Research Article

Effectiveness of Structured Teaching Program on Oral Hygiene Among Diabetic Patients Attending A Tertiary Care Centre: A Quasi-Experimental Study

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Abstract

Introduction: Diabetes, a chronic and prevalent disease, not only affects blood sugar levels but also has a profound impact on oral health and dental care. Hence this study was conducted assess the effectiveness of a structured teaching program in improving oral hygiene behaviors.

Methodology: Study design: Quasi-experimental study.

• *Study period:* Period of 3 Months after ethical clearance.

• *Site of Study:* Government Medical College and Hospital, Omandurar Government Estate, Chennai.

• *Study population*: Type 2 Diabetic Patients who are attending Government Medical College and Hospital, Omandurar Government Estate, Chennai.

Results: The study included participants from different age groups, with the majority falling in the 51- 60 years range, and a slightly higher percentage of males. Following the implementation of a structured teaching program, there was a significant improvement in participants' knowledge, attitude, and practice related to oral hygiene. The intervention resulted in a notable shift from poor knowledge to good knowledge, a decrease in negative attitudes, and an increase in positive attitudes. Although there was an improvement in practice, a majority of participants still fell into the poor practice category.

Conclusion: The findings suggest that tailored educational interventions can effectively address gaps in knowledge, improve attitudes, and enhance practices related to oral hygiene. The study highlights the importance of continuous reinforcement and support to sustain improvements in oral hygiene behaviors.

Keywords : oral hygiene, diabetics, knowledge, attitude, practice

Introduction

Diabetes, a chronic and prevalent disease, not only affects blood sugar levels but also has a profound impact on oral health and dental care. It is essential to recognize the interplay between diabetes and oral health to provide comprehensive and safe healthcare for diabetic patients.

Communication and collaboration among multiple healthcare providers, including physicians, dentists, and nurses, are crucial in managing the oral health of these patients effectively. Numerous studies have demonstrated the association between diabetes and various oral mucosa alterations. Diabetic patients are more susceptible to oral complications, including mucosal lesions, oral candidiasis (fungal infection), and delayed wound healing in the oral cavity. Candida albicans, a common fungal species, is frequently isolated in diabetic patients and can lead to chronic and recurrent oral infections (Ramachandran & Snehalatha,2009).

Several risk factors contribute to the development of oral mucosa alterations in diabetic patients. The foremost risk

factor is diabetes itself, as elevated blood sugar levels create a favorable environment for the growth of microorganisms, including fungi. Additionally, smoking has been identified as a significant risk factor for oral mucosa alterations in diabetic individuals. The combined effect of diabetes and smoking increases the likelihood of oral complications, emphasizing the importance of addressing both factors in the management of oral health in diabetic patients (Leite et al., 2013; Ship, 2003).

Health education plays a crucial role in improving the prognosis and healthcare behavior of diabetic patients. By educating patients about the potential oral complications associated with diabetes and the importance of maintaining good oral hygiene, healthcare providers can empower patients to take proactive steps in managing their oral health. Education can include practical advice on oral hygiene practices, such as regular brushing, flossing, and tongue cleaning, as well as the use of fluoride toothpaste and regular dental check-ups. Promoting a balanced diet and lifestyle modifications, including smoking cessation, are also vital components of diabetic oral healthcare education (Ship, 2003).

By enhancing patient understanding and awareness of the relationship between diabetes and oral health, healthcare providers can facilitate early detection and intervention, leading to improved outcomes. Additionally, collaborative efforts between healthcare professionals, including physicians and dentists, can ensure a comprehensive and coordinated approach to managing the oral health of diabetic patients. Regular communication and shared knowledge among healthcare providers can contribute to better patient care and optimize treatment outcomes.

The oral mucosa and saliva play a crucial role in maintaining oral health by providing a protective barrier against microbial invasion. They contain antimicrobial factors that help to defend the oral cavity from infection. However, in individuals with diabetes, the oral mucosa undergoes specific alterations that can compromise its protective functions.

One of the notable changes in the oral mucosa of diabetic individuals is a decrease in saliva production, leading to a condition called xerostomia or dry mouth. Reduced saliva flow contributes to poor lubrication of the oral cavity, making it more susceptible to microbial colonization and infection. The lack of moisture in the mouth creates an environment that facilitates the proliferation of pathogenic microorganisms, increasing the risk of oral infections.

Another common manifestation of oral mucosa alterations in diabetes is a coated tongue, also known as lingua villosa. It is characterized by an accumulation of debris and bacteria on the surface of the tongue, giving it a white or yellowish appearance. Coated tongue not only affects the aesthetics of the oral cavity but also contributes to halitosis or bad breath, which can have a negative impact on an individual's self-confidence and social interactions.

Diabetic individuals with persistently high glucose levels are more prone to developing oral cavity infections and abscesses. Elevated blood sugar levels provide a favorable environment for microorganisms to thrive and multiply, leading to a higher risk of oral infections. Furthermore, poor oral hygiene practices, such as irregular brushing and flossing, can further exacerbate the risk of infection in diabetic individuals.

The oral health status of diabetic patients is closely linked to their overall quality of life. Poor oral health can cause pain, discomfort, and difficulty in chewing and speaking, affecting one's ability to enjoy food and communicate effectively. The presence of oral infections and halitosis can also lead to embarrassment and social isolation, impacting the individual's self-esteem and psychological well- being.

