

# Knowledge, Practices, Nutritional Value and Periodontal Disease Status among Type 2 Diabetes Patients-A Cross Sectional Study

*Running title:* Diabetes awareness and nutritional value

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**Abstract:** Context: WHO theme of the year 2016 is “BEAT DIABETES” as they considered diabetes prevalence is increasing rapidly in many countries. It has quadrupled to 422 million adults since 1980 with majority in developing countries. Numerous risk factors that can worsen the periodontal status of diabetes individuals include poor oral hygiene, poor metabolic control, longer duration of diabetes and who are smokers.(4) Not much studies have been conducted in this aspect. Hence a humble attempt has been made to assess oral health knowledge, nutritional value, practice and periodontal disease status among diabetes patients. Aims: To assess the knowledge, nutritional value, oral hygiene practice, awareness among type 2 diabetic patients. To assess periodontal disease level using CPI Index. To assess association between knowledge, nutritional value, oral hygiene practice and periodontal status. Settings and Design: This study was a cross sectional descriptive survey among type II diabetic individuals visiting SRM Medical College and Hospital at kanchipuram district. Methods and Material: Tamilnadu during the year 2016. Participants were selected by simple random sampling. Study was conducted by two well-trained dentist, one examiner conducted the survey and other examiner performed examination of oral cavity. Statistical analysis used: To analyze the data, descriptive and inferential statistics were applied; distribution frequency and percentage in terms of demographic characteristics and diabetes-related variables were expressed. To evaluate the homogeneity and similarity of all three groups, we used chi square. Results: Total of 365 diabetes patients participated in the study. Among this majority were males (51.5%) and females (48.5%). Most of the patient were there in the age group of 51-60years (35.9%). 93.4% Of the patients were aware that diabetes is one of the most common systemic diseases currently. 37.8% were unaware of the various risk factors for diabetes. 80% of patients said that they received diet counseling and 65.5% of patients have been reported to follow a proper diet plan. Among these 44.4% were following a carbohydrate rich diet plan. 45.5 % of patients were regularly following the diet plan for a period of more than 3 months. 55.3% preferred dietary fibers as food source best suited to control diabetes. , 11.5% had a habit of smoking and 17.5% were reported with a habit of alcohol consumption and 3.6% of patients were reported to have been using other kinds of tobacco products. 78.6 % of patients brushed their teeth once a day. Among these 99.7% were using brush and paste as a source of cleaning.34.8 % of the patients were reported to visit the dentist once a year followed by 13.2% for every months and 11% for every 3 months whereas 41% of patients have never undergone dental checkup. Out of these 42.5% stated that the dentist was aware of their condition on diabetes. Conclusions: In conclusion this study revealed that overall knowledge of patients with diabetes appeared to be acceptable and there was adequate knowledge among the diabetic patients. However practices among diabetes patients needs to be promoted to enhance periodontal status.

**Keywords:** Diabetes, Periodontal Status, Nutritional Value, Knowledge, Awareness

## 1. Introduction

Diabetes mellitus is a hyperglycemic condition which is often characterized by chronic abnormalities of protein fat carbohydrates mechanism as a result of either insulin deficiency or insulin resistance or both<sup>(1,2,3)</sup> Over past few decades prevalence of diabetes has been increased drastically<sup>(4)</sup> Incidences of mortality and morbidity are high in case of diabetes worldwide<sup>(5)</sup> WHO theme of the year 2016 is “BEAT DIABETES” as they considered diabetes prevalence is increasing rapidly in many countries. It has quadrupled to 422 million adults since 1980 with majority in developing countries. Who projects that diabetes will be the 7<sup>th</sup> leading cause of death by the year 2030<sup>(6)</sup>

Diabetes patients are often witnessing several oral complications like xerostomia, dental caries, gingivitis, periodontitis, opportunistic infections (oral candidiasis),

delayed wound healing, oral paresthesia, altered taste.<sup>(3,7,8,9)</sup> Many diabetic people were unaware regarding oral complications and were having poor oral hygiene<sup>(4)</sup> Providing a proper oral health care and oral hygiene behavior is adversely related to socioeconomic status, urbanization, sedentary lifestyle, poor nutrition and obesity. Evidences constantly show that educating patients is the ultimate weapon to decrease the complications of diabetes and its management<sup>(1)</sup> Thus we concentrate mainly on providing good oral hygiene, adequate oral hygiene instructions and healthy lifestyle information related to oral health among diabetes population.

