once in 3 months, Once in 6 months, Once in year). Tobacco use and alcohol use were also recorded. (Appendix-III)

Clinical examination

Community Periodontal Index of Treatment Needs (CPTIN) was developed by joint working committee and federation Dentaire Internationale in 1982. CPTIN Periodontal screening frequently makes use of the Community Periodontal Index (CPI), which was created by the World Health Organization to assess periodontal health in the community. The dentition is divided into sextants for assessments periodontal needs. Each sextant is given score. Periodontal status assessment was done with a Community Periodontal Index (CPI) probe (Hu-Friedy, Chicago, IL, USA), with a 0.5 mm ball tip, with a black band between 3.5 and 5.5 mm and mouth mirror. The teeth examined were 17, 16, 11, 26, 27, 37, 36, 31, 46, and 47. Although 10 index teeth were examined and only the highest score relating to each sextant was made. (Appendix-III) These teeth are considered as the best estimator of worst periodontal condition of the mouth. The molars are examined in pairs and the highest score is considered. For up to 19 years, only six index teeth are considered 16, 11, and 26, 46, 31, 36. The second molars are ignored as they give false results.

Code 0 - No sign of disease
Code 1 - Gingival Bleeding
Code 2 - Presence of supra or sub gingival calculus
Code 3 - Pathological pocket of 4mm-5mm. i.e. when the gingival margin is on black area of probe
Code 4 - Pathological pocket of 6mm or more i.e. the black area of CPTIN probe is not visible.

Data Processing and Analysis

Data was cleaned, checked & coded in MS Excel. The coded data was exported to SPSS. Chi-square test was used to find association between Age groups and oral hygiene practises, Gender and oral hygiene status, occupation and oral hygiene status, Education level and oral hygiene practices. Association of Age Groups, Gender, Education level and Occupation with Treatment needs. Descriptive statistics was used to represent demographic details and oral hygiene practises among tuberculosis patients. (N-337)

Ethical approval

IIPHG's Institutional Ethics Committee's approval was sought. Permission from the Tb alert India organization was taken. All responders were made aware that there are no observable dangers of physical or emotional abuse associated with taking part in the study, that participation is completely voluntary, and that participants are free to discontinue the study at any moment. Signed consent (Appendix-II) was sought from participants. The consent form was verbally translated & conveyed in Hindi for obtaining consent from the participants visiting DOT centre. The concerns of confidentiality, voluntarism and risk reduction were kept in mind while designing the tool

for data collection. All the data collected have been kept confidential. Confidentiality-ensuring procedures were strictly followed. This report and any further reports, presentations, or publications will not include any identifiable information. One of the elements of research quality is the ethical conduct of the study, which is crucial for maintaining respondent's rights and making the study socially relevant. There were no rewards nor penalties for taking part in the study or not.

4. RESULTS

The data analysis was done on a sample of 337 participants.

Socio-Demographic characteristics of study population

Out of 337 participants 63 (18.7 %) were between age of 18 to 20 years, 131 (38.9%) participants were between 21 to 30 years of age being the highest number from this age group. 62 (18.40%) participants were between the age group of 31 to 40 years.^[37] (11.0%) participants were between 41-50 years. 31(9.20%) participants were between 51-60 years and 13(3.90%) were above 60 years.

Majority were males i.e. 184 (54.60%) and 153(45.4%) were females. majority of participants 183(54.30%) were having education high school or less. 70(20.8%) participants have education till intermediate level. 61(18.1%) were graduated. Approximately 22 (6.50%) participants didn't visit school.

More than 50% of participant were unemployed i.e. 231(68.50%) and 106 (31.50%) were employed.