To mitigate the adverse effects of oral mucosa alterations in diabetic individuals, it is essential to prioritize oral hygiene and preventive measures. Diabetic patients should be educated about the importance of maintaining good oral hygiene practices, including regular brushing, flossing, and tongue cleaning. Adequate hydration and saliva stimulation techniques can help alleviate symptoms of xerostomia and improve saliva flow. Dentists and healthcare providers should also emphasize the need for regular dental check-ups and prompt treatment of any oral infections or abscesses. (Chen et al., 2022; Jhugroo et al.,2019).

Diabetes mellitus is not only associated with alterations in the oral mucosa but also with an increased risk of various oral diseases and disorders. One of the most significant oral complications of diabetes is periodontitis, a chronic inflammatory condition affecting the tissues surrounding the teeth. Studies have suggested that periodontitis may contribute to poor metabolic control in diabetic patients, making it crucial to address oral health as part of diabetes management.

Patients with long-standing and poorly controlled diabetes are particularly vulnerable to developing oral candidiasis, a fungal infection caused by Candida albicans. The weakened immune system and elevated glucose levels in diabetic individuals create an environment conducive to the overgrowth of Candida, leading to oral thrush. Oral candidiasis can cause discomfort, difficulty in swallowing, and altered taste sensation.

Furthermore, periodontal changes have been identified as an early clinical manifestation of diabetes. Diabetic patients may exhibit increased gingival inflammation, bleeding gums, and bone loss around the teeth. Periodontal disease not only affects oral health but also has systemic implications. The chronic inflammation associated with periodontitis can contribute to insulin resistance and impaired glycemic control in individuals with diabetes.

Diabetic individuals, both those with controlled and uncontrolled diabetes, have a higher relative risk of tooth loss compared to those without diabetes. This increased risk of tooth loss is attributed to several factors, including compromised

oral health, reduced saliva flow, impaired wound healing, and a higher prevalence of periodontal disease. Tooth loss not only affects the individual's ability to chew and speak but also has psychosocial implications, affecting their self- confidence and quality of life.

One of the barriers to optimal oral health in diabetic patients is the cost of dental care. Many diabetic individuals may avoid routine dental visits due to financial constraints or lack of awareness about the potential oral health complications associated with diabetes. It is crucial to educate diabetic patients about the importance of regular dental check-ups, preventive care, and the potential impact of oral health on their overall well-being.

Efforts should be made to integrate oral health education into diabetes management programs and improve access to affordable dental care for diabetic individuals. Healthcare providers, including dentists and primary care physicians, should collaborate to ensure comprehensive care for diabetic patients, addressing both their systemic and oral health needs. By emphasizing the importance of oral hygiene, regular dental visits, and preventive measures, healthcare professionals can empower diabetic patients to take control of their oral health and improve their overall quality of life. (Nikbin et al.,2014; Ittichaicharoen et al., 2016; Vu et al.,2022).

Despite advancements in diabetes care, achieving optimal glycemic control remains a challenge in many treated patients, primarily due to various factors such as limited access to affordable diabetes care, low disease awareness, and disparities in healthcare availability. Non- insulin dependent diabetes mellitus (NIDDM), commonly known as type 2 diabetes, has been associated with inadequate salivary gland function, which can have implications for glycemic control.

Studies have indicated that individuals with NIDDM may experience impaired salivary gland function, leading to abnormalities in glycemic control. The exact mechanisms underlying this association are not fully understood, but it is hypothesized that impaired insulin signaling in the salivary glands of individuals with obesity and insulin resistance may contribute to salivary gland dysfunction. As a result, these individuals may have reduced saliva production, which can affect oral health and potentially impact glycemic outcomes.

Burning mouth syndrome is a frequently reported complaint among diabetic patients. This condition is characterized by a bilateral burning sensation in the oral mucosa, often without any identifiable clinical or laboratory findings. The exact cause of burning mouth syndrome is unknown, but it is believed to involve dysfunction of the nerves responsible for pain and sensation in the oral cavity. Diabetic individuals may be more prone to developing this neurosensory disorder, which can further contribute to their oral discomfort and potentially impact their overall well-being. The established association between periodontitis and diabetes highlights the need for increased research and interventions targeting both diseases,

particularly in populations with health disparities and limited access to oral and healthcare. Efforts should be made to raise awareness about the link between oral health and diabetes, as well as the importance of regular dental check- ups and periodontal care in managing glycemic control.

Addressing health disparities and improving access to oral and healthcare services for underserved populations is crucial in managing the interplay between diabetes and oral health. Further research is needed to better understand the underlying mechanisms connecting diabetes, salivary gland function, burning mouth syndrome, and periodontitis. By enhancing our understanding of these relationships, we can develop targeted interventions and strategies to improve both glycemic control and oral health outcomes in diabetic patients, ultimately improving their overall health and well-being. (Ervasti et al.,1985; Moore et al., 2000; Lamster et al., 2008; Banyai et al.,2022).

Objectives
The objectives of the present study are
1. To assess the pre-existing knowledge, attitude and practice of diabetic patients regarding oral hygiene using pre-test knowledge, attitude and practice scores.
2. To assess the knowledge, attitude and practice of diabetic patients regarding oral hygiene using post-test knowledge, attitude and practice scores.
3. To determine the effectiveness of structured teaching program by comparing pretest and post-test knowledge, attitude and practice scores regarding oral hygiene among diabetic patients.
4. To determine association of pre-test knowledge, attitude and practice score regarding oral hygiene among diabetic patients with their selected demographic variables.