Studies have shown two way relationships between diabetes and periodontitis. I.e. either poor glycemic control affects periodontal status or periodontal disease affects glycemic control<sup>(9,10,11,12)</sup> Periodontal disease will be more severe, destructive and progressive in poorly or uncontrolled

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patients than controlled or non-diabetic patients.<sup>(3,4,10,12)</sup> Periodontitis is considered as most frequent oral manifestation as well as 6<sup>th</sup> common complication following other diabetes complications. Numerous risk factors that can worsen the periodontal status of diabetes individuals include poor oral hygiene, poor metabolic control, longer duration of diabetes and who are smokers.<sup>(4)</sup> Not much studies have been conducted in this aspect. Hence a humble attempt has been made to assess oral health knowledge, nutritional value, practice and periodontal disease status among diabetes patients.

### Objectives

- To assess the knowledge, nutritional value, oral hygiene practice, awareness among type 2 diabetic patients.
- To assess periodontal disease level using CPI Index.
- To explore the relationship between diabetes and periodontal disease.

## 2. Materials and Methodology

This study was a cross sectional descriptive survey among type II diabetic individuals visiting SRM Medical College and Hospital at kanchipuram district, Tamilnadu during the year 2016. Participants were selected by simple random sampling.

### Inclusion & Exclusion Criteria

Type II diabetes individuals whose age ranging between 35 years to 79 years with at least 16 functional teeth was included in this study. Pregnant women, individual who has undergone periodontal surgical treatment 6 months prior to the study and physically or mentally disabled people were excluded from the study.

### Ethical Considerations

This study was approved by institutional ethics committee (IEC no: 1004/IEC/2016) which gave us the permission to conduct the study. Patients were explained both verbally and with written information sheet regarding nature and purpose of this study. Written informed consent was obtained from all the participants. The participants were also assured that information provided will be kept highly confidential and will not be revealed under any circumstances.

### Sample Size Estimation:

To determine the sample size required for the study with a power of 80%, the required prevalence rate was taken from a previously published article. After sample size estimation, the required sample size based on 80% power was 347. However a total of 362 subjects were included.

### Data Collection:

A pre tested, self-administered questionnaire was given to the patients which included socio demographic status (age, gender, BMI, educational status, occupation, income), general questions related to diabetes, knowledge among diabetes patients, nutritional value among diabetes patients, awareness among diabetes patients, oral health in diabetes patients.

Fasting and post prandial blood glucose levels were obtained from SRM biochemistry blood investigation lab. Community Periodontal Index (CPI) was measured using

CIPITN probe by well-trained practitioner/dentist. Study was conducted by two well-trained dentist, one examiner conducted the survey and other examiner performed examination of oral cavity.

At the end of questioning session patients were informed about the consequences of systemic condition on oral health and their present oral health status followed by treatment needed.

### Statistical Analysis

To analyze the data, descriptive and inferential statistics were applied; distribution frequency and percentage in terms of demographic characteristics and diabetes-related variables were expressed. To evaluate the homogeneity and similarity of all three groups, we used chi square.

Multiple linear regression analysis was applied to determine factors influencing diabetes condition. SPSS software version 16.0 (SPSS Inc., Chicago, IL, USA) was utilized for data analysis.  $P < 0.05$  was considered as significant in all the tests.

## 3. Results

Total of 365 diabetes patients participated in the study. Among these majority were males (51.5%) and females (48.5%). Most of the patient were there in the age group of 51-60 years (35.9%) followed by 41-50 yrs (33.2%) and 61-70 years (23.3%). Only 7.7% of patients were above 70 years of age. Table (1) gives various other demographic details used in the study and Table (2) shows the distribution of study subjects based on BMI and table (3) shows the distribution of study subjects based on various general information collected in the study.

93.4% Of the patients were aware that diabetes is one of the most common systemic diseases currently. Regarding risk factor of diabetes 37.8% answered that they were unaware of the various risk factors and the rest considered family history, old age, overweight, eating too much of sugar, stress, lack of exercise, smoking/alcohol as one of the risk factor. About opinion regarding control of diabetes 62.7% answered yes whereas 19.7% answered no and 17.6% as don't know. 42.7% patients answered limited intake of sugar and fatty food as a way to control sugar whereas 33.2% as don't know, rest 9.6% considered weight loss as an option. Table(4) shows the awareness of study subjects regarding diabetes and various systemic diseases.