Oral hygiene practices

It was observed that 253(75.10%) participants brush their teeth once and only 84(24.90%) brush their teeth twice a day. The data shows that, compared to other age groups, majority of the 21-30 years individuals (36.00%) and 31-40 years (18.20%) showed a statistically significant greater association with once a day brushing their teeth. Whereas, the majority of below 20 years of aged individuals (23.80%) and 21-30 years(47.60%) showed statistically significant association with twice a day brushing. (P=0.015).The findings are shown in Table No.1

Table 1

Age Groups	Once		Twice		Chi-Square	DF	P Value
	Count	Count (N %)	Count	Count (N%)			
Below 20years	43	17.00%	20	23.80%	14.086	5	0.015*
21-30 years	91	36.00%	40	47.60%			
31-40 years	46	18.20%	16	19.00%			
41-50 years	32	12.60%	5	6.00%			
51-60 years	29	11.50%	2	2.40%			
Above 60years	12	4.70%	1	1.20%			

Table-2: Modified Response for Gender & Frequency of cleaningteeth in a day

The data shows that, majority of the males (58.10%) showed a statistically significant greater association with

once a day brushing their teeth. Whereas, the majority females (56.00%) showed statistically significant association with twice a day brushing. (P=0.025).The findings are shown in the Table-2

Table 2

Gender	Once		Twice		Chi-Square	DF	P Value
	Count	Count (N%)	Count	Count (N%)			
Female	106	41.90%	47	56.00%	5.026	1	0.025*
Male	147	58.10%	37	44.00%			

When assessing dental awareness, 97.60% of participants used toothbrush and toothpaste dental aids when compared to other aids. Toothbrush and toothpowder, fingers and tooth powder is used by 1.20% participants.

Majority of people (54.60%) don't know about their type of brush bristles. 43.30% uses soft brushes and 1.80% uses medium brush whereas less than 1% uses hard brush for brushing their teeth. Approximately 51.30% individuals change their brushes when bristles fray. 43.60% change brushes in every three months and 5% changes their brush in every six months.

It is noteworthy that among all, none of individuals were aware about the brushing techniques. Tongue cleaning is

one of the important aspect of cleaning the oral cavity. It was evaluated that 55.80% clean their tongue twice daily and 44.20% clean their tongue once daily.

Tooth brush alone cannot achieve plaque control hence there is need of interdental aids to maintain good gingival health. Majority (100%) participants were unaware about the interdental aids.

It is surprising that around 36.20% of the total population visit the dentist only in problem while only 0.30% of the patients visit the dentist on regular basis once in 6 months. Moreover, 63.5% patients didn't even feel the need to visit a dentist.

Periodontal status score (CPI) of tuberculosis patients at different sextant of dental arch.**Table 2: Association of age groups with periodontal status in 16/17 (Maxillary Right) region.**

Age Groups	16/17								DF	χ^2 Value	P Value
	Healthy		Gingivitis		Normal		Periodontitis				
	N	%	N	%	N	%	N	%			
Below 20 years	1	100.00%	24	12.10%	36	28.30%	2	18.20%	15	61.212	0.001*
21-30 years	0	0.00%	65	32.80%	63	49.60%	3	27.30%			
31-40 years	0	0.00%	39	19.70%	21	16.50%	2	18.20%			
41-50 years	0	0.00%	33	16.70%	4	3.10%	0	0.00%			
51-60 years	0	0.00%	25	12.60%	2	1.60%	4	36.40%			
Above 60 years	0	0.00%	12	6.10%	1	0.80%	0	0.00%			

Table – 2: The data shows that, compared to other age groups, majority of the 51-60 years individuals showed a statistically significant greater association with Periodontitis (36.4%) and 21-30 years individuals

showed a statistically significant greater association with normal status (49.6%) and gingivitis cases (32.8%) in 16/17 region (P=0.001).

Table 3: Association of age groups with periodontal status in 11 (Maxillary Right Anterior) region.