Justification
- Diabetic patients are more prone to oral health problems and complications due to their compromised immune system and impaired wound healing. Poor oral hygiene can lead to various oral diseases such as periodontitis, dental caries, and fungal infections. It is essential to assess and improve the knowledge, attitude, and practice of oral hygiene among diabetic patients to prevent these complications and improve their overall health.
- Many diabetic patients may not have adequate knowledge about the importance of oral hygiene or the specific oral care practices they should follow. They may not be aware of the potential oral health complications associated with diabetes. Assessing their knowledge, attitude, and practice can help identify gaps and develop targeted interventions to improve oral hygiene practices.
- A structured teaching program can be an effective method to educate and empower diabetic patients regarding oral hygiene. By providing them with evidence-based information, practical tips, and guidance, it can help them understand the importance of oral hygiene, adopt appropriate practices, and improve their oral health outcomes. This study aims to evaluate the effectiveness of

such a program in improving the knowledge, attitude, and practice of oral hygiene among diabetic patients.
- The use of a quasi-experimental design in this study allows for the comparison of pre-test and post-test scores, which helps determine the impact of the structured teaching program. By assessing changes in knowledge, attitude, and practice scores, the study can provide valuable insights into the effectiveness of the intervention.
- Exploring the association of pre-test knowledge, attitude, and practice scores with demographic variables can provide a deeper understanding of the factors influencing oral hygiene practices among diabetic patients. It can help identify specific subgroups that may require targeted interventions or additional support.

Methodology
- The study was conducted after getting Ethical Clearance.
- **Study design:** Quasi-experimental study.
- **Study period:** Period of 3 Months after ethical clearance
- **Site of Study:** Government Medical College and Hospital, Omandurar Government Estate, Chennai
- **Study population:** Type 2 Diabetic Patients who are attending Government Medical College and Hospital, Omandurar Government Estate, Chennai

Inclusion Criteria
- Adult patients (18 years or older) with a diagnosis of Type 2 Diabetes Mellitus
- Patients attending Government Medical College and Hospital, Omandurar Government Estate, Chennai
- Patients who are willing to participate in the study and provide informed consent
- Patients who are able to communicate and understand the educational program.
- Patients who have access to a phone or email for follow-up communication.

Exclusion Criteria
- Patients with severe cognitive impairment or communication difficulties.
- Patients with severe systemic or oral diseases that could affect oral hygiene (e.g., severe periodontitis, uncontrolled hypertension).
- Patients who have received any oral hygiene education or intervention in the past 6 months.
- Patients who are unwilling or unable to provide informed consent or participate in the study.

Sample Size
63 individuals (Calculated using $n = [(Z\alpha/2 + Z\beta)^2 * (\sigma 1^2 + \sigma 2^2)] / \delta^2$) $\alpha = 0.05$ (two-tailed test)
Power $(1 - \beta) = 0.80$ Effect size $(\delta) = 0.5$
Standard deviations $(\sigma 1, \sigma 2) = 10, 12$
Critical values $(Z\alpha/2, Z\beta) = 1.96, 0.84$ (corresponding to $\alpha = 0.05$ and power $= 0.80$)

Using these values, the sample size can be calculated as:
$n = [(1.96 + 0.84)2 * (102 + 122)] / 0.52$
$n \approx 63$

Study Tool
Study tool consists of two components
- Interviewer administered, structured Questionnaires and
- Structured teaching programme on oral hygiene

Questionnaire
The structured Questionnaire (vernacular) was used for data collection. It was a modified questionnaire taken from prevailing studies and refined according to the recommendations of National oral health programme module and opinions from the experts from the field of Community Medicine and Public Health Dentistry." testing was done to determine the feasibility of the study, to refine and modify the instrument. The finding of the pilot study revealed the feasibility of proceeding to the main study. Initially, the questionnaire was drafted in English and then translated to Tamil and again back translated to English to ensure that the meaning of the message conveyed did not vary.

The questionnaire had four parts are as follows
Part 1: Socio demographic profile
Part 2: Questions regarding knowledge on oral hygiene
Consists of 16 questions focused on knowledge regarding components of oral hygiene, brush, toothpaste proper brushing techniques, tongue cleaning, gargling mouth after each candy and meal.
Part 3: Questions regarding attitude towards oral hygiene.
Consists of 7 questions which focused on attitude towards impact of diet on oral health impact of poor oral hygiene and attitude towards dental visits.
Part 4: Questions regarding practice of oral hygiene

Consists of 12 questions which focused on practice regarding brush, toothpaste, proper brushing techniques, practice regarding tongue cleaning, gargling mouth after each meal.

Plan of Structured Teaching Programme
TOPIC : Oral Hygiene
AUDIENCE Type 2 Diabetic Patients who are attending MTM
Clinic DURATION: 30 minutes
LANGUAGE: Tamil METHODS OF TEACHING:
Lecture with poster presentation. Video demonstration,
PLACE: MTM Clinic, Government Medical College and Hospital, Omandurar Government Estate, Chennai

SPECIFIC LEARNING OBJECTIVES
At the end of the session the patients will be able to,
- Describe the various components of oral cavity and oral hygiene List the various dentifrices used in maintenance of oral hygiene and its proper usage
- Explain the role of diet and importance of dental visit.
- Name at least four effects of improper oral hygiene
- List the steps in correct brushing technique with proper angle

Data Collection Procedure
Base-line data collection (Pre-test sessions)
- After getting permission to start the study to from the IEC and the explaining the purpose of the study to the study participants, data collection will be done for about three weeks.
- Confidentiality will be ensured. All ethical principles will be adhered during data collection.
- Questions will be explained to the students and they will be asked to answer them without probing the answers. It will be made sure that all the questions will be answered by the participants.