80% of patients said that they received diet counseling and 65.5% of patients have been reported to follow a proper diet plan. Among these 44.4% were following a carbohydrate rich diet plan and 32.3% of patients were following a fiber rich diet plan. Out of these 45.5 % of patients were regularly following the diet plan. Out of the study population, 11.5% had a habit of smoking and 17.5% with the habit of alcohol consumption and 3.6% of patients reported to be using tobacco products.

78.6 % of patients brushed their teeth once a day, 21.1% twice a day and .3% brushed thrice daily. Among these 99.7% use brush and paste as a source of cleaning. 34.8 % of

the patients were reported to visit the dentist once a year followed by 13.2% who visited every month and 11% for every 3 months whereas 41% of patients have never undergone dental checkup. Out of these 42.5% stated that the dentist was aware of their condition on diabetes. Tables (6, 7, 8, 9, 10, and 11) give the periodontal status of the study subjects using the loss of attachment values of CPI Index for each sextant. Significant differences in loss of attachment levels was seen in sextant1, 2and 5 (p<.05).

**Table 1:** Gives Various Demographic Details Used In the Study

Variables	Category	Frequency	Percentage (%)	p value
Annual Income	>10,000	53	14.6	.578
	10,000 – 50,000	80	21.8	
	50,000 – 1,00,000	143	39.2	
	> 1,00,000	89	24.4	
Education	> 10thstd	229	62.7	.470
	SSLC	89	24.4	
	UG/PG	47	12.9	

**Table 2:** Distribution of study subjects based on BMI

Variables	Category	Frequency	Percentage (%)	p value
Lean	0	5	1.4	.201
	1	194	53.2	
	2	166	45.5	

**Table 3:** Distribution of study subjects based on various general information collected in the study

Variables	Category	Frequency	Percentage (%)	P value
Years with diabetes	> 1 yr	68	18.6	.880
	1 – 5 yrs	110	30.1	
	5 – 10 yrs	91	24.9	
	> 10 yrs	96	26.3	
Medication for control	Yes	341	93.4	.456
	No	24	6.6	
History of diabetes in Family	Yes	182	49.9	.672
	No	183	50.1	
Frequency of checking glucose level	Frequently	104	28.5	.060
	Regularly	139	38.1	
	Whenever worsened	80	21.9	
	Never	42	11.5	
Other Systemic problems	Kidney problems	45	12.2	.452
	Eye problems	103	28.3	
	,Nervous disorders	46	12.6	
	Diabetic foot	13	3.6	
	Others	158	43.3	

**Table 4:** Awareness among Diabetes Patients Regarding Diabetes and Various Systemic Diseases

Variables	Category	Frequency	Percentage (%)	p value
Diabetics more prone to oral Diseases	Yes	81	22.2	.284
	No	57	15.6	
	Don't know	227	62.2	
Diabetes cause tooth decay	Yes	149	40.8	.317
	No	168	46.0	
	Don't Know	48	13.2	
Diabetes affects gums	Yes	155	42.5	.119
	No	154	42.2	
	Don't Know	56	15.3	
Smoking more injurious to	Yes	166	45.5	.655
	No	86	23.6	

Diabetics than non-diabetics	Don't Know	113	31.0	.676
Diabetes affects eye	Yes	319	87.4	
	No	33	9.0	
Diabetes affects kidneys	Don't Know	13	3.6	.525
	Yes	313	85.8	
	No	34	9.3	
Diabetes affects nerves	Don't Know	18	4.9	.130
	Yes	294	80.5	
	No	41	11.2	
Diabetes affects Heart	Don't Know	30	8.2	.251
	Yes	291	79.7	
	No	44	12.1	
Heard of Diabetic Foot	Don't Know	30	8.2	.957
	Yes	339	92.9	
	No	14	3.8	
	Don't Know	12	3.3	

**Table 5:** Fasting Blood Glucose levels in the study subjects

Variables	Category	Frequency	Percentage (%)
Normal (70 - 100)	0	65	17.8
High (101 – 200)	1	223	61.1
Very High (> 200)	2	77	21.1

**Table 6:** Loss of Attachment sextant in 1

Variables	Category	Frequency	Percentage (%)	p value	
0 – 3 mm	0	180	3.3	.036	
	4 – 5 mm	1	124		34.0
	6 – 8 mm	2	47		12.9
	9 – 11 mm	3	2		0.5
	Excluded Sextant	5	12		3.3

**Table7:** Loss of Attachment in sextant 2

Variables	Category	Frequency	Percentage (%)	p value	
0 – 3 mm	0	271	74.2	.035	
	4 – 5 mm	1	70		19.2
	6 – 8 mm	2	17		4.7
	Excluded Sextant	5	7		1.9