Age Groups	11						DF	χ^2 Value	P Value
	Gingivitis		Normal		Periodontitis				
	N	%	N	%	N	%			
Below 20 years	25	11.50%	36	31.90%	2	28.60%	15	52.038	0.001*
21-30 years	74	34.10%	55	48.70%	2	28.60%			
31-40 years	43	19.80%	17	15.00%	2	28.60%			
41-50 years	34	15.70%	3	2.70%	0	0.00%			
51-60 years	28	12.90%	2	1.80%	1	14.30%			
Above 60 years	13	6.00%	0	0.00%	0	0.00%			

Table – 3: The data shows that, compared to other age groups, majority of the below 20 years, 21-30 years and 31-40 years individuals showed a statistically significant greater association with Periodontitis (28.6%) and 21-

30 years individuals showed a statistically significant greater association with normal status (48.7%) and gingivitis cases (34.1%) in 11 region (P=0.001).

Table 4: Association of age groups with periodontal status in 26/27 (Maxillary Left) region.

Age Groups	26/27								DF	χ^2 Value	P Value
	Healthy		Gingivitis		Normal		Periodontitis				
	N	%	N	%	N	%	N	%			
Below 20 years	0	0.00%	20	10.00%	40	33.10%	3	21.40%	15	79.656	0.001*
21-30 years	0	0.00%	66	32.80%	61	50.40%	4	28.60%			
31-40 years	0	0.00%	44	21.90%	16	13.20%	2	14.30%			
41-50 years	1	100.00%	33	16.40%	3	2.50%	0	0.00%			
51-60 years	0	0.00%	26	12.90%	1	0.80%	4	28.60%			
Above 60 years	0	0.00%	12	6.00%	0	0.00%	1	7.10%			

Table – 4: The data shows that, compared to other age groups, majority of the 21-30 years and 51-60 years individuals showed a statistically significant greater association with Periodontitis (28.6%) and 21-30 years individuals showed a statistically significant greater

association with normal status (50.4%) and gingivitis cases (32.8%) in 26/27 region (P=0.001).

Table 5: Association of age groups with periodontal status in 36/37(Mandibular Left) region.

Age Groups	36/37						DF	χ^2 Value	P Value
	Gingivitis		Normal		Periodontitis				
	N	%	N	%	N	%			
Below 20years	21	10.60%	39	33.30%	3	13.60%	15	85.86	0.001*
21-30 years	67	33.80%	60	51.30%	4	18.20%			
31-40 years	46	23.20%	13	11.10%	3	13.60%			
41-50 years	31	15.70%	4	3.40%	2	9.10%			
51-60 years	25	12.60%	1	0.90%	5	22.70%			
Above 60years	8	4.00%	0	0.00%	5	22.70%			

Table – 5: Majority of the 51-60 years individuals showed a statistically significant greater association with normal status (51.3%) and gingivitis cases (33.8%) in 36/37 region (P=0.001).
 Majority of the 21-30 years individuals showed a statistically significant greater association with Periodontitis (22.7%) and 21-30 years individuals

Table 6: Association of age groups with periodontal status in 31(Mandibular Left Anterior) region.

Age Groups	31						DF	χ^2 Value	P Value
	Gingivitis		Normal		Periodontitis				
	N	%	N	%	N	%			
Below 20years	23	11.00%	37	31.60%	3	30.00%	10	55.385	0.001*
21-30 years	70	33.30%	59	50.40%	2	20.00%			
31-40 years	45	21.40%	15	12.80%	2	20.00%			
41-50 years	33	15.70%	3	2.60%	1	10.00%			
51-60 years	27	12.90%	3	2.60%	1	10.00%			
Above 60years	12	5.70%	0	0.00%	1	10.00%			

Table–6: Majority of the below 20 years individuals showed a statistically significant greater association with normal status (50.4%) and gingivitis cases (33.3%) in 31 region (P=0.001).
 Majority of the 21-30 years individuals showed a statistically significant greater association with Periodontitis (30 %) and 21-30 years individuals

Table – 7: Association of age groups with periodontal status in 46/47(Mandibular right) region