Intervention
- All study participants will be assembled and intervention will be given as a single group. Interventions will be given in Tamil (vernacular language) to facilitate better understanding among the participants. All the participants will be given health education directly by the principal investigator.
- It will be made sure that all the queries will be addressed immediately. Post-test sessions:
- 6 weeks after the last intervention session, the post-test data collection will be done using the same questionnaire for three weeks.
- Patients found to have dental problem will be referred to the Department of Dentistry for further management.

Scoring Procedure
The scoring procedure of our study as follows, KNOWLEDGE DOMAIN contains 16 questions ATTITUDE DOMAIN contains 7 questions PRACTICE DOMAIN contains 12 questions

All the questions were multiple-choice questions. Responses of the questions were scored based on following recommendations. According to recommendations of Indian dental association and National oral health and various literatures Maintainance of good oral hygiene programme involves:
1. Using a soft bristled type brush for cleaning teeth
2. Changing the brush for atleast once in three months
3. Using a pea sized fluoride containing toothpaste
4. Brushing twice daily at morning and night
5. Brushing for full 2 minutes at an angle of 45°
6. Brushing in circular motion up and down and back and forth movements
7. Gargling mouth after each meal and candy intake
8. Visiting a dentist atleast once in 6 months and whenever there is a toothache/discomfort.

Responses which satisfied the above-mentioned criteria were given the score of 1. And other responses were given the score of 0 as below,

The maximum score that can be obtained in each domain as follows,

Table 1: Categorization of level of knowledge attitude and practice

Domain	Maximum score that can be obtained
Knowledge domain	16
Attitude domain	7
Practice domain	12

To find out the association between knowledge, attitude and practice each domain have been categorised as follows, Knowledge and practice the scores converted into percentages and they were classified as poor, average and good. The attitude scores were converted into percentages and classified as negative attitude and positive attitude as given in the below table 2 and table 3.

Table 2: Categorisation of level of knowledge and practice regarding oral hygiene

PERCENTAGE SCORE	LEVEL OF KNOWLEDGE	LEVEL OF PRACTICE
0-50%	Poor knowledge	Poor practice
51-75%	Average knowledge	Average practice
76-100%	Good knowledge	Good practice

Table 3: Categorisation of level of attitude regarding oral hygiene

PERCENTAGE SCORE	LEVEL OF ATTITUDE
0-50%	Negative attitude
51-100%	Positive attitude

Data Analysis
- The collected data was entered into an Excel sheet and then analyzed using SPSS version 22 software.
- Descriptive analysis was conducted, with percentages and proportions used to express categorical variables, and mean ± standard deviation used for continuous variables. The significance of the data will be tested using chi-square test and Fischer test for categorical variables, and paired t-tests for continuous variables. A p-value of less than 0.05 will be considered statistically significant.
- Charts and graphs were prepared using Microsoft Excel version 2019.

Results
The data collected are organized, analysed and presented under the following headings in accordance with the objectives of the study

SECTION I
SOCIO-DEMOGRAPHIC CHARACTERISTICS OF STUDY PARTICIPANTS

Table 4: Comparison of socio-demographic characteristics of study participants.

| Demographic data	Category	Frequency (%)	p value
Age	20-30 yrs	20.6349206	0.99276693
	31-40 yrs	22.2222222	
	41-50 yrs	22.2222222	
	51-60 yrs	26.984127	
	>60 yrs	7.93650794	
Gender	Male	63.4920635	0.75
	Female	36.5079365	
Educational Status	Graduate / Postgraduate	25.3968254	0.75
	Post High School Diploma	17.4603175	
	High School	20.6349206	
	Middle School	4.76190476	
	Primary School	15.8730159	
	Illiterate	15.8730159	
Socioeconomic class	Class I	14.2857143	0.93716704
	Class II	28.5714286	
	Class III	33.3333333	
	Class IV	23.8095238	
Type of family	Nuclear family	47.6190476	0.75
	Joint family	52.3809524	
Type of diet	Vegetarian	55.5555556	0.75
	Non vegetarian	44.4444444	

Figure 1: Age distribution of study participants
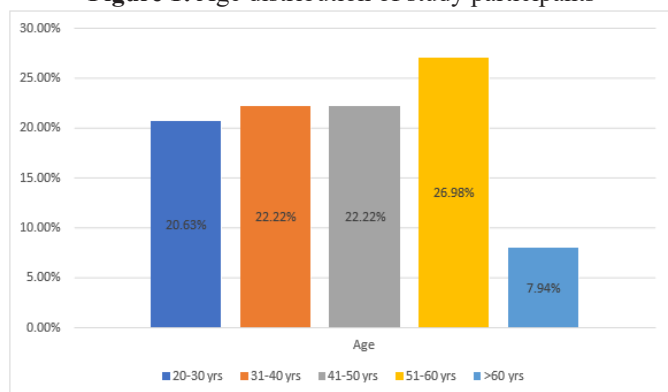
The mean age of study participants in experimental group was found to be 43.60 years with standard deviation of 11.94954. Figure 1 shows that majority 17(26.98%) of the study participants in experimental group belonged to the age group of 51-60 years, followed by 31-40 years 14(22%),14(22%) from the age group of 31-40 years and 13(20.63%) from the
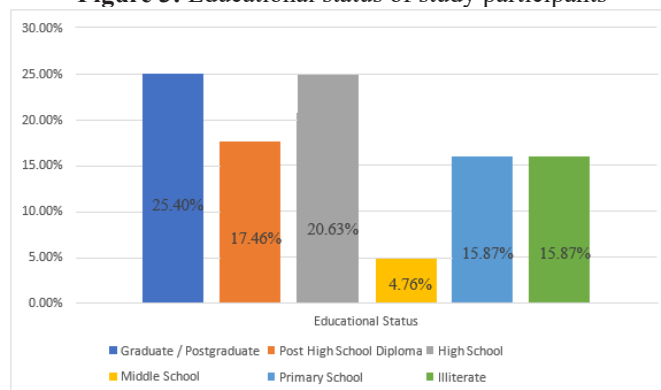
age group of 20-30 years. Only 5(7.93%) study participants belonged to >60year age group.