**Table 8:** Loss of Attachment in Sextant 3

Variables	Category	Frequency	Percentage (%)	p value	
0 – 3 mm	0	174	47.7	.374	
	4 – 5 mm	1	120		32.9
	6 – 8 mm	2	52		14.2
	9 – 11 mm	3	1		0.3
	> 12 mm	4	18		4.9

**Table 9:** Loss of Attachment in sextant 4

Variables	Category	Frequency	Percentage (%)	p value	
0 – 3 mm	0	173	47.4	.422	
	4 – 5 mm	1	138		37.8
	6 – 8 mm	2	43		11.8
	Excluded Sextant	5	11		3.0

**Table 10:** Loss of Attachment in sextant 5

Variables	Category	Frequency	Percentage (%)	p value	
0 – 3 mm	0	158	43.3	.013	
	4 – 5 mm	1	123		33.7
	6 – 8 mm	2	63		17.2
	9 – 11 mm	3	1		0.3
	Excluded Sextant	5	20		5.5

**Table 11:** Loss of Attachment in sextant 6

Variables	Category	Frequency	Percentage (%)	p value
0 – 3 mm	0	186	51.0	.379
4 – 5 mm	1	126	34.5	
6 – 8 mm	2	34	9.3	
9 – 11 mm	3	1	0.3	
Excluded Sextant	5	18	4.9	

#### 4. Discussion

Diabetes mellitus is a disease with strong social impact, associated with high morbidity and mortality rates that result from long term micro vascular and macro vascular complications<sup>(12)</sup>. Type 2 diabetes is a significant public health concern. Medical complications commonly associated with diabetes include renal disease, retinopathy, neuropathy, peripheral vascular disease and coronary heart disease.<sup>(13)</sup> It is well documented that there is a strong association between diabetes and periodontitis.<sup>(14)</sup> Most of the participants of the study considered poor glycemic control as a risk factor for diabetes complications. This was in accordance with the study conducted by eik filho et al which considered life style habits like nutrition, practice of physical activity, alcohol consumption, and smoking as a reason for poor glycemic control<sup>(15)</sup>.

##### Awareness among diabetic

Most of the respondents in the study were aware about the various complications of diabetes mellitus which affects eyes, kidneys, nerves, heart and foot. Only 22.2 % of the population was aware of the fact that diabetes could cause oral diseases. This was in accordance<sup>(16, 17)</sup> and contradictory<sup>(18)</sup> to various studies conducted for assessing the awareness and this difference in opinion may be due to the difference in literacy levels.

##### Oral hygiene practices

The results of the study showed that only 21.1% of the participants brushed their teeth twice daily, 78.6% brushed their teeth once daily, and only 0.3 % of the population used other aids to clean their teeth which is similar to the study conducted by Maha A Bahammam which indicated that oral hygiene measures are not a routine practice in this population. Hence encouragement of proper oral hygiene methods together with education concerning their use should be undertaken in order to enhance periodontal health and prevent gingival diseases in this high-risk population. Similar findings of inadequate oral hygiene in diabetic patients have been shown by other investigators<sup>(19,20,21)</sup>.

##### Habits

Alcohol and smoking habits were seen in only 17.5% and 11.5% of the study population. The numbers of smokers were considerably low in the present study. This may be due to the gender differences and social stigmata in the Indian culture.

##### Knowledge among diabetics

While the overall knowledge of patients with diabetes appeared to be acceptable, several areas of knowledge deficiency were identified in this group that should be filled by the on-going health promotion activities. This was in contradiction to the study conducted by Mafomekong Ayuk

Foma<sup>(22)</sup> which suggested poor knowledge among diabetic patients. However this difference may be attributed to the variation in training received and the availability of information on diabetes to general population.

##### BMI and diabetes mellitus

Most of the participants were of normal body weight. Overweight was seen in 45.5% and lean BMI was seen in 1.4% of the study subjects and there was no statistically significant difference in the periodontal status among various classes of BMI. Body Mass Index was found not strongly and independently associated with the risk of being diagnosed with type 2 diabetes.

Regarding loss of attachment there was significant association between diabetes and loss of attachment. This was in accordance with the study conducted by Ira B. Lamster<sup>(2)</sup>

In conclusion this study revealed that overall knowledge of patients with diabetes appeared to be acceptable and there was adequate knowledge among the diabetic patients. However practices among diabetes patients needs to be promoted to enhance periodontal status

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