Age Groups	46/47								DF	χ^2 Value	P Value
	Healthy		Gingivitis		Normal		Periodontitis				
	N	%	N	%	N	%	N	%			
Below 20years	0	0.00%	20	10.20%	39	33.60%	4	18.20%	15	92.499	0.001*
21-30 years	1	50.00%	67	34.00%	60	51.70%	3	13.60%			
31-40 years	0	0.00%	47	23.90%	12	10.30%	3	13.60%			
41-50 years	1	50.00%	30	15.20%	4	3.40%	2	9.10%			
51-60 years	0	0.00%	25	12.70%	1	0.90%	5	22.70%			
Above 60years	0	0.00%	8	4.10%	0	0.00%	5	22.70%			

Table–7: The data shows that, compared to other age groups, majority of the 51- 60 years individuals showed a statistically significant greater association with Periodontitis (22.7 %) and 21-30 years individuals showed a statistically significant greater association with normal status (51.7%) and gingivitis cases (34%) in 46/47 region (P=0.001).

Community periodontal treatment index needs

Table 8: Treatment needs.

Treatment	Count	Column N %
TN-0	104	30.90%
TN-1	102	30.30%
TN-2a	105	31.20%
TN-2b	16	4.70%
TN-3	9	2.70%
TN-4	1	0.30%

Table- 8: Majority of individuals require treatment TN-2a (31.20%) which indicates of scaling and improved oral hygiene practices. 30.30% indicates of no periodontal treatment(TN-1). 30.90% individuals require treatment indicative of improving oral hygiene practices. Less than 1% population needs minor surgical

procedures.

5. DISCUSSION

This study was formulated to assess the oral hygiene practices and periodontal status in TB patients. A total of 337 TB patients visiting DOT center facilitated by Tb Alert India organization at four DOT cum DMC center situated at North East region of Delhi (Mukundpur, Burari, Nathupura and Bawana) were examined in the present study. It was effectively stated that a single examiner conducted the clinical examination throughout the duration of the study in order to prevent biases.

TB is almost generally transmitted from person to person by the human form of bacillus as a result of airborne droplets from a patient who has an active infection. Despite the promising developments in tuberculosis control strategies, the disease's enormous worldwide burden continues.

In this study, affected patients were in all age groups, the majority of patients were young aged and middle aged patients [figure 1]. More than 50% population comprises of male when compared to females [figure 2]. Further it was evaluated 68.50% were unemployed. [Figure 3].

Periodontal disease and poor oral hygiene are interlinked, and inappropriate tooth brushing and other oral hygiene practices can promote bacterial buildup and dental plaque buildup on teeth and gums, which can lead to inflammatory responses in periodontal tissues. [De Oliveira C et al 2010]. The present study confirms Oral hygiene practices are still remained as unrealized problem. Though 97.60% participants prefer to use toothbrush and tooth paste when compared to other dental aids. [Figure-6]. It was further seen that only 24.90% brush their teeth twice. [Figure-5]. Cleaning tongue is essential aspects of cleaning cavity.

It was observed that 44.20% didn't clean their tongue and it was noted 63.50% participants never visited to dentist. [Figure-10].

On comparing various locations in oral cavity i.e. sextant wise distribution the younger age grouped (21-30 years) showed significance with gingivitis. As increase in age showed association with periodontitis. Similar results were seen in [Payal S. et al. 2015]. Which discusses about the highest significance seen in tuberculosis patients. Majority of individuals require treatment TN-2a (31.20%) which indicates of scaling and improved oral hygiene practices.

There is compromised gingival health seen in this study which should be addressed. Furthermore studies are required to confirm the cause effect relationship of periodontitis and tuberculosis.

6. CONCLUSION

This study demonstrates how oral hygiene practices are still neglected, which is a significant social issue. It has an impact on oral health and causes the development of periodontal disorders. Medication side effects and poor oral hygiene habits create gingivitis, which further damages the tissues inside the socket and results in periodontitis. Age and education are important factors in preserving oral health. The findings indicated the need to raise knowledge about good oral hygiene and prevention. To promote individual and societal health, there is a need to disseminate information and implement applicable public health interventions. Integration of dental knowledge with other elements of health is crucial.

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