**Figure 2:** Gender distribution of study participants
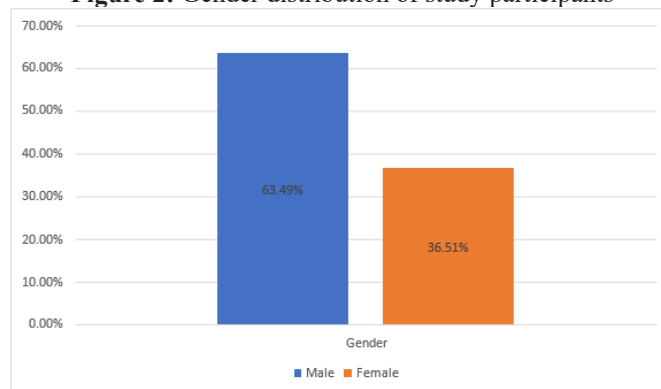
From figure 2 participants 40(63.49%) were males and rest 23(36.50%) were females.

**Figure 3:** Educational status of study participants

The study participants had varying levels of education, with 16(25.39%) being graduate or postgraduate, 11(17.46%) having a post high school diploma, 13(20.63%) completing high school, 3(4.76%) having a middle school education, 10(15.87%) having a primary school education, and 10(15.87%) being illiterate.

**Figure 4:** Socioeconomic status of study participants
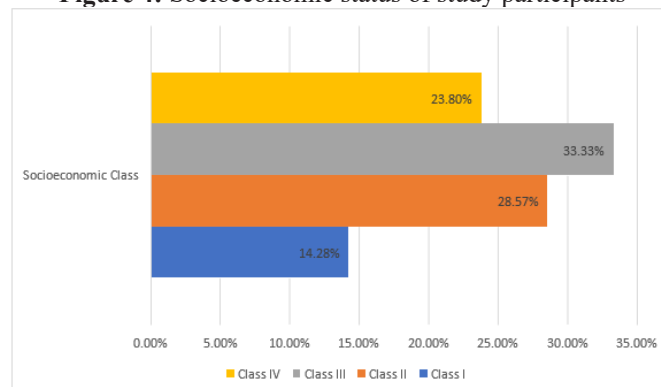
Above figure 4 shows that the participants belonged to different socioeconomic classes, with 9(14.29%) classified as Class I, 18(28.57%) as Class II, 21(33.33%) as Class III, and 15(23.81%) as Class IV. The Socioeconomic status were calculated using B.G Prasad's scale.

Figure 5: Type of family of study participants
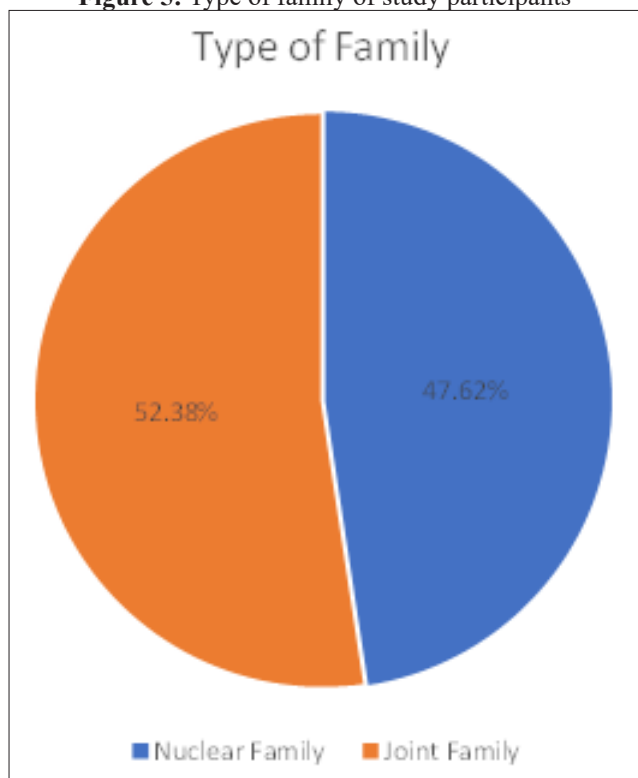
The majority of participants 30(47.62%) belonged to nuclear families, while 33(52.38%) belonged to joint families.

Figure 6: Type of diet of the study participants
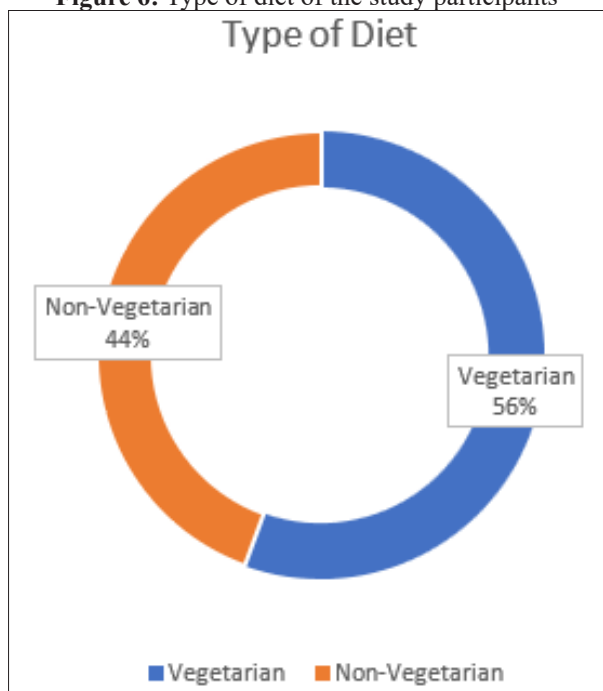
Among the participants, 55.56% followed a vegetarian diet, while 44.44% followed a non- vegetarian diet.

SECTION II
EXISTING LEVEL OF KNOWLEDGE, ATTITUDE AND PRACTICE OF STUDY PARTICIPANT

In our study knowledge domain was assessed using 16 questions. Knowledge levels of study participants were categorised into poor knowledge (0-50%), adequate knowledge (51-75%) and good knowledge (76-100%) based on their percentage scores.

Table 5: Level of knowledge in pre test

Level of knowledge	No of Participants	Percentage
Poor knowledge (0-50%)	42	66.6666667
Average knowledge (50-75%)	20	31.7460317
Good knowledge (75-100%)	1	1.58730159
Total	63	100

According to the table 5, out of the total 63 participants, 42 participants (66.67%) had poor knowledge, 20 participants (31.75%) had average knowledge, and only 1 participant (1.59%) had good knowledge.

In our study attitude domain consists of 7 questions. The attitude levels were categorised as negative attitude (0-50%) and positive attitude (51-100%) based on their percentage scores.

Table 6: Level of attitude in pre-test

Level of attitude	No of Participants	Percentage
Negative attitude (0-50%)	37	58.7301587
Positive attitude (50-100%)	26	41.2698413
Total	63	100

From the above table, out of the total 63 participants, 37 participants (58.73%) had a negative attitude, while 26 participants (41.27%) had a positive attitude.

In our study practice domain was assessed using 12 questions. Practice levels of study participants were categorised into poor practice (0-50%), adequate practice (51-75%) and good practice (76-100%) based on their percentage scores.

Table 7 depicted below shows that 62 participants (98.41%) had poor practice, indicating that the majority of participants had low levels of practice. Only 1 participant (1.59%) had an average level of practice, while none of the participants had a good level of practice.

Table 7: Level of practice in pre test

Level of Practice	No of Participants	Percentage
Poor practice (0-50%)	62	98.4126984
Average practice (50-75%)	1	1.58730159
Good practice (75-100%)	0	0
Total	63	100

SECTION III
COMPARISON OF LEVEL OF KNOWLEDGE, ATTITUDE AND PRACTICE SCORES IN PRE AND POST-TEST

Table 8: Comparison of level of knowledge scores in pre and post test

Level of Knowledge	Pretest		Post-test	
	No of Participants	Percentage	No of Participants	Percentage
Poor knowledge (0-50%)	42	66.6666667	0	0
Average knowledge (50-75%)	20	31.7460317	8	12.6984127
Good knowledge(75- 100%)	1	1.58730159	55	87.3015873

From the above Table 8, it is evident that based on the pretest results, out of the total 63 participants, 42 participants (66.67%) had poor knowledge, 20 participants (31.75%) had average knowledge, and only 1 participant (1.59%) had good knowledge. This indicates that the majority of participants had limited knowledge in the given area before the intervention. After the intervention, the post-test results show a significant improvement in knowledge levels. None of the participants scored in the poor knowledge category, indicating that the intervention effectively addressed the gaps in their knowledge. The number of participants with average knowledge increased to 8(12.70%), while a significant majority of 55 participants (87.30%) achieved a good level of knowledge.

Table 9: Comparison of level of attitude scores in pre and post test

Level of Attitude	Pretest		Post-test	
	No of Participants	Percentage	No of Participants	Percentage
Negative attitude(0-50%)	37	58.7301587	28	44.4444444
Positive attitude (50-100%)	26	41.2698413	35	55.5555556

From the above table it is clear that before intervention a majority of participants had a negative attitude towards the subject or topic based on the pretest results, out of the total 63 participants, 37 participants (58.73%) had a negative attitude, while 26 participants (41.27%) had a positive attitude. After the intervention, the post-test results show a notable improvement in participants' attitudes. The number of participants with a negative attitude decreased to 28 (44.44%), indicating a positive shift in their perceptions and outlook. Conversely, the number of participants with a positive attitude increased to 35 (55.56%), reflecting a more favorable and optimistic mindset.

Table 10: Comparison of level of practice scores in pre and post test

Level of Practice	Pretest		Post-test	
	No of Participants	Percentage	No of Participants	Percentage
Poor practice(0- 50%)	62	98.4126984	40	63.4920635
Average practice(50-75%)	1	1.58730159	23	36.5079365
Good practice(75- 100%)	0	0	0	0

Above table shows that in our study according to the pretest results, out of the total 63 participants, 62 participants (98.41%) had poor practice, indicating a significant room for improvement in their practical skills or behaviors related to the subject matter. Only one participant (1.59%) had an average practice level, and no participants had a good practice level. After the intervention, the post-test results show a positive change in participants' practice levels. The number of participants with poor practice decreased to 40 (63.49%), reflecting an improvement in their practical skills or behaviors. Additionally, the number of participants with average practice increased to 23 (36.51%), indicating progress in their ability to perform the required tasks or behaviors.

However, there were no participants who achieved a good practice level in the post-test, suggesting that further intervention or training may be needed to enhance their practical skills to the desired level.

Overall, the findings suggest that the structured teaching program had a positive impact on improving knowledge, attitude, and practice among the participants. There was a notable improvement in knowledge levels, with a significant shift towards good knowledge. Attitudes also improved, with a larger proportion of participants adopting a positive attitude. However, there is still room for improvement in practice, as a substantial number of participants remained in the poor practice category.

Table 11: Comparison of overall knowledge, attitude and practice scores

Category	Maximum Score	Mean		Standard Deviation	Mean±SD	Mean Difference	Standard Deviation of Mean Difference	t Value / Z Value	p Value
Knowledge Score	32	Pre test	14.6666667	3.3020033	14.66±3.3020	11.71429	3.097494	30.01757	1.22727E-38
		Post-test	26.3809524	1.77281052	26.38±1.7728				
Attitude scores	14	Pre test	6.85714286	2.13161413	6.85±2.1316	0.873016	2.773678	2.498252	0.015146442
		Post-test	7.73015873	1.66758807	7.73±1.6675				
Practice scores	24	Pre test	7.74603175	2.69987009	7.74±2.6998	4.730159	2.789417	13.45961	4.64558E-20
		Post-test	12.4761905	3.3020033	12.47±3.3020				

The overall knowledge and practice scores in experimental group were subjected to paired t- test as they followed normal distribution and attitude scores were subjected to Mann Whitney U test as they followed non normal distribution. All three categories show statistically significant differences between the pre-test and post-test scores. The knowledge scores and practice scores exhibit large mean differences and high t-values, indicating substantial changes, while the attitude scores show a smaller mean difference but still exhibit a significant difference.

SECTION IV
ASSOCIATION BETWEEN LEVEL OF BASELINE KNOWLEDGE, ATTITUDE AND PRACTICE SCORES AND SOCIODEMOGRAPHIC VARIABLES.

Various sociodemographic details like age, sex, type of diet, type of family, birth order, and socioeconomic status, and occupation were compared with the knowledge, attitude and practice scores in the experimental group and chi-square test and Fisher's exact test was applied. And there are no significant associations between the level of baseline knowledge and sociodemographic variables such as age, gender, educational status, socioeconomic class, type of family, or type of diet. It is important to note that the p-values for these associations are all above the threshold (p > 0.05), indicating a lack of significant correlation.

Discussion
This study is aimed to assess the impact of a structured teaching program on the knowledge, attitude, and practice of study participants in a specific subject area. The results indicate significant improvements in knowledge, attitude, and practice scores after the intervention.

Socio-demographic Characteristics of Study Participants
The socio-demographic characteristics of the study participants provide valuable insights into the sample composition. The study included participants from various age groups, with the majority falling within the 51-60 years range. The gender distribution was slightly skewed, with a higher percentage of males compared to females. The educational status of participants varied, with a significant proportion having graduate/postgraduate education or a high school diploma. The participants belonged to different socioeconomic classes, predominantly Class III and Class II. The type of family was evenly distributed between nuclear and joint families, and the majority followed a vegetarian diet. These socio-demographic characteristics reflect the diversity of the study population and ensure a representative sample for the evaluation of the intervention.

Level of Knowledge, Attitude, Practice regarding Oral Hygiene
The assessment of participants' baseline knowledge, attitude, and practice regarding oral hygiene revealed several important findings. The pretest results indicated a limited level of knowledge among the participants, with a majority categorized as having poor knowledge. Similarly, a significant number of participants exhibited a negative attitude and poor practice related to oral hygiene. These findings highlight the need for educational interventions to improve participants' understanding, attitude, and practical skills in maintaining oral hygiene.

Association between Socio-demographic Variables and Knowledge, Attitude, Practice Scores
The analysis of the association between socio-demographic variables and knowledge, attitude, and practice scores revealed no significant correlations. The participants' age, gender, educational status, socioeconomic class, type of family, and type of diet did not demonstrate a statistically significant association with their baseline knowledge, attitude, or practice scores. These results suggest that the initial level of knowledge, attitude, and practice regarding oral hygiene was independent of the socio-demographic characteristics of the participants. It is important to note that other unmeasured variables or confounding factors might influence these associations and should be considered in future research.

Effectiveness of Structured Teaching Program
The structured teaching program implemented in the study proved to be effective in improving participants' knowledge,

attitude, and practice related to oral hygiene. Following the intervention, there was a significant improvement in participants' knowledge levels, with a notable shift from poor knowledge to good knowledge. The increase in the number of participants categorized as having average knowledge also indicates progress. Similarly, participants' attitudes showed a positive change, with a decrease in the number of participants with a negative attitude and an increase in those with a positive attitude. Although there was an improvement in practice levels, a majority of participants still fell into the poor practice category.

The results of the paired t-tests and Mann-Whitney U test demonstrated statistically significant differences between pretest and post-test scores in knowledge, attitude, and practice. These findings indicate that the structured teaching program effectively addressed the gaps in participants' knowledge, improved their attitudes, and enhanced their practices related to oral hygiene.

The positive outcomes of the intervention highlight the importance of educational interventions in promoting oral health. However, it is essential to recognize that sustained improvements in knowledge, attitude, and practice require continuous reinforcement and support. Further research is warranted to explore the long-term impact of such interventions and to identify additional factors that may influence oral hygiene behaviors.

Summary
This study aimed to assess the socio-demographic characteristics of study participants, evaluate their level of knowledge, attitude, and practice regarding oral hygiene, examine the association between socio-demographic variables and these scores, and assess the effectiveness of a structured teaching program in improving oral hygiene behaviors.

The study included participants from different age groups, with the majority falling in the 51- 60 years range, and a slightly higher percentage of males. The participants had varied educational backgrounds, primarily graduate/postgraduate or high school education, and belonged to different socioeconomic classes, predominantly Class III and Class II. The study population consisted of both nuclear and joint families, with the majority following a vegetarian diet.

The baseline assessment of participants' knowledge, attitude, and practice regarding oral hygiene revealed a limited level of knowledge, negative attitudes, and poor practices among the participants. There were no significant associations found between socio-demographic variables and baseline knowledge, attitude, or practice scores.

However, following the implementation of a structured teaching program, there was a significant improvement in participants' knowledge, attitude, and practice related to oral hygiene. The intervention resulted in a notable shift from poor knowledge to good knowledge, a decrease in negative

attitudes, and an increase in positive attitudes. Although there was an improvement in practice, a majority of participants still fell into the poor practice category.

The findings suggest that tailored educational interventions can effectively address gaps in knowledge, improve attitudes, and enhance practices related to oral hygiene. The study highlights the importance of continuous reinforcement and support to sustain improvements in oral hygiene behaviors.

Conclusion
In conclusion, this study examined the socio-demographic characteristics of the study participants, assessed their baseline knowledge, attitude, and practice regarding oral hygiene, explored the association between these variables, and evaluated the effectiveness of a structured teaching program. The findings indicated that the structured teaching program led to a significant improvement in participants' knowledge and attitude, although there was still room for improvement in practice. The socio-demographic characteristics of the participants did not demonstrate a significant association with their baseline knowledge, attitude, or practice scores. These results emphasize the importance of tailored educational interventions to promote oral health and the need for ongoing support and reinforcement to maintain positive changes in oral hygiene behaviors.

Limitations
- The study may use a quasi-experimental design, which lacks random assignment of participants to intervention and control groups. This design limitation can introduce biases and make it difficult to establish causality.
- There may be a potential for selection bias if the participants in the study are not representative of the overall population of diabetic patients attending the tertiary care center. This can limit the generalizability of the findings.
- The study might have a small sample size (e.g., 63 individuals), which can limit the statistical power and generalizability of the results. A larger sample size would provide more robust and reliable findings.
- The study may rely on self-report measures to assess oral hygiene practices and knowledge. Self-reported data can be subject to recall bias or social desirability bias, which can affect the accuracy of the reported information.
- The study may have a short follow-up period, which might not capture the long-term effects of the structured teaching program on oral hygiene practices and outcomes. Longer follow- up periods would provide a more comprehensive understanding of the intervention's sustainability and impact.
- If the study lacks a control group, it becomes challenging to attribute any observed changes solely to the structured teaching program. Without a comparison group, it is difficult to determine the true effectiveness of the intervention.
- There may be uncontrolled confounding variables that can influence the outcomes. Factors such as socio-economic status, educational level, or access to healthcare might

impact oral hygiene practices independently of the structured teaching program.
- The study might focus on a specific tertiary care center or a particular demographic group, limiting the generalizability of the findings to other settings or populations.

Recommendations

Based on the findings on the effectiveness of a structured teaching program on oral hygiene among diabetic patients, the following recommendations can be made:

- Healthcare providers should consider implementing structured teaching programs focused on oral hygiene for diabetic patients. These programs can include educational sessions, interactive demonstrations, and practical guidance on proper oral hygiene practices.
- The study highlights the importance of oral hygiene in diabetic patients. Healthcare providers should emphasize the significance of maintaining good oral hygiene to prevent oral diseases and improve overall health outcomes in diabetic individuals.
- Recognize that each diabetic patient has unique needs and challenges related to oral hygiene. Customize the structured teaching program to address individual patient concerns, such as adapting oral hygiene techniques for patients with physical limitations or providing additional support for patients with poor dexterity.
- Ensure that the structured teaching program includes ongoing reinforcement of knowledge and skills. Follow-up sessions, reminders, and educational materials can help patients retain and apply the information learned during the program.
- Foster collaboration between healthcare providers and oral health professionals, such as dentists and dental hygienists. Encourage interdisciplinary teamwork to address oral health issues comprehensively and provide integrated care for diabetic patients.
- Consider conducting long-term follow-up studies to evaluate the sustainability and long-lasting impact of the structured teaching program on oral hygiene practices and oral health outcomes in diabetic patients. Assessing the program's effectiveness over an extended period can provide valuable insights into its efficacy and potential for long-term behavior change.
- Identify high-risk populations within the diabetic patient population, such as those with uncontrolled diabetes or limited access to oral healthcare. Design targeted interventions to address their specific needs and barriers to oral hygiene.
- Integrate behavior change strategies into the structured teaching program to facilitate adoption and maintenance of oral hygiene practices. Motivational interviewing, goal setting, and positive reinforcement can help patients develop and sustain healthy oral hygiene habits.
- Assess the cost-effectiveness of implementing structured teaching programs on oral hygiene in diabetic care settings. Consider the economic impact of improved oral health outcomes and potential reductions in oral healthcare costs associated with preventing oral diseases in diabetic patients.
- Share the study findings and best practices with healthcare professionals, policymakers, and relevant stakeholders. Promote awareness and knowledge about the importance of oral hygiene in diabetic patients, and advocate for the integration of oral health promotion within diabetes management programs.

Conflict Of Interest
None declared.